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# Animal Welfare - Environment - Sustainable Development Nexus: Scoping Study

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# **Animal Welfare - Environment - Sustainable Development Nexus: Scoping Study**

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Final Version February 2023*

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## **Executive Summary**

### **Introduction**

On 2 March 2022, a resolution was adopted by the United Nations Environment Assembly (UNEA) on the animal welfare–environment–sustainable development nexus<sup>1</sup>. This acknowledged that animal welfare can contribute to addressing environmental challenges, promoting the One Health approach and achieving the Sustainable Development Goals. The resolution called on the United Nations Environment Programme (UNEP) to analyse the animal welfare–environment–sustainable development nexus, in collaboration with its One Health partners

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<sup>1</sup> UNEP. Resolution adopted by the United Nations Environment Assembly on 2 March 2022 5/1. Animal welfare–environment–sustainable development nexus.  
<https://wedocs.unep.org/bitstream/handle/20.500.11822/39795/ANIMAL%20WELFARE%E2%80%93ENVIRONMENT%E2%80%93SUSTAINABLE%20DEVELOPMENT%20NEXUS.%20English.pdf> & <https://wedocs.unep.org/handle/20.500.11822/39791>

This Scoping Study has been prepared in order to support the work of UNEP and the drafters/reviewers of the full nexus report by highlighting the major resources and knowledge which already exists about the animal welfare – environment – sustainable development nexus.

It is not meant to provide a report on the animal welfare – environment – sustainable development nexus, but rather an overview of useful sources and approaches which could be considered and further developed. It is recognised that the preparation of the full nexus report will require further research and critical analysis, based on multi-disciplinary scientific, practical and ethical expertise.

The contents of the Scoping Study were carefully chosen and ordered, to ensure that they:

- 1) Explained animal welfare and sentience;
- 2) Explored the animal welfare-environment nexus (following the major pillars of UNEPs strategy and programme of work);
- 3) Included One Health as this was specifically included in the resolution (and of salient importance);
- and 4) Explored the sustainable development nexus (dividing UNEP and environmental SDGs, and other SDGs also impacted). An overview of “Just Transitions” for change was also included, because many ideas were encountered during the research, and it was felt that they may be helpful at a later stage in the process.

There is a strong body of science supporting animal sentience, and this is already recognised in the EU’s Lisbon Treaty<sup>2</sup>, the Animal Welfare Strategy for Africa (under the African Union)<sup>3</sup>, and the World Organisation for Animal Health (WOAH, previously OIE)’s Global Animal Welfare Strategy<sup>4</sup>.

The WOA defines animal welfare as follows<sup>5</sup>:

“Animal welfare means the physical and mental state of an animal in relation to the conditions in which it lives and dies”.

“An animal experiences good welfare if the animal is healthy, comfortable, well nourished, safe, is not suffering from unpleasant states such as pain, fear and distress, and is able to express behaviours that are important for its physical and mental state”.

Whilst the first part of this definition is sometimes used alone as a description of a continuum from poor welfare to optimum welfare, the objective for policy and legislative purposes is to ensure good welfare.

The *Centro de Educación en Bienestar de Animales de Producción* (Farm Animal Welfare Education Center, FAWEC), following Fraser et al.<sup>6</sup>, explains the concept of animal welfare simply, using three elements: the animal's normal biological functioning (which, among other things, means ensuring that the animal is healthy and well-nourished), its emotional

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<sup>2</sup> [https://ec.europa.eu/food/animals/welfare\\_en](https://ec.europa.eu/food/animals/welfare_en)

<sup>3</sup> <https://www.au-ibar.org/home/170-en/media/press-releases/au-ibar/1143-animal-welfare-stakeholders-launch-the-african-platform-for-animal-welfare-apaw-and-endorse-the-animal-welfare-strategy-for-africa-awsa> & <https://www.au-ibar.org/strategy-documents>

<sup>4</sup> [https://www.oie.int/fileadmin/Home/eng/Animal\\_Welfare/docs/pdf/Others/EN\\_OIE\\_AW\\_Strategy.pdf](https://www.oie.int/fileadmin/Home/eng/Animal_Welfare/docs/pdf/Others/EN_OIE_AW_Strategy.pdf)

<sup>5</sup> WOA. Chapter 7.1. Introduction to the Recommendations for Animal Welfare.

[https://www.oie.int/fileadmin/Home/eng/Health\\_standards/tahc/current/chapitre\\_aw\\_introduction.pdf](https://www.oie.int/fileadmin/Home/eng/Health_standards/tahc/current/chapitre_aw_introduction.pdf)

<sup>6</sup> Fraser et al. *A Scientific Conception of Animal Welfare that Reflects Ethical Concerns*. 1987. <https://www.wellbeingintlstudiesrepository.org/ethawel/1/>

state (including the absence of negative emotions, such as pain and chronic fear), and its ability to express certain normal behaviours.<sup>7</sup>

Current understanding of animal welfare is underpinned by a strong body of science, and backed by international and local strategies, policies, principles, standards and legislation. The WOAAH has a growing body of internationally-accepted animal welfare standards, which are all science-based.<sup>8</sup> These include an introduction with “guiding principles for animal welfare” which include the principle that the use of animals carries with it an ethical responsibility to ensure the welfare of such animals to the greatest extent practicable.<sup>9</sup>

The WOAAH’s Global Animal Welfare Strategy, which was adopted in 2017, includes the stated objective of achieving: “A world where the welfare of animals is respected, promoted and advanced, in ways that complement the pursuit of animal health, human well-being, socio-economic development and environmental sustainability”.<sup>10</sup>

The 182 member countries of the WOAAH have all accepted the WOAAH’s body of animal welfare work.

The majority of developed countries and an increasing number of developing countries now have national animal welfare legislation as well.<sup>11</sup>

The lives of humans affect those of animals – both directly and indirectly – in many different ways. Specific categories where humans use or impact animals include: companionship (pets); farming purposes; experimentation (including science, research and testing); work; sports, leisure and entertainment; zoos/aquaria and wildlife management and exploitation. All of these have some causal linkages to the environment, albeit to a greater or lesser extent.

This Scoping Study shows that there are indeed inextricable linkages between the wellbeing of people, animals and nature. The causal relationships are complex and multifaceted, and extend beyond the simple fact that human relationships with animals and their welfare impact the environment in multiple ways and, conversely, environmental changes – and indeed environmental policies and programmes – impact the lives and welfare of animals. Beyond this lies a complex web of causality based on root causes and drivers of both environmental and animal welfare impacts, plus another complex web of impacts on sustainable development and the Sustainable Development Goals (SDGs). This Executive Summary covers the “tip of the iceberg” of these causal inter-relationships, and the full Scoping Study needs to be not only read and understood, but also developed into a full

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<sup>7</sup> The Farm Animal Welfare Education Center (FAWEC). What is Animal Welfare?

<https://www.fawec.org/en/technical-documents-general-concepts/106-what-is-animal-welfare>

<sup>8</sup> WOAAH. Development of Animal Welfare Standards. Recognised international standards.

<https://www.oie.int/en/what-we-do/animal-health-and-welfare/animal-welfare/development-of-animal-welfare-standards/>

<sup>9</sup> OIE. Introduction to the Recommendations for Animal Welfare. Terrestrial Animal Health Code. Chapter 7.1.

[https://www.woah.org/fileadmin/Home/eng/Health\\_standards/tahc/2018/en\\_chapitre\\_aw\\_introduction.htm](https://www.woah.org/fileadmin/Home/eng/Health_standards/tahc/2018/en_chapitre_aw_introduction.htm)

<sup>10</sup> WOAAH. Global Animal Welfare Strategy. <https://www.oie.int/app/uploads/2021/03/en-oie-aw-strategy.pdf>

<sup>11</sup> Global Animal Law (GAL Association). Database Legislation. Animal Legislations in the World at National Levels. <https://www.globalanimallaw.org/database/national/index.html>

report on the animal welfare – environment – sustainable development nexus, using a multi-disciplinary team of experts who can drill down into these inter-relationships from various perspectives.

With regard to UNEP's work, human interactions with animals and their welfare impact all the major pillars of UNEP's Medium-Term Strategy for 2022—2025<sup>12</sup>: the three planetary crises of climate change, nature and biodiversity loss, and pollution and waste; and the prevention of future pandemics. Conversely, these all impact the lives and welfare of animals.

This Scoping Study highlights the mass of information that is readily available about these interlinkages and their impacts. Many of the sources are flagship reports and research already well-known to UNEP and its Member States. The same messages are repeated endlessly, and these highlight the urgent need for transformative action to prevent or mitigate the multiple existential crises we are facing – human, animal and environmental.

### **Inter-Relationships with Environmental Crises & Drivers**

#### **➤ Climate:**

According to the FAO, global livestock supply chains account for 14.5% of anthropogenic greenhouse gas (GHG) emissions<sup>13</sup>, although more recent studies indicate that this may be even higher, and recommend updating this figure to 16.5%.<sup>14 15</sup>

The global food system as a whole (farming, transportation, packing, etc.) contributes 20 to 30 percent of anthropogenic greenhouse gas emissions – which are responsible for global warming because they trap heat that would otherwise escape from the atmosphere - and is the leading cause of deforestation, which further exacerbates climate change.<sup>16</sup>

Feed production and processing, and digestive fermentation from ruminants are the two main sources of emissions, representing 45% and 39% of sector emissions, respectively. Manure storage and processing represent 10%. The remainder is attributable to the processing and transportation of animal products. Included in feed production, the expansion of pasture and feed crops into forests accounts for about 9% of the sector's emissions.<sup>17</sup> Not included in those figures for livestock supply chain emissions are those

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<sup>12</sup> UNEP. For People and Planet. The United Nations Environment Programme strategy for tackling climate change, biodiversity and nature loss, and pollution and waste from 2022—2025. <https://wedocs.unep.org/bitstream/handle/20.500.11822/35875/K2100501-e.pdf>

<sup>13</sup> FAO. Livestock Environmental Assessment and Performance Partnership. <https://www.fao.org/partnerships/leap/en/>

<sup>14</sup> Twine, Richard. Emissions from Animal Agriculture—16.5% Is the New Minimum Figure. 2 June 2021. <https://www.mdpi.com/2071-1050/13/11/6276>

<sup>15</sup> Xu, Xiaoming et al. Global greenhouse gas emissions from animal-based foods are twice those of plant-based foods. 13 September 2021. <https://www.nature.com/articles/s43016-021-00358-x>

<sup>16</sup> Garnett T. 2014. What is a sustainable healthy diet? A discussion paper. Oxford, United Kingdom: Food Climate Research Network (FCRN). <https://cgispace.cgiar.org/bitstream/handle/10568/35584/FCRN-sustainable-healthy-diet.pdf>

<sup>17</sup> FAO. Tackling Climate Change through Livestock. A global assessment of emissions and mitigation opportunities. <https://www.fao.org/3/i3437e/i3437e.pdf>

caused by producing fish and other marine animals for human consumption, including via energy-intensive recirculating aquaculture systems (RAS).

The oceans cover over 70% of the Earth's surface and play a crucial role in taking up CO<sub>2</sub> from the atmosphere.<sup>18</sup> <sup>19</sup> However, increasing CO<sub>2</sub> in the ocean alters the chemistry of seawater – an effect known as ocean acidification – which has negative impacts on marine life.<sup>20</sup> Industrial agriculture contributes to dead zones in the ocean, which are like oceanic deserts no longer able to support marine life.<sup>21</sup> Marine vertebrates influence the capacity of ecosystems to release, fix, store, or sequester carbon; and also, themselves function as carbon stores and contribute to carbon flux (downward movement of carbon to deeper waters and sediment).<sup>22</sup> <sup>23</sup> There is now a clear need to include consideration of these functions both in policies on climate change mitigation and adaptation, and in the protection of marine vertebrate populations.

Climate change will increasingly impact terrestrial animals (including humans), marine ecosystems, fisheries and aquaculture alike.

### ➤ Biodiversity:

Today, humans, together with the livestock reared for food, constitute 96% of the mass of all mammals on the planet (humans 36% and livestock 60%). Other mammals now represent just 4%.<sup>24</sup> <sup>25</sup>

An estimated one million of the world's eight million or so species of plants and animals, including insects, are threatened with extinction. Two in five amphibian species are at risk of extinction, and close to one-third of other marine species. Insect species are also in decline,

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<sup>18</sup> UN. While Oceans Cover 70 Per Cent of Earth's Surface, Understanding Has Lagged, Speakers in Lisbon Dialogue Stress, Offering Ways to Close Knowledge Gap. 30 June 2022. <https://press.un.org/en/2022/sea2152.doc.htm>

<sup>19</sup> Shutler, Dr. Jamie & Watson, Prof. Andy. Guest post: The oceans are absorbing more carbon than previously thought. 28 September 2020. <https://www.carbonbrief.org/guest-post-the-oceans-are-absorbing-more-carbon-than-previously-thought>

<sup>20</sup> Shutler, Dr. Jamie & Watson, Prof. Andy. Guest post: The oceans are absorbing more carbon than previously thought. 28 September 2020. <https://www.carbonbrief.org/guest-post-the-oceans-are-absorbing-more-carbon-than-previously-thought>

<sup>21</sup> Bailey, Anna et al. Agricultural Practices Contributing to Aquatic Dead Zones. Springer Link. 28 June 2020. [https://link.springer.com/chapter/10.1007/978-981-15-3372-3\\_17#:~:text=The%20excessive%20influx%20of%20nitrogen,the%20affected%20body%20of%20water.](https://link.springer.com/chapter/10.1007/978-981-15-3372-3_17#:~:text=The%20excessive%20influx%20of%20nitrogen,the%20affected%20body%20of%20water.)

<sup>22</sup> Martin, Angela Helen et al. Integral functions of marine vertebrates in the ocean carbon cycle and climate change mitigation, Science Direct. 21 May 2021. <https://www.sciencedirect.com/science/article/pii/S2590332221002384>

<sup>23</sup> Chami, Ralph et al. Natures' solution to Climate Change. A Strategy to Protect Whales can Limit Greenhouse Gases and Global Warming. The International Monetary Fund. December 2019. <https://www.imf.org/en/Publications/fandd/issues/2019/12/natures-solution-to-climate-change-chami>

<sup>24</sup> Rosane, Olivia. Humans and Big Ag Livestock Now Account for 96 Percent of Mammal Biomass. 23 May 2018. <https://www.ecowatch.com/biomass-humans-animals-2571413930.html#:~:text=Humans%20account%20for%20about%2036,than%20that%20of%20wild%20birds.>

<sup>25</sup> UNEP/International Resource Panel. Food Systems and Natural Resources. <http://www.resourcepanel.org/reports/food-systems-and-natural-resources>



with at least one in ten threatened with extinction and some regions suffering massive declines – 75% decline in flying insect biomass over 27 years.<sup>26</sup> <sup>27</sup> Insects are crucial for pollination, so this impacts food security.<sup>28</sup>

Each species threat represents the suffering of thousands of individual sentient beings, and even millions or billions in some cases. Furthermore, their demise will inevitably have “knock-on” effects on other animals, species and habitats.

Food systems and, in particular, human consumption of animal products is the major root cause of the current biodiversity crisis.<sup>29</sup> Land use change is the major driver of biodiversity loss.<sup>30</sup> <sup>31</sup> The livestock sector is by far the single largest anthropogenic user of land.<sup>32</sup> The total area occupied by grazing is equivalent to 26 percent of the ice-free terrestrial surface of the planet. In addition, the total area dedicated to feed-crop production amounts to 33 percent of total arable land. In all, livestock production accounts for 70 percent of all agricultural land.<sup>33</sup>

Exploitation of wildlife has been identified as the second most significant direct driver of biodiversity loss.<sup>34</sup> There are enormous and relentless anthropogenic pressures on wildlife,

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<sup>26</sup> Hallmann, Caspar A. et al. More than 75 percent decline over 27 years in total flying insect biomass in protected areas. 18 October 2017.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0185809>

<sup>27</sup> IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany. 1148 pages. <https://doi.org/10.5281/zenodo.3831673> & IPBES (2019): Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. S. Díaz, J. Settele, E. S. Brondizio, H. T. Ngo, M. Guèze, J. Agard, A. Arneth, P. Balvanera, K. A. Brauman, S. H. M. Butchart, K. M. A. Chan, L. A. Garibaldi, K. Ichii, J. Liu, S. M. Subramanian, G. F. Midgley, P. Miloslavich, Z. Molnár, D. Obura, A. Pfaff, S. Polasky, A. Purvis, J. Razzaque, B. Reyers, R. Roy Chowdhury, Y. J. Shin, I. J. Visseren-Hamakers, K. J. Willis, and C. N. Zayas (eds.). IPBES secretariat, Bonn, Germany. 56 pages. <https://doi.org/10.5281/zenodo.3553579>

<sup>28</sup> Bayer. Finding future models for agricultural systems Pollinators perform a crucial service that supports most of the world's plant diversity – and a significant portion of global agriculture. The Importance of Insect Pollinators for Agriculture. [https://www.bayer.com/sites/default/files/BEEINFOmed\\_7\\_The-Importance-of-Insect-Pollinators%208q1.pdf](https://www.bayer.com/sites/default/files/BEEINFOmed_7_The-Importance-of-Insect-Pollinators%208q1.pdf)

<sup>29</sup> UNEP. Our global food system is the primary driver of biodiversity. 3 February 2021. <https://www.unep.org/news-and-stories/press-release/our-global-food-system-primary-driver-biodiversity-loss>

<sup>30</sup> IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany. 1148 pages. <https://doi.org/10.5281/zenodo.3831673>

<sup>31</sup> IPBES. Models of drivers of biodiversity and ecosystem change. <https://ipbes.net/models-drivers-biodiversity-ecosystem-change>

<sup>32</sup> FAO. Livestock's Long Shadow: Environmental Issues and Options 2006. <https://www.fao.org/3/a0701e/a0701e.pdf>

<sup>33</sup> FAO. Livestock's Long Shadow: Environmental Issues and Options 2006. <https://www.fao.org/3/a0701e/a0701e.pdf>

<sup>34</sup> IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany. 1148 pages. <https://doi.org/10.5281/zenodo.3831673>

including when wild animals are captured, transported and killed for a myriad of human purposes – including many inessential uses, such as for luxury products, products for which alternatives exist, and for entertainment.

We are destroying biodiversity, the very characteristic that until recently enabled the natural world to flourish so abundantly. If we continue this damage, whole ecosystems will collapse.<sup>35</sup>

#### ➤ **Pollution:**

Industrial animal agriculture and crop production (including for animal feed) and aquaculture are major emitters of pollution, as well as transport and industry.<sup>36</sup> Indeed, agriculture is a leading cause of pollution in many countries,<sup>37</sup> particularly industrial animal agriculture.<sup>38</sup> The FAO has stated that the livestock sector is probably the largest sectoral source of water pollution and a major source of land-based pollution.<sup>39</sup> Industrial agriculture is polluting and degrading land, with fertile soil being lost at the rate of 24 billion tons a year. Louise Baker, external relations head of the UN Convention to Combat Desertification (UNCCD), likened industrial agriculture to an “extractive industry,” and stressed that it was not sustainable.<sup>40</sup>

In intensive animal production, animals and their wastes are concentrated and usually exceed the capacity of the land to absorb the waste. Undesirable components of animal waste from farms and slaughterhouses include pathogens (such as *E-coli*), antibiotic-resistant bacteria, hormones, veterinary pharmaceuticals, excess nutrients, viruses, industrial chemicals, and heavy metals which can pollute land and water; and can release ammonia, hydrogen sulphide, volatile organic compounds, bioaerosols, and particulate matter into the air.<sup>41</sup>

According to the FAO, a third of global food production is lost or wasted annually.<sup>42</sup> This adds substantial pollution to our environment, simply for food that is being thrown into landfills to pollute our environment even further; and in the case of food of animal origin, animals suffer and die for no useful purpose.

Water, air and soil pollution can cause significant adverse health outcomes in animals, and well as humans; as can non-physical pollution, such as noise pollution.

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<sup>35</sup> Wellbeing International Studies Repository. The Economics of Biodiversity: The Dasgupta Review. [https://www.wellbeingintlstudiesrepository.org/cgi/viewcontent.cgi?article=1000&context=es\\_gen](https://www.wellbeingintlstudiesrepository.org/cgi/viewcontent.cgi?article=1000&context=es_gen)

<sup>36</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6>

<sup>37</sup> WWF. Farming: Pollution. [http://www.panda.org/what\\_we\\_do/footprint/agriculture/impacts/pollution/](http://www.panda.org/what_we_do/footprint/agriculture/impacts/pollution/)

<sup>38</sup> Henning Steinfeld et al., FAO, Livestock's Long Shadow: Environmental Issues and Options (2006). <http://www.fao.org/docrep/010/a0701e/a0701e00.htm>

<sup>39</sup> FAO. Livestock's Long Shadow: Environmental Issues and Options 2006. <https://www.fao.org/3/a0701e/a0701e.pdf>

<sup>40</sup> UNCCD. Global Land Outlook 2 (2022). <https://www.unccd.int/resources/global-land-outlook/glo2>

<sup>41</sup> Pew Commission. Putting Meat on the Table. 2008. <https://www.ncifap.org/reports/>

<sup>42</sup> FAO. Food Loss and Food Waste. <http://www.fao.org/food-loss-and-food-waste/en/>

### ➤ **Pandemics:**

There is a clear nexus between human interactions with animals and their welfare and pandemics. COVID-19 is a zoonotic disease: one which transmits between animals and humans. It is not the first, and is unlikely to be the last. 60 per cent of known infectious diseases in humans and 75 per cent of all emerging infectious diseases are zoonotic in nature.<sup>43</sup> Intensified farming systems and unsustainable exploitation of natural resources, including the increasing trade in wild animals, are fuelling zoonoses.<sup>44</sup>

UNEP itself has identified key anthropogenic drivers for the emergence of zoonoses, from agricultural intensification and increased demand for animal protein to the conversion of land and climate change. These drivers are destroying natural habitats and seeing humanity exploiting more species, which brings people into closer contact with disease vectors.

UNEP's much-quoted comment reflects this, in a nutshell:

"Pandemics such as the COVID-19 outbreak are a predicted and predictable outcome of how people source and grow food, trade and consume animals, and alter environments."<sup>45</sup>

Understanding the animal-environment nexus is central to understanding these drivers, and this is essential to inform effective strategies and policy responses to prevent future outbreaks – using the vital "deep prevention". This also needs to be addressed in the expected global pandemics' agreement, from a One Health perspective.

### ➤ **Food Systems:**

Current food systems are responsible for animal welfare problems and are destroying the environment upon which future food production depends. Globally, the over-exploitation of current – industrialised – food systems is responsible for 60% of global terrestrial biodiversity loss (terrestrial and aquatic), around 24% of the global greenhouse gas emissions, 33% of degraded soils, the depletion of 61% of "commercial" fish populations, and the overexploitation of 20% of the world's aquifers.<sup>46</sup> Agriculture and food production are significantly implicated in the extent to which planetary boundaries have been and are likely to be exceeded, particularly with respect to nitrogen flows, water usage, and land use change, and in the negative effects of loss of biodiversity on human health. These pressures are expected to significantly increase with population, urbanisation and

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<sup>43</sup> UNEP/ILRI. Preventing the next pandemic - Zoonotic diseases and how to break the chain of transmission. 6 July 2020. <https://www.unenvironment.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and>

<sup>44</sup> Jones, Bryony A. et al. Zoonosis emergence linked to agricultural intensification and environmental change. National Library of Medicine. 13 May 2013. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3666729/>

<sup>45</sup> UNEP/ILRI. Preventing the next pandemic - Zoonotic diseases and how to break the chain of transmission. 6 July 2020. <https://www.unenvironment.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and>

<sup>46</sup> International Resource Panel. Food Systems and Natural Resources. 2016. <https://www.resourcepanel.org/reports/food-systems-and-natural-resources#:~:text=An%20estimated%2060%25%20of%20global,acidification%2C%20salinization%2C%20compaction%20and%20chemical>

“supermarketisation” trends, as well as dietary shifts to more resource-intensive food, unless decisive action is taken.<sup>47</sup>

### ➤ **Conflict and Disasters:**

There is also a nexus between animal welfare and the environment in the context of human-human conflicts and disasters. Wild and domesticated animals have long-suffered abuse, injury and death in armed conflicts. Both conflicts and disasters can have severe impacts on individual animals, entire species and communities, as well as the natural environment, with repercussions that have the potential to reverberate for generations. It is important to include animals in disaster and conflict planning, as well as relief work.<sup>48</sup>

### **One Health**

One Health is predicated on a systemic understanding of the interdependencies between the health of humans, animals, plants and the environment and how these can manifest as health threats.<sup>49</sup> This is reflected in the One Health High Level Expert Panel (OHHLEP) definition which One Health partners have now embraced, which specifically mentions “wellbeing” and includes: “One Health is an integrated, unifying approach that aims to sustainably balance and optimise the health of people, animals and ecosystems.”<sup>50</sup> This means developing a more thorough understanding of the animal welfare-environment-sustainable development nexus. This will enable better understanding of the root causes and drivers of disease emergence, spread and persistence, as well as the impacts of biodiversity loss and environmental degradation.

### **Just Transitions**

The reports and studies in this Scoping Study build a solid case for the need for transformational change to address the nexus between the inhumane and unsustainable exploitation of animals and the multiple environmental crises, and zoonoses. There is broad agreement that the changes needed will be far-reaching, and that they must be tackled using “Just Transitions”, protecting the public good and human rights, and prioritising the wellbeing of people, nature and animals over infinite economic growth.

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<sup>47</sup> UNEP, CBD, WHO. Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review. 2015. <https://www.cbd.int/health/SOK-biodiversity-en.pdf>

<sup>48</sup> Janice Cox, Janice and Zee, Jackson. CEOBS. How animals are harmed by armed conflicts and military activities. When faced with the human suffering of conflicts it can be difficult to think about their parallel impact on animals. 18 March 2021. <https://ceobs.org/how-animals-are-harmed-by-armed-conflicts-and-military-activities/>

<sup>49</sup> One Health Joint Plan of Action (2022-2026). Working together for the health of humans, animals, plants and the environment. Draft March 2022. <https://www.oie.int/en/document/one-health-joint-plan-of-action-2022-2026-working-together-for-the-health-of-humans-animals-8-plants-and-the-environment/>

<sup>50</sup> WHO. Tripartite and UNEP support OHHLEP's definition of "One Health" Joint Tripartite (FAO, OIE, WHO) and UNEP Statement. 1 December 2021. <https://www.who.int/news/item/01-12-2021-tripartite-and-unep-support-ohhlep-s-definition-of-one-health>

During the research for this Scoping Study, many suggestions for “Just Transitions” were encountered – in reports, papers and advocacy messaging. Whilst it was recognised that these may be outside the scope of the animal welfare-environment-sustainable development nexus report which UNEP has been tasked to organise, they were considered too valuable to overlook: So, they were captured and included in an Annex to assist in subsequent analysis and decision-making on what to do about the nexus report.

Key areas that have to be tackled to build humane and sustainable relationships with nature and animals include: policy and regulation; One Health; food systems; wildlife trade; finance and economics; science and research; capacity building; society and consumers; education and other Just Transition support. However, in order to deliver action under these key areas, there needs to be political will and effective implementation – which appear to be critical missing gaps.

## **Sustainable Development**

This Scoping Study underlines the inextricable linkages between the wellbeing of people, animals and nature, and how human-animal interactions and animal welfare are at the heart of sustainability.

UN General Assembly Resolution 70/1 which adopted the 2030 Sustainable Development Agenda explicitly envisaged a world “in which humanity lives in harmony with nature and in which wildlife and other living species are protected”.<sup>51</sup> However, the Sustainable Development Goals (SDGs)<sup>52</sup> and their targets never did truly reflect the aspirations of UN General Assembly resolution 70/1, and remained largely anthropocentric. Indeed, none of the 2030 Agenda’s 169 targets references the welfare of individual animals. Our current treatment of animals affects our ability to achieve the Sustainable Development Goals, and both human-induced environmental challenges and our interventions to mitigate or adapt to them often affect animals.<sup>53</sup>

The 2030 Agenda for Sustainable Development recognises that the welfare of people depends entirely on the welfare of the ecosystems in which we live and, increasingly, that the welfare of these ecosystems depends on our collective ability to protect them. Animals are a critical part of our global ecosystem. People’s reliance on animals may have become less evident in daily lives but it has not ended. It has evolved and, in some cases, our reliance has become even more acute. Animal welfare matters to the sustainability of human development and the health of global ecosystems and human populations.<sup>54</sup>

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<sup>51</sup> UN General Assembly. Transforming our world: the 2030 Agenda for Sustainable Development. A/RES/70/1. Resolution adopted by the General Assembly on 25 September 2015. [https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A\\_RES\\_70\\_1\\_E.pdf](https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_70_1_E.pdf)

<sup>52</sup> UN Department of Economic and Social Affairs. Do you know all 17 SDGs? <https://sdgs.un.org/goals>

<sup>53</sup> Verkuijl, Cleo et al. Mainstreaming animal welfare in sustainable development A policy agenda. SEI & CEEW. May 2022. <https://euagenda.eu/upload/publications/animal-welfare-stockholm50backgroundpaper.pdf>

<sup>54</sup> Keeling L, Tunón H, Olmos Antillón G, Berg C, Jones M, Stuardo L, Swanson J, Wallenbeck A, Winckler C and Blokhuis H (2019) Animal Welfare and the United Nations Sustainable Development

The 2019 Global Sustainable Development Report (GSDR), “The Future is Now”, a document prepared by an independent group of scientists appointed by the UN Secretary-General,<sup>55</sup> acknowledged for the first time that the improvement of animal welfare was missing from the enumeration of the UN’s sustainable development goals (SDGs):<sup>56</sup>

“The clear link between human health and well-being and animal welfare is increasingly being recognized in ethics- and rights-based frameworks. Strong governance should safeguard the well-being of both wildlife and domesticated animals with rules on animal welfare embedded in transnational trade.”<sup>57</sup>

The Human Development Report 2020 - The Next Frontier: Human Development and the Anthropocene<sup>58</sup> which for the first time adjusted the Human Development Index to reflect the impact on planetary pressures of that development, also explored the ethical dimensions of human-animal relationships. This includes these prophetic words: “the future of the planet and its sentient beings is one of the largest ethical issues facing humanity going forward.”

A system or procedure is sustainable if it is acceptable now, and if its expected future effects are acceptable - in particular, in relation to resource availability, consequences of functioning, and morality of action. There are a variety of factors that could make any animal use system unsustainable. For example, the system might involve depletion of resources such that a resource becomes unavailable or a product of the system might accumulate to a degree that prevents the functioning of the system. This could include inefficient usage of world food resources; adverse effects on human health; poor animal welfare; harmful environmental effects, such as low biodiversity or insufficient conservation; unacceptable genetic modification; not being “fair trade”, in that producers in poor countries are not properly rewarded; or damage to rural communities. Indeed, any effect which the general public find unacceptable makes a system unsustainable.<sup>59</sup>

The lack of consideration of animal welfare in sustainable development policymaking has been an important oversight. The SDGs and their targets were drafted from an

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Goals. *Front. Vet. Sci.* 6:336. doi: 10.3389/fvets.2019.00336 *Frontiers in Veterinary Science* - <https://www.frontiersin.org/articles/10.3389/fvets.2019.00336/full>

<sup>55</sup> Independent Group of Scientists appointed by the Secretary-General. *Global Sustainable Development Report 2019: The Future is Now – Science for Achieving Sustainable Development*, United Nations, New York, 2019, online at: <https://sustainabledevelopment.un.org/gsdr2019>.

<sup>56</sup> Bridgers, Jessica. “Just in Time for World Animal Day, UN Global Sustainable Development Report Identifies Animal Welfare as Issue Missing from the Sustainable Development Agenda, World Animal Net”, 4 October 2019, online at: <http://worldanimal.net/world-animal-net-blog/item/503-just-in-time-for-world-animal-day-unglobal-sustainable-development-report-identifies-animal-welfare-as-issue-missing-from-the-sustainable-development-agenda>.

<sup>57</sup> Page 117 of the Independent Group of Scientists appointed by the Secretary-General, *Global Sustainable Development Report 2019: The Future is Now – Science for Achieving Sustainable Development*, United Nations, New York, 2019 [underlined by the author]. <https://sustainabledevelopment.un.org/gsdr2019>.

<sup>58</sup> <http://hdr.undp.org/sites/default/files/hdr2020.pdf>

<sup>59</sup> Broom, Donald Maurice. *Components of sustainable animal production and the use of silvopastoral systems*. August 2017. <https://doi.org/10.1590/S1806-92902017000800009> & [https://www.academia.edu/37753495/Components\\_of\\_sustainable\\_animal\\_production\\_and\\_the\\_use\\_of\\_silvopastoral\\_systems](https://www.academia.edu/37753495/Components_of_sustainable_animal_production_and_the_use_of_silvopastoral_systems)



anthropocentric perspective, without referencing the well-being of animals, whether wild or domesticated. Yet our current treatment of animals affects our ability to achieve the SDGs, and both human-induced environmental challenges and our interventions to mitigate or adapt to them often affect animals.

Analysis of the impacts of human-animal interactions and animal welfare on the SDGs indicates that these underly all of the SDGs to some extent or other. There are clearly deep and inextricable linkages with SDGs 12 (Responsible Consumption and Production), 14 (Life Below Water), 15 (Life on Land), 13 (Climate Action), 2 (Zero Hunger), 6 (Clean Water and Sanitation) and 3 (Good Health and Wellbeing). But there are also linkages with all of the other SDGs. Indeed, it is clear that the SDGs will not be achieved without the inclusion of human-animal interactions and animal welfare.

## **Conclusions**

This Scoping Study shows that there are considerable causal inter-relationships between good animal welfare, environmental protection, and the prevention of pandemics. Also, conversely, where animal welfare is severely compromised, there are greater risks across environmental issues.

Interestingly, most of the nexus areas examined are in fact aligned, rather than the “trade-offs”, which are so often mentioned. This makes perfect common sense: protecting animals protects nature, and both of these are essential for human wellbeing. In particular, preventative and proactive actions are most likely to coincide. For example, protecting natural populations and habitats, preventing the introduction of alien species, protecting animals in their habitats (naturalness as an integral part of both animal welfare and ecosystem protection).

It is where human intervention is maximised that any “trade-offs” seem to occur. This is largely because of different interests and disciplines working in silos, without systemic policy-making and implementation. This indicates the vital importance of One Health approaches – but also of ensuring that One Health work is applied broadly and more proactively. To ensure “deep prevention” (and “wide prevention”), wherever possible. This is the only way of ensuring policy coherence, and of maximising policy effectiveness – across different dimensions. As in the One Health definition: “an integrated, unifying approach that aims to sustainably balance and optimise the health of people, animals and ecosystems”.

This Scoping Study provides incontrovertible evidence that without the critical analysis of a full animal welfare-environment-sustainable development nexus report it will be impossible to address the existential “triple planetary crises” of human-driven climate change, widespread biodiversity loss and unmitigated pollution, or to prevent future pandemics. It will also be impossible to meet the new human right to a clean, healthy and sustainable environment or – indeed – to achieve the sustainable development goals.

## 1. Introduction

On 2 March 2022, a resolution was adopted by the United Nations Environment Assembly (UNEA) on the animal welfare–environment–sustainable development nexus<sup>60</sup>. This acknowledged that animal welfare can contribute to addressing environmental challenges, promoting the One Health approach and achieving the Sustainable Development Goals. The resolution called on the United Nations Environment Programme (UNEP) to analyse the animal welfare–environment–sustainable development nexus, and – in collaboration with its One Health partners - to prepare a report of its findings for consideration at the next UNEA (UNEA 6).

This Scoping Study was drafted primarily to support the work of UNEP and the drafters/reviewers of the full nexus report. It has been prepared in order to highlight major resources and knowledge about the animal welfare – environment – sustainable development nexus. There is already an enormous body of research on the nexus, and it is hoped that this overview will increase understanding of the issues, and also help future researchers by providing relevant references and background (thus preventing them from having to “reinvent the wheel”).

This Scoping Study has been prepared from an animal welfare perspective, in order to help environmental experts to understand this new area of expertise, and thus view “their” issues through a new lens. There will need to be further research and critical analysis, based on multi-disciplinary scientific, practical and ethical expertise - particularly in the few areas identified where current environmental and animal welfare beliefs, values and approaches appear to differ.

It is stressed that this Scoping Study is not meant to provide a report on the animal welfare – environment – sustainable development nexus, but rather an overview of useful sources and approaches which should be considered, and further developed.

## 2. Methodology

This Scoping Study was prepared by casting a wide net over all available resources relevant to the animal welfare – environment – sustainable development nexus. The rationale behind this was to provide an overview of animal welfare issues related to the nexus, and background to relevant animal protection perspectives; as well as published research which drafters and reviewers of the UNEP nexus report could use in their work.

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<sup>60</sup> UNEP. Resolution adopted by the United Nations Environment Assembly on 2 March 2022 5/1. Animal welfare–environment–sustainable development nexus.  
<https://wedocs.unep.org/bitstream/handle/20.500.11822/39795/ANIMAL%20WELFARE%E2%80%93ENVIRONMENT%E2%80%93SUSTAINABLE%20DEVELOPMENT%20NEXUS.%20English.pdf> & <https://wedocs.unep.org/handle/20.500.11822/39791>



Major research and reports have been included, and where sources such as briefings and newspaper articles are included, it has been ensured that these are factual and backed by referenced/linked sources of research.

The contents of the Scoping Study were carefully chosen and ordered, to ensure that they: 1) Briefly explained animal welfare and sentience (to new audiences); 2) Explored the animal welfare-environment nexus (following the major pillars of UNEPs strategy and programme of work); 3) Included One Health as this was specifically included in the resolution (and of salient importance); and 4) Explored the sustainable development nexus (dividing UNEP and environmental SDGs, and other SDGs also impacted).

The section on the sustainable development nexus focusses mainly on the SDGs, as the current policy stream covering sustainable development. However, it is recognised that the resolution refers to sustainable development more broadly, and thus the UNEP nexus report will have to reflect this. This is welcomed, because the SDGs and their targets were drafted from an anthropocentric perspective, and they will miss many of the beneficial impacts of animal welfare. This is why a general section was included in the Scoping Study which explains why animal welfare is a sustainability issue in its own right, as well as impact the wellbeing of people and nature.

The number of peer reviewed papers on the links between animal welfare and sustainable development are few in number, and these are not comprehensive or categorical (for example, because researchers had specific backgrounds, such as veterinary/agricultural). Thus, as decision was taken to widen the net to include other authors, including animal protection analysts. These have grown to understand the positive impacts of good animal welfare through their work, including through research and first-hand experiences. All contributions were checked to ensure that these were factual.

An overview of “Just Transitions” for change was also included, because many ideas were encountered during the Scoping Study research, and it was felt that they may be helpful at some stage in the process. In the same way as GEO 7 will begin to consider the “how” of transformative change for some sectors, it was considered that it would be constructive for the UNEP nexus report to do likewise for any issues identified where change is clearly needed.

## **3. Animal Welfare Background**

### **3.1. Animal Welfare**

The World Organisation for Animal Health (WOAH, previously OIE) defines animal welfare as follows<sup>61</sup>:

“Animal welfare means the physical and mental state of an animal in relation to the conditions in which it lives and dies”.

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<sup>61</sup> WOAH. Chapter 7.1. Introduction to the Recommendations for Animal Welfare.  
[https://www.oie.int/fileadmin/Home/eng/Health\\_standards/tahc/current/chapitre\\_aw\\_introduction.pdf](https://www.oie.int/fileadmin/Home/eng/Health_standards/tahc/current/chapitre_aw_introduction.pdf)

“An animal experiences good welfare if the animal is healthy, comfortable, well nourished, safe, is not suffering from unpleasant states such as pain, fear and distress, and is able to express behaviours that are important for its physical and mental state”.

Whilst the first part of this definition is sometimes used alone as a description of a continuum from poor welfare to optimum welfare, the objective for policy and legislative purposes is to ensure good welfare.

The *Centro de Educación en Bienestar de Animales de Producción* (Farm Animal Welfare Education Center, FAWEC), following Fraser et al.<sup>62</sup>, explains the concept of animal welfare simply, using three elements: the animal's normal biological functioning (which, among other things, means ensuring that the animal is healthy and well-nourished), its emotional state (including the absence of negative emotions, such as pain and chronic fear), and its ability to express certain normal behaviours.<sup>63</sup>

There are other important aspects of animal welfare contained in the WOA's Guiding Principles for Animal Welfare<sup>64</sup> which provide useful guidance, and these include:

- The use of animals carries with it an ethical responsibility to ensure the welfare of such animals to the greatest extent practicable.
- The internationally recognised “Three Rs” (reduction in numbers of animals, refinement of methods and replacement of animals with non-animal techniques) for the use of animals in science.
- The internationally recognised “Five Freedoms” (freedom from hunger, thirst and malnutrition; freedom from fear and distress; freedom from physical and thermal discomfort; freedom from pain, injury and disease; and freedom to express normal patterns of behaviour).

However, although the “Five Freedoms” is one of the original animal welfare concepts, this has increasingly been found to be limited in its assumption that the absence of (or “freedom” from) negative states would ensure high welfare. The more modern “Five Domains” model considers aspects such as nutrition, environment, health and behaviour as governing inputs that result in a range of mental states from negative to positive, and goes beyond minimising negative experiences to raising positive experiences to ensure an animal's welfare and quality of life. This model was designed specifically to facilitate structured, systematic, comprehensive and coherent animal welfare assessments. It is regularly updated, and increasingly utilised in various animal use sectors. World Animal Protection has a useful overview of the “Five Domains” model with a comparison to the

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<sup>62</sup> Fraser et al. [A Scientific Conception of Animal Welfare that Reflects Ethical Concerns](https://www.wellbeingintlstudiesrepository.org/ethawel/1/). 1987. <https://www.wellbeingintlstudiesrepository.org/ethawel/1/>

<sup>63</sup> The Farm Animal Welfare Education Center (FAWEC). What is Animal Welfare? <https://www.fawec.org/en/technical-documents-general-concepts/106-what-is-animal-welfare>

<sup>64</sup> WOA. Chapter 7.1. Introduction to the Recommendations for Animal Welfare. [https://www.oie.int/fileadmin/Home/eng/Health\\_standards/tahc/current/chapitre\\_aw\\_introduction.pdf](https://www.oie.int/fileadmin/Home/eng/Health_standards/tahc/current/chapitre_aw_introduction.pdf)

“Five Freedoms”.<sup>65</sup> This paper by Mellor, David J. et al provides further information on the 2020 Five Domains Model - Including Human–Animal Interactions in Assessments of Animal Welfare.<sup>66</sup>

The WOAHA has a growing body of internationally-accepted animal welfare standards, which are all science-based. There is a useful chart on the WOAHA website which provides further information about these.<sup>67</sup>

The WOAHA also has a Global Animal Welfare Strategy, which was adopted in 2017 by all WOAHA Member Countries, with the stated objective of achieving: “A world where the welfare of animals is respected, promoted and advanced, in ways that complement the pursuit of animal health, human well-being, socio-economic development and environmental sustainability”.<sup>68</sup>

The 182 WOAHA member countries have all accepted this body of animal welfare work, and many countries now have national animal welfare legislation as well – the majority of developed countries and an increasing number of developing countries. This can be seen in the Global Animal Legislation Database.<sup>69</sup> There is also a strong body of animal welfare legislation at European Level.<sup>70</sup>

The FAO has a “Gateway to Animal Welfare” which includes research on farmed animal welfare.<sup>71</sup> This describes animal welfare as a “global common good”, and addresses this not as a stand-alone topic, but related to other relevant topics such as food safety and security, human and animal health, sustainability and rural development.

The science of animal welfare is underpinned by a long-standing and large body of research. The results of animal welfare science studies are commonly published in the peer-reviewed academic journals, such as “Applied Animal Behaviour Science”.<sup>72</sup> and “Animal Welfare”.<sup>73</sup>

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<sup>65</sup> World Animal Protection. Five Domains vs. Five Freedoms of Animal Welfare. 24 June 2021. <https://www.worldanimalprotection.us/blogs/five-domains-vs-five-freedoms-animal-welfare>

<sup>66</sup> Mellor, David J. et al. The 2020 Five Domains Model: Including Human–Animal Interactions in Assessments of Animal Welfare. <https://www.mdpi.com/2076-2615/10/10/1870/htm>

<sup>67</sup> WOAHA. Development of Animal Welfare Standards. Recognised international standards. <https://www.oie.int/en/what-we-do/animal-health-and-welfare/animal-welfare/development-of-animal-welfare-standards/>

<sup>68</sup> WOAHA. Global Animal Welfare Strategy. <https://www.oie.int/app/uploads/2021/03/en-oie-aw-strategy.pdf>

<sup>69</sup> Global Animal Law (GAL Association). Database Legislation. Animal Legislations in the World at National Levels. <https://www.globalanimallaw.org/database/national/index.html>

<sup>70</sup> Global Animal Law (GAL Association). Animal Welfare Legislation at European Level. <https://www.globalanimallaw.org/database/europe.html>

<sup>71</sup> FAO. Gateway to Animal Welfare. <https://www.fao.org/ag/againfo/themes/animal-welfare/aw-abthegat/aw-whaistgate/en/#:~:text=What%20is%20the%20Gateway%20to,related%20to%20farm%20animal%20welfare>

<sup>72</sup> Elsevier. Applied Animal Behaviour Science. <https://www.journals.elsevier.com/applied-animal-behaviour-science>

<sup>73</sup> Universities Federation for Animal Welfare (UFAW). The UFAW Journal - Animal Welfare. <https://www.ufaw.org.uk/the-ufaw-journal/animal-welfare>

<sup>74</sup> There will also be a new journal “Perspectives in Animal Health and Welfare” from September 2022.<sup>75</sup> Also of interest is the WellBeing International Studies Repository (WBISR), which is a multidisciplinary, open access collection of academic, archival, and other materials addressing various topics within the fields of human well-being, animal well-being and environmental sustainability (the PAE Triad).<sup>76</sup> The Society of Companion Animal Studies (SCAS) provides research on the human-animal bond.<sup>77</sup>

Animal welfare science helps improve animals’ lives in an evidence-based way, and touches on fascinating, fundamental biological problems (e.g., the nature of sentience).<sup>78</sup> It should be noted that animal welfare science includes research on individual species, which supports effective regulation, enforcement, decision-making and practical care and handling of animals.

Animal welfare science investigates the well-being of animals, both domestic and wild. It usually focuses on those whose welfare is compromised by human activities. The lives of humans affect those of our fellow animals – both directly and indirectly – in many different ways. Specific categories where humans use or impact animals include: companionship (pets); farming purposes; experimentation (including science, research and testing); work; sports, leisure and entertainment; zoos/aquaria and terrestrial and marine wildlife management and exploitation. All of these have some causal linkages to the environment, albeit to a greater or lesser extent.

There are some aspects of animal welfare which are particularly salient to environmental linkages. For example:

➤ ***Naturalness, harmony, integrity, coping and resilience***

Naturalness is one of the three key approaches to animal welfare. When animals are placed in unnatural conditions, or bred to be unnatural, or motivated to behave unnaturally, these constitute welfare compromises. Obviously, this approach links to environmental concern for natural habitats and systems. Animals are part of nature (even if we add artificial selection, put them in manmade systems or designate them in a different category such as “domestic”). Making animals “unnatural” contributes to destroying the natural ecosystems of which they are part. This does not mean that all anthropogenic impacts are wrong, nor that we should be concerned only with absolutely “pristine” habitats and wild-types; it

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<sup>74</sup> University of Guelph. Campbell Centre for the Study of Animal Welfare. What is Animal Welfare Science? <https://www.uoguelph.ca/ccsaw/what-animal-welfare-science#:~:text=Welfare%20scientists%20investigate%20the%20well,e.g.%20the%20nature%20of%20sentience>).

<sup>75</sup> Perspectives in Animal Health and Welfare.  
<https://www.unitec.ac.nz/eypress/index.php/perspectives-in-animal-health-and-welfare/>

<sup>76</sup> Wellbeing International Studies Repository.  
<https://www.wellbeingintlstudiesrepository.org/about.html>

<sup>77</sup> Society of Companion Animal Studies (SCAS) <http://www.scas.org.uk/>

<sup>78</sup> University of Guelph. Campbell Centre for the Study of Animal Welfare. What is Animal Welfare Science? <https://www.uoguelph.ca/ccsaw/what-animal-welfare-science#:~:text=Welfare%20scientists%20investigate%20the%20well,e.g.%20the%20nature%20of%20sentience>).

simply means that we should recognise that we cause problems when we disrupt nature and/or the nature of animals.

Animal welfare may be seen as animals' harmony with nature/their environments.<sup>79</sup> Harmony is a relational concept. We might think of harmony in terms of the relationships between:

- The various internal functions of animals, and their interactions with the external environment.
- Animals within groups and ecosystems, including across species (e.g., food webs).
- The entire planetary system.
- Humans and animals and/or humans and the environment (see below).

The concept of integrity might be considered the harmonious completeness of all elements of an animal (and perhaps its interactions).<sup>80</sup> Surgical, behavioural or genetic modifications alter that integrity. We might similarly understand the integrity of ecosystems to be their overall and complete functioning, which is damaged by disruption of any of the elements. A common concept of animal welfare is animals' ability to cope with their environments.<sup>81</sup> This is analogous to ideas of environmental resilience. It includes short-term adaptations (e.g., behavioural changes) and longer-term evolution. Animals' coping is part of an ecosystems' resilience.

This does not mean those environments must be perfect or static: animals can "cope" with changes and challenges to a certain degree, just as ecosystems can cope with some disruption. Indeed, natural systems, including natural animals, are the result of a millennia of natural forces that has led to a more or less harmoniously balanced whole.<sup>82</sup> We might describe this best as a dynamic equilibrium, in that it is subject to continued *natural* change. This is sustainable in a dynamic sense, shaped by environmental changes, adaptations and evolution that are "in synch". In other words, the changes need to be ones to which animals can adapt in terms of the extent and speed of the change, and of specific practicalities such as habitat corridors that allow populations to move as local conditions change.

Of course, in order to be able to cope with changes and challenges, animals need to be able to respond (physiologically, behaviourally and evolutionarily). This requires some degree of control and choice, and therefore of resources and freedom needed for such responses. It also requires their environments to be ones for which they are adapted, in which the

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<sup>79</sup> Hughes BO (1982) The historical and ethical background of animal welfare. In: Uglow J (ed) How well do our animals fare? Proc. 15th annual conference of the reading University Agricultural Club, 1981, pp 1–9.

Cf: Hughes B O 1976 Behaviour as an index of welfare. In: Proceedings of the 5th European Poultry Conference pp 1005-1014. World Poultry Association: Malta Hurnik J F 1988 Welfare of farm animals. Applied Animal Behaviour Science 20: 105-117.

<sup>80</sup> Vorstenbosch, J., "The Concept of Integrity. Its Significance for the Ethical Discussion on Biotechnology and Animals," Livest. Prod. Sci. 36 (1993), 109–112.

<sup>81</sup> Broom, Donald J. Animal welfare defined in terms of attempts to cope with the environment. March 1996.

[https://www.researchgate.net/publication/301650716\\_Animal\\_welfare\\_defined\\_in\\_terms\\_of\\_attempts\\_to\\_cope\\_with\\_the\\_environment](https://www.researchgate.net/publication/301650716_Animal_welfare_defined_in_terms_of_attempts_to_cope_with_the_environment)

<sup>82</sup> Verhoog, H., "Morality and the 'Naturalness' of Transgenic Animals," Animal Issues 2(2) (1998), 1–16

resources are available and the relevant environmental cues occur. This is essentially a natural environment.

### ➤ ***Function, health, stress, survival and reproduction***

Animal welfare can be seen as how well animals function (or cope, flourish etc.). This “function” can be considered in relation to evolution (e.g., “Darwinian fitness”) or relation to human interests (e.g., for animals: productivity; for environment: ecosystem services). Animal welfare is conceptually very closely related to animal health (one might say welfare includes health or vice versa, depending on one’s definitions). This recognition is inherent in approaches such as One Health.

Modern definitions of health – including that of the quadripartite<sup>83</sup> – go beyond physical/physiological health and include mental health and wellbeing, often extending into social and environmental realms; recognising the need to prevent threats and damages, and to optimise the wellbeing of people, animals and the environment. Similarly, modern definitions of satisfactory animal welfare include the animal being in a state of overall wellbeing, which is a condition of physical, mental and emotional harmony, and which includes the ability to live naturally and to meet all species-specific social, cultural and ethological needs.<sup>84</sup>

There is also an analogical relationship between animal and environmental health. Overall health depends on the health of each part and the interactions between them. If many tissues are unhealthy, that reduces the health of the organism; so, if many animals are unhealthy, that reduces the health of the organism. This does not mean every cell must be healthy for an animal to be healthy or that every animal needs to be full of vitality for an ecosystem to be healthy (or every human for a society to be healthy). However, an animal cannot be considered healthy unless its parts are generally healthy, and an environment cannot be healthy unless the animals in it are generally healthy, within the normal (“ecologically healthy”) cycle of life. Our right to a healthy environment therefore includes a right to healthy animals in that environment (which is particularly borne out in the context of zoonotic pandemics).

Stress is an important welfare and health consideration. Stress is itself a welfare compromise, and can be the cause and/or consequence of other health problems (e.g., infections) or wellbeing compromises (e.g., behaviour restriction). Some stress may be natural or beneficial (in certain situations), but severe or chronic stress seems to have limited functional or adaptive value.<sup>85</sup>

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<sup>83</sup> UNEP. Tripartite and UNEP support OHHLEP's definition of "One Health".

<https://www.who.int/news/item/01-12-2021-tripartite-and-unep-support-ohhlepe-s-definition-of-one-health>

<sup>84</sup> Cox, Janice H. MBA, and Lennkh, Dr. iur. Sabine. The Model Animal Welfare Act. Definitions. <https://worldanimal.net/our-programs/model-law-project/part-2-proposal-for-the-wording-of-a-new-animal-welfare-act/chapter-1-preliminary-provisions#section5>

<sup>85</sup> Broom, Donald M. and Johnson, K. G. Stress and Animal Welfare. January 2000. <https://link.springer.com/book/10.1007/978-94-024-0980-2>



Death in itself is not usually considered an animal welfare issue.<sup>86</sup> Death is natural, and dead animals do not experience any welfare. However, the reasons, means, timing and rate of death may reflect welfare compromises (e.g., unnatural disease or inhumane slaughter). Death also *prevents* positive welfare experiences. It is also worth noting a specific relationship between some indicators for both environmental and animal welfare impacts, such as mortality and fertility rates. When animals die faster than they reproduce, that suggests widespread welfare compromises as well as threats to the population/species.<sup>87</sup>

### ➤ ***Feelings and behaviour***

As is seen below in the section on “Animal Sentience”, animals have the potential to suffer and feel pleasure. This may seem less closely linked to environmental concerns. However, when feelings do exist, then such feelings are part of the nature. As such, malfunctions of feelings (e.g., mental health compromises) constitute malfunctions of part of nature; and feelings caused by humans are anthropogenic. Wild animals experiencing additional suffering due to deforestation (or any other habitat loss) is part of its impact. Animals experiencing suffering in factory farms are part of the unnaturalness of those systems.

Behavioural ecology is an important part of understanding both animal welfare and environmental impacts. It is the study of behavioural interactions between individuals within populations and communities, usually in an evolutionary context.<sup>88</sup> It looks at how competition and cooperation between and within species affects evolutionary fitness. Animals respond to changes in their environments. Changes in behaviour can affect how the animals fare (i.e., their welfare) and how the species fares (e.g., through altered geographic range, changing food preferences leading to increased competition etc.). Animals may also alter their interactions with human habitations or practices in ways that then lead to direct responses from humans (e.g., human-animal conflicts).

One aspect of animals’ behaviour is how they make trade-offs (in ways that have evolved in their ecological niches). For example, threats or changes in their habitat/environment or resource availability may alter their behaviour. When animals are highly motivated to perform certain behaviours, and these are frustrated, then this is *primarily* an animal welfare matter. This is most obvious when animals are placed in unnatural environments (e.g., industrial farming) but it also applies to wild animals unable to perform motivated natural behaviour. Restrictions may be due to lack of capacity (e.g., mutilations), freedom (e.g., space), resources (e.g., food, substrate or habitat) or conspecifics (for social species).

Behaviour is important for our understanding of environmental and animal welfare impacts. Animals’ behaviour is an important aspect of ecosystem functioning (e.g., carbon and nitrogen cycles). Motivational systems have evolved to enable animals to dynamically

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<sup>86</sup> Webster, J. *Animal Welfare: Limping Towards Eden*; Blackwell Animal Welfare Series; Universities Federation for Animal Welfare; Blackwell Publishing: Hoboken, NJ, USA, 2005.

<sup>87</sup> Yeates, James W. Death Is a Welfare Issue. *Journal of Agricultural and Environmental Ethics*. Springer. June 2010. <https://link.springer.com/article/10.1007/s10806-009-9199-9>

<sup>88</sup> Nature Portfolio. Behavioural Ecology. <https://www.nature.com/subjects/behavioural-ecology#:~:text=Behavioural%20ecology%20is%20the%20study,within%20species%20affects%20evolutionary%20fitness>.

prioritise options and actions. This allows adaptation at the individual and group level. In addition, observations of animals *changing* their behaviour indicates both animal welfare and environmental impacts.

### ➤ **Relationships, stewardship**

Animal welfare is also often considered in terms of how we humans relate to animals.<sup>89</sup> This would suggest it applies only to animals who are affected by humans (which is probably now all animals) insofar as they are affected. This approach has less support recently, but perhaps underlies in the question whether animal welfare might apply differently to wild animals. Either way, this concept relates to husbandry and stewardship exhibited by stockpersons, keepers and carers and to abuse and cruelty. These concepts are applicable to animals and the environment.

## **3.2. Sentience**

There is a strong body of science supporting animal sentience, and this is already recognised in the EU's Lisbon Treaty<sup>90</sup>, the Animal Welfare Strategy for Africa (under the African Union)<sup>91</sup>, and the WOAHP's Global Animal Welfare Strategy<sup>92</sup>.

Sentience is the capacity to perceive or feel things. Sentient beings share with us consciousness, feelings, emotions, perceptions – and the ability to experience pain, suffering, fear, distress and states of well-being.<sup>93</sup> The Cambridge Declaration on Consciousness<sup>94</sup> is a useful analysis of the neurobiological substrates of conscious experience and related behaviours in human and non-human animals.

Because animals, just like humans, are sentient, their reaction to human action, at a physical, physiological and psychological level, is fundamentally different from that of other elements of our ecosystems. Therefore, recognition that animals are sentient and that therefore their welfare should be respected should be a core element of the global effort to protect the environment and achieve the vision of humanity living in harmony with nature. A similar sentiment was expressed by the UN Secretary-General in his Report on Harmony with Nature (A/75/266, paragraph 42)<sup>95</sup>, in which he noted that “*non-human animals are sentient beings, not mere property, and must be afforded respect and legal recognition*”.

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<sup>89</sup> Broom DM (2010a) Animal welfare: an aspect of care, sustainability, and food quality required by the public. J Veterinary Med Education 37:83–88

<sup>90</sup> [https://ec.europa.eu/food/animals/welfare\\_en](https://ec.europa.eu/food/animals/welfare_en)

<sup>91</sup> <https://www.au-ibar.org/home/170-en/media/press-releases/au-ibar/1143-animal-welfare-stakeholders-launch-the-african-platform-for-animal-welfare-apaw-and-endorse-the-animal-welfare-strategy-for-africa-awsa> & <https://www.au-ibar.org/strategy-documents>

<sup>92</sup> [https://www.oie.int/fileadmin/Home/eng/Animal\\_Welfare/docs/pdf/Other/EN\\_OIE\\_AW\\_Strategy.pdf](https://www.oie.int/fileadmin/Home/eng/Animal_Welfare/docs/pdf/Other/EN_OIE_AW_Strategy.pdf)

<sup>93</sup> World Animal Net. The Model Animal Welfare Act. Definitions. <https://worldanimal.net/our-programs/model-law-project/part-2-proposal-for-the-wording-of-a-new-animal-welfare-act/chapter-1-preliminary-provisions#section5>

<sup>94</sup> The Cambridge Declaration on Consciousness. 7 July 2012.

<https://worldanimal.net/images/stories/documents/Cambridge-Declaration-on-Consciousness.pdf>

<sup>95</sup> UN General Assembly. Harmony with Nature report of the Secretary-General. (A/75/266, paragraph 42). <https://undocs.org/en/A/75/266>



This implies that animals are a special part of “nature”, and should not be treated as inanimate natural objects or mere insentient “resources”.

A useful source book on the science behind sentience and animal welfare, and the implications of this for ethical decision-making about humans and non-humans and sustainability is “Sentience and Animal Welfare” by Professor Donald Broom.<sup>96</sup>

A paper by Prof. Marc Bekoff on animal emotions provides a useful overview of interdisciplinary research which provides compelling evidence that many animals experience such emotions as joy, fear, love, despair, and grief.<sup>97</sup>

There is also a new book (May 2022) from John Webster, retired Professor of Animal Husbandry at the University of Bristol, UK, who established the Bristol Unit for Study of Animal Welfare and Behaviour and is a founding member of the UK Farm Animal Welfare Council (FAWC) entitled: “Animal Welfare: Understanding Sentient Minds and Why It Matters”. This is an overview of the concept of sentience throughout the animal kingdom and why it matters to humans.<sup>98</sup>

## **4. Nexus with Environmental Issues**

### **4.1. Introduction**

The UNEP document entitled “Nature at the Heart of Sustainable Development” stressed the inextricable linkages between the wellbeing of people, animals and nature, using these words:

“Ours is a connected planet. Health, food, economies and the well-being of nearly 8 billion people and more than 8 million other species across diverse ecosystems constitute a web of life that is inextricably interlinked. Nature is that web, yet human activities have altered 75 per cent of the planet’s land surface, 85 per cent of its wetlands and 66 per cent of its oceans, and in doing so have undermined the very foundation of our societies and economies”.<sup>99</sup>

This Scoping Study underlines these interlinkages in the complex web of life, and highlights the mass of information that is readily available about them. Many of the sources are flagship reports and research already well-known to UNEP and Member States. The same

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<sup>96</sup> Broom, D. M. Sentience and Animal Welfare. 2014.  
<https://www.cabi.org/vetmedresource/ebook/20143282083>

<sup>97</sup> Bekoff, Marc PhD. Animal Emotions: Exploring Passionate Natures: Current interdisciplinary research provides compelling evidence that many animals experience such emotions as joy, fear, love, despair, and grief—we are not alone. BioScience, Volume 50, Issue 10, October 2000, Pages 861–870, [https://doi.org/10.1641/0006-3568\(2000\)050\[0861:AEPPN\]2.0.CO;2](https://doi.org/10.1641/0006-3568(2000)050[0861:AEPPN]2.0.CO;2)

<sup>98</sup> Webster, John. Animal Welfare: Understanding Sentient Minds and Why It Matters. May 2022.  
<https://www.ufaw.org.uk/ufaw-wiley-blackwell-animal-welfare-series/animal-welfare-understanding-sentient-minds-and-why-it-matters>

<sup>99</sup> UNEP. Nature at the Heart of Sustainable Development. UN Environment Assembly 5.2. A contribution to the High-Level Segment of the resumed session of the 5th UN Environment Assembly. 2022. <https://wedocs.unep.org/bitstream/handle/20.500.11822/37922/UNE5.2.pdf?sequence=1&isAllowed=y>

messages are repeated, and highlight the urgent need for action to prevent or mitigate the multiple existential crises we are facing.

UNEP's Medium-Term Strategy for 2022—2025, entitled “For People and Planet” seeks to “deliver a transformational change for people and nature”. In its foreword by Inger Andersen, UNEP's Executive Director, it states that it does this: “By drilling down on the root causes of the three planetary crises of climate change, nature and biodiversity loss, and pollution and waste. Our aim is to propose solutions in line with a sustainable and just post-COVID-19 recovery.”<sup>100</sup> This part of the Scoping Study is designed to detail the nexus between these environmental objectives, and the prevention of future pandemics, and human-animal interactions and the welfare of animals, in order to ensure that these can be effectively addressed by UNEP and Member States to ensure the achievement of both this strategy and sustainable development.

The United Nations General Assembly has declared that everyone on the planet has a right to a healthy environment. In a resolution<sup>101</sup> passed on 28 July 2022 at UN headquarters in New York City, the General Assembly said climate change and environmental degradation were some of the most pressing threats to humanity's future. It called on states to step up efforts to ensure their people have access to a “clean, healthy and sustainable environment”.<sup>102</sup> The General Assembly also called upon countries, companies and international organisations to scale up efforts to turn that into a reality. Such action is vital because the “triple planetary crises” of human-driven climate change, widespread biodiversity loss and unmitigated pollution now threaten to surpass the planetary boundaries necessary to live safely on earth. These threats undermine the right to life, dignity and health.<sup>103</sup> This Scoping Study illustrates that this new human right to a clean, healthy and sustainable environment cannot be achieved without full and thorough consideration of the animal welfare – environment nexus.

## 4.2. Major Reports

There are flagship reports, such as those on climate change and biodiversity, and other research which includes some helpful information on the linkages with animal welfare and the use of animals and certain environmental issues. These will be covered in separate sections below. However, there are also some resources on the links between animal welfare and the environment more generally, and the most important of these are summarised below.

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<sup>100</sup> UNEP. For People and Planet: The United Nations Environment Programme strategy for tackling climate change, biodiversity and nature loss, and pollution and waste from 2022—2025. <https://wedocs.unep.org/bitstream/handle/20.500.11822/35875/K2100501-e.pdf>

<sup>101</sup> UN Digital Library. The human right to a clean, healthy and sustainable environment: draft resolution. 2022. <https://digitallibrary.un.org/record/3982508?ln=en>

<sup>102</sup> UNEP. In historic move, UN declares healthy environment a human right. 28 July 2022. <https://www.unep.org/news-and-stories/story/historic-move-un-declares-healthy-environment-human-right>

<sup>103</sup> World Economic Forum. The UN just declared a new human right. 9 August 2022. <https://www.weforum.org/agenda/2022/08/the-un-just-declared-a-universal-human-right-to-a-healthy-sustainable-environment-here-s-where-resolutions-like-this-can-lead/>

**The International Resource Panel (IRP)**<sup>104</sup> was launched by the United Nations Environment Programme (UNEP) in 2007 to build and share the knowledge needed to improve our use of resources worldwide. The Panel consists of eminent scientists with expertise in resource management issues, including scientists and governments from both developed and developing regions, civil society, industrial and international organisations. It studies key questions around global resource use and produces assessment reports that distil the latest scientific, technical and socio-economic findings to inform decision-making.

In 2016, the IRP prepared a report on “**Food Systems and Natural Resources**” that took a holistic perspective, reflecting the need to re-examine the total food/agriculture system. It said: “We are no longer talking about the consequences of unsustainable agriculture and fisheries only. We are talking about the natural resource use and environmental impacts of all food related activities, their governance structures, socio-economic outcomes, and the complex interlinkages between all of these.”<sup>105</sup>

The report found that “many of our food systems are currently unsustainable from a natural resources perspective. The way in which these food systems currently operate are responsible for land degradation, depletion of fish stocks, nutrient losses, impacts on terrestrial and aquatic biodiversity, impacts on air, soil and water quality, and greenhouse gas emissions contributing to climate change. The expected population growth, expansion of cities, and dietary shifts to unhealthy and unsustainable consumption, will increase the pressures even more. A reduction in food loss and waste across food systems, and a levelling off of meat and dairy consumption in developed countries could reduce the global cereal demand by 15%; while the reduction by 50% of meat and dairy consumption in these countries could lead to up to 40% lower nutrient losses and greenhouse gas emissions.”<sup>106</sup>

The foreword of that 2016 report was by Achim Steiner, previously UNEP Executive Director and now Administrator of the UN Development Programme (UNDP). He stated there that: “Globally, food systems are responsible for 60% of global terrestrial biodiversity loss, around 24% of the global greenhouse gas emissions, 33% of degraded soils, the depletion of 61% of ‘commercial’ fish populations, and the overexploitation of 20% of the world’s aquifers. These pressures on our natural resource base are expected to significantly increase with population, urbanisation and supermarketisation trends, as well as dietary shifts to more resource-intensive food.”<sup>107</sup>

The report stressed the high resource cost of consumption of livestock-based food, giving an example of grain being used as animal feed for livestock production which is then consumed by humans, instead of directly consumed by humans.

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<sup>104</sup> UNEP/International Resource Panel. About Us. <http://www.resourcepanel.org/about-us>

<sup>105</sup> UNEP/International Resource Panel. Food Systems and Natural Resources. <http://www.resourcepanel.org/reports/food-systems-and-natural-resources>

<sup>106</sup> UNEP/International Resource Panel. Food Systems and Natural Resources. <http://www.resourcepanel.org/reports/food-systems-and-natural-resources>

<sup>107</sup> UNEP/International Resource Panel. Food Systems and Natural Resources. <http://www.resourcepanel.org/reports/food-systems-and-natural-resources>

The report covered many other relevant areas of interest, including:

1. To effectively enhance resource efficiency in food systems the focus of attention should be expanded from farmers and fishermen, to include other actors further along (“downstream”) the ‘food chain’, and ultimately to consumers.
2. Using the food systems lens on local, national or regional levels allows for the analysis of underlying drivers and possible solutions in a more systematic and holistic manner.
3. In developing regions, there is a rapidly evolving replacement of traditional food systems by modern food systems. This trend is driven by macro-trends such as urbanisation, increased wealth and other socio-economic and demographic developments. These intertwined trends also imply changes in dietary patterns and ‘supermarketisation’ in many parts of the world. These developments significantly increase the pressure on our natural resources.
4. The environmental costs (externalities) of the food system are hardly included in food prices. The pricing of environmental externalities, reinforcement of legislation to prevent pollution and other forms of environmental degradation, and the removal of harmful subsidies (e.g., fossil fuels) could provide important incentives to improve resource efficiency.
5. Implementing full-cost accounting for food products that reflects the environmental and social costs of their production in order to facilitate a shift in consumption patterns.
6. Reduction of overconsumption and change of unhealthy dietary patterns (e.g., shift in affluent societies from animal-based to more plant-based diets).
7. In countries suffering from overconsumption, lifestyle choices and consumer information play a fundamental role.
8. Governments play an important role in education, which is relevant both for food producers, as well as for food consumers.
9. The extensification of agriculture may require more land than intensive agriculture to achieve the same production levels, but it may be more sustainable in the long term and have fewer impacts on wildlife and human health.

The **Global Environment Outlook (GEO)** is a UNEP flagship publication which aims to keep the state and direction of the world’s environment under review – which is crucial for the mission of UNEP. The latest edition of GEO is GEO 6, published in 2019, with the theme “Healthy Planet, Healthy People”. There is a GEO 6 Full Report<sup>108</sup> and a GEO 6 Summary for Policymakers.<sup>109</sup> GEO 6 concluded that environmental policy efforts are being hindered by unsustainable production and consumption patterns in most countries, with human activities globally having degraded the Earth’s ecosystems, endangering the ecological foundations of society. The GEO called for urgent action at an unprecedented scale to arrest and reverse this situation. However, despite the importance and urgency of action to protect the environment, the approach suggested was to mainstream environmental considerations into social and economic decisions. It is unclear whether this might imply any

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<sup>108</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6>

<sup>109</sup> UNEP. Global Environment Outlook 6 Summary for Policymakers. 6 August 2019. [https://www.unep.org/resources/assessment/global-environment-outlook-6-summary-policymakers?\\_ga=2.58831021.1679832863.1648133604-1602352062.1634737523](https://www.unep.org/resources/assessment/global-environment-outlook-6-summary-policymakers?_ga=2.58831021.1679832863.1648133604-1602352062.1634737523)

subservience of environmental objectives to economic and social aims – even though economic or social wellbeing is dependent on a thriving environment.

It is noted that both GEO 6<sup>110</sup> and GEO 5<sup>111</sup> (which was published in 2012) contain sections on drivers of environmental change. GEO 6 reviews five drivers - population growth and demographics, urbanisation, economic development, new technological forces, and climate change. However, it could be said that climate change is an impact, rather than a driver (or both, due to feedback loops) – as are biodiversity loss and pollution, for example. Also, population and economic development are not ultimate drivers, as it depends on how these populations run their lives – materialism, consumption patterns, industrialisation, processing, trade etc. GEO 5 does include mention of food systems when examining drivers. It would be easier to plan policies and programmes if consideration of food systems was carried out in a more systemic manner, with a view to systems transformation.

Food systems are covered in the full GEO reports, but not synthesised in the GEO for Policymakers in a way which would lead to greater analysis and to propel action. To have an impact, the GEO for Policymakers would need to really identify what needs to change, and how this could be accomplished. It is noted that GEO 5 states: “This dominance is reinforced by a set of interlocking structural constraints including high levels of producer subsidies, dietary preferences, and a large industrialised food processing economy. For example, of the top 20 sources of industrial pollution in the United States, eight are slaughterhouses, but even with well-understood environmental and health problems associated with this food system, its highly entrenched nature makes it extremely difficult to modify.” This is worrying because it implies an understanding of the environmental problems of the food system, but a political unwillingness or incapacity to take the actions needed to address these (despite the fact that the IPBES 2019 Global Assessment<sup>112</sup> specifically states that biodiversity goals and the 2030 agenda cannot be achieved without “transformative changes across economic, social, political and technological factors”).

The full GEO 6 report<sup>113</sup> does include plenty of material about the environmental impacts of livestock, aquaculture and fisheries. General examples are given below, and others in relevant sections of this Scoping Study.

#### Environment and Resources:

The agri-food system is responsible for significant environmental impacts including greenhouse gas emissions, habitat destruction and biodiversity loss, and pollution of air and water resources. These environmental costs are compounded by the inefficiency of the agri-

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<sup>110</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6>

<sup>111</sup> UNEP. Global Environment Outlook (GEO) 5. Full Report. 2012. <https://www.unep.org/resources/global-environment-outlook-5> & UNEP. Global Environment Outlook (GEO) 5. Summary for Policymakers. 2012. [https://www.unep.org/resources/report/global-environment-outlook-5-summary-policymakers?\\_ga=2.71431315.1679832863.1648133604-1602352062.1634737523](https://www.unep.org/resources/report/global-environment-outlook-5-summary-policymakers?_ga=2.71431315.1679832863.1648133604-1602352062.1634737523)

<sup>112</sup> IPBES. The Global Assessment on Biodiversity and Ecosystem Services. Report on <https://ipbes.net/global-assessment>

<sup>113</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6>

food system. According to one study, 62 per cent of the energy (in terms of kcal) harvested as crops and other biomass, is lost or wasted after accounting for losses from food waste, trophic losses from livestock, and human overconsumption.<sup>114</sup>

It is worth noting that the word “animal” is not explicitly mentioned in the GEO 5 Summary for Policymakers at all. In GEO 6, it is mentioned three times in connection with disease emergence and the area for livestock farming including both land for animals, and arable land used for animal feed production. This is it. In wildlife/biodiversity, animals are only mentioned in terms of “species”. There is to date no separate consideration for the plight of sentient animals, or their welfare.

The Full GEO reports contain analysis of what is needed to transform food systems to achieve the SDGs (but not “how”). The conclusion is that a whole-system approach is needed towards sustainability, including tackling food losses and greenhouse gas emissions along supply chains, wasteful consumption patterns including high consumer food waste and overconsumption of animal products. The reports are clear on the need for demand-side measures, as well as supply-side measures. Demand-side measures would include reduced consumption (to healthier and more sustainable diets), reduced waste and/or reduced feed/fuel use.

Changes in diet are considered an effective measure for reducing land-use impacts of agriculture. Diet changes resulting in less meat consumption would reduce crop use as animal feed, which in turn would reduce demand for land, since direct human consumption of crops requires less land. In particular, a reduction in beef consumption would have the most direct positive impact on environmental indicators, as ruminants have the lowest feed and protein conversion rates of all livestock. The reduction of meat consumption in high-income countries could lead to positive impacts in terms of reducing agricultural land-use and increasing human health.<sup>115</sup> It will also lead to greater efficiency, because for every 100 calories fed to animals in the form of human-edible crops, we receive just 30 calories in the form of meat and dairy products.<sup>116</sup>

Agriculture is responsible for the majority of environmental consequences associated with food production – with industrial production and monocultures being most problematic. However, at present, agricultural policies are typically focused on supporting farmers rather than on providing incentives for improved environmental outcomes. To the extent that they encourage production without accounting for environmental impacts, many agricultural policies exacerbate environmental problems (e.g., subsidies for fertiliser, water or energy use).<sup>117</sup>

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<sup>114</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6>

<sup>115</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6>

<sup>116</sup> Stevenson, P. J. Industrial Livestock Production: The Twin Myths of Efficiency and Necessity. CIWF. <https://www.ciwf.org.uk/media/7425974/industrial-livestock-production-the-twin-myths-of-efficiency-and-necessity.pdf>

<sup>117</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6>



GEO 6<sup>118</sup> suggests that the elements that policies need to address include the following:

1. Polluter pays (incorporating the cost of negative environmental externalities into market prices)
2. The beneficiary pays principle (incentivising farmers to minimise negative externalities or create positive externalities through payments for ecosystem services)
3. Consumer education
4. Dietary guidelines (including environmental considerations)
5. Labelling and certification
6. Public procurement
7. Consumption taxes

However, the GEO report recognises that “reforming subsidy regimes often presents governments with significant political challenges”.<sup>119</sup>

The 5<sup>th</sup> UN Environment Assembly (UNEA 5) approved the writing of GEO 7 in March 2022. The resolution requested UNEP to establish an ad hoc intergovernmental and multi-stakeholder advisory group and prepare GEO-7 to be submitted at a future UNEA session no sooner than 2025.<sup>120</sup> Given the existing evidence of the importance of animal welfare to the state of the environment, it would be helpful for animal welfare experts to be included in this process, so salient points from the nexus can be effectively included.

The **UNEP, CBD, WHO report on “Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review”** contains a Chapter (5) on “Agricultural biodiversity, food security and human health”.<sup>121</sup> This also states that agriculture and food production are significantly implicated in the extent to which planetary boundaries have been or are likely to be exceeded with respect to nitrogen flows, water usage, and land use change, and in the negative effects of loss of biodiversity on human health. It documents the impacts of dietary shifts from plant products to increased consumption of meat, dairy and eggs with growing incomes to the added pressure of livestock systems, with livestock production already using 30% of the earth’s entire land surface, mostly permanent pasture but also including 33% of the global arable land used to produce feed for livestock – a very inefficient use of resources and crop calories. At present, 36% of calories produced by cropping systems is used for animal feed of which only 12% are ultimately used for human consumption. It has been estimated that if these calories were consumed by people directly, the current global food production system could feed an additional 4 billion meeting our estimated population growth forecasts for 2050. The report states that for every kilogram of beef produced, 1 kg of feed is needed, citing USDA as the source.<sup>122</sup> However, in this USDA

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<sup>118</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6>

<sup>119</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6>

<sup>120</sup> IISD. Summary report, 21 February – 4 March 2022, UNEA-5.2, OECPR-5.2 and UNEP@50. <https://enb.iisd.org/unea5-oecpr5-unep50-summary>

<sup>121</sup> UNEP, CBD, WHO. Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review. 2015. <https://www.cbd.int/health/SOK-biodiversity-en.pdf>

<sup>122</sup> UNEP, CBD, WHO. Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review. 2015. <https://www.cbd.int/health/SOK-biodiversity-en.pdf>

bulletin, the figure cited is 5 kg of feed/kg of beef output (not including grass-based fodder).<sup>123</sup>

The **WHO Regional Office for Europe 2021 report on “Plant based diets and their impact on health, sustainability and the environment”**<sup>124</sup> includes the following observations:

Overall, a diet that is predominantly plant-based and low in salt, saturated fats and added sugars is recommended as part of a healthy lifestyle.

Plant-based diets have the potential not only to improve human health but also to reduce the environmental impacts associated with high consumption of animal-sourced foods such as meat and dairy products. The production of plant foods, such as fruits and vegetables, grains, legumes, nuts and seeds, produces lower greenhouse gas emissions than that of animal foods. Foods associated with the greatest negative environmental impacts – unprocessed and processed red meat – are consistently associated with the largest increases in disease risk. Shifting towards plant-based diets can also help prevent biodiversity loss. This shift in dietary patterns could significantly reduce global land use for agriculture, by reducing the amount of land required for grazing and growing crops. The report identifies that reducing the consumption of unprocessed and processed red meat has dual benefits for both human and planetary health.

The FAO has carried out prolific and thorough research on the nexus between food systems and the environment. Probably its most thorough assessment was the FAO’s seminal 2006 report **“Livestock’s Long Shadow: Environmental Issues and Options”**<sup>125</sup> – an extensive report of over 400 pages. This assessment built on the work of the Livestock, Environment and Development (LEAD) Initiative. This multi-stakeholder Initiative, coordinated by FAO’s Animal Production and Health Division, was formed to address the environmental consequences of livestock production, particularly in the light of rising demand for food products of animal origin and the increasing pressure on natural resources. Although this report is somewhat dated, key points remain relevant. Some important extracts of this are given below (noting that many cited figures have changed for the worse since its publication).

#### Policy Challenges and Options:

“Obstacles to effective livestock-environment policy make it appear that two things are missing. First, there is a lack of understanding about the nature and extent of livestock’s impact on the environment, among producers, consumers and policy-makers alike. Livestock-environment interactions are not easily understood. They are broad and complex, and many of the impacts are indirect and not obvious, so it is easy to underestimate livestock’s impact on land and land use, climate change, water and biodiversity. Second –

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<sup>123</sup> Dyck, John H. and Kenneth E. Nelson, Kenneth E. USDA. Structure of the Global Markets for Meat. Market and Trade Economics Division, Economic Research Service, U. S. Department of Agriculture, Agriculture Information Bulletin No. 785.  
[https://www.ers.usda.gov/webdocs/publications/42513/30787\\_aib785\\_002.pdf?v=0](https://www.ers.usda.gov/webdocs/publications/42513/30787_aib785_002.pdf?v=0)

<sup>124</sup> World Health Organization. Regional Office for Europe. (2021). Plant-based diets and their impact on health, sustainability and the environment: a review of the evidence: WHO European Office for the Prevention and Control of Noncommunicable Diseases. World Health Organization. Regional Office for Europe. <https://apps.who.int/iris/handle/10665/349086>.

<sup>125</sup> FAO. Livestock’s Long Shadow: Environmental Issues and Options 2006.  
<https://www.fao.org/3/a0701e/a0701e.pdf>



and partially as a result of the lack of understanding – a policy framework conducive to more environmentally benign practices simply does not exist in many cases, or is rudimentary at best.”<sup>126</sup>

#### Summary and Conclusions:

“As we have seen, the livestock sector is a major stressor on many ecosystems and on the planet as whole. Globally it is one of the largest sources of greenhouse gases and one of the leading causal factors in the loss of biodiversity, while in developed and emerging countries it is perhaps the leading source of water pollution.”<sup>127</sup>

The Executive Summary of this report acknowledged that “livestock’s contribution to environmental problems is on a massive scale and its potential contribution to their solution is equally large. The impact is so significant that it needs to be addressed with urgency. Major reductions in impact could be achieved at reasonable cost.”<sup>128</sup> Despite this, the necessary action has not been forthcoming. Instead of the transformation required, there was powerful industry lobbying, and concerted efforts to improve the public image of the livestock industry. And now the identified environmental impacts have worsened, exacerbating existential environmental threats.

It is also worth noting that much has changed since 2006 in terms of science and research and the development of plant-based and cellular alternatives to meat, seafood and dairy products. Also, whilst the 2006 report suggested that the further intensification of animal production could perhaps be helpful, this has been challenged in subsequent research, which cites reasons including inaccessibility for resource-poor households, and its impact on different environmental and societal sustainability issues.<sup>129</sup> Indeed, this approach would increase the waste of global resources devoted to animal feed production, with its associated problems of resource demand, alongside increased suffering of farmed animals.

FAO publications include a number of reports related to livestock and its many environmental impacts, including “**Livestock in a Changing Landscape – Drivers, Consequences and Responses**”<sup>130</sup>. This is a significant work, with just the first volume being 450 pages long, and containing a whole chapter (Chapter 16) addressing responses on environmental issues. This chapter refers to different production systems, clearly recognising both the inherent environmental problems of intensive systems – linked to the production of concentrated feed, the use of fossil fuel, and the disposal of animal wastes – and the potential of extensive systems to contribute to biodiversity and water management. A key finding is that livestock’s impact on the environment has been largely negative, and that neither policy, nor technology,

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<sup>126</sup> FAO. Livestock’s Long Shadow: Environmental Issues and Options. Chapter 6, Policy challenges and options. 2006. <https://www.fao.org/3/a0701e/a0701e.pdf>

<sup>127</sup> FAO. Livestock’s Long Shadow: Environmental Issues and Options 2006. <https://www.fao.org/3/a0701e/a0701e.pdf>

<sup>128</sup> FAO. Livestock’s Long Shadow: Environmental Issues and Options 2006. <https://www.fao.org/3/a0701e/a0701e.pdf>

<sup>129</sup> Ujo, Hendrik M. J. and Steenstra, Fokje. Animal Production Systems Group Wageningen University. Intensification of smallholder livestock production, is it sustainable? <https://edepot.wur.nl/169791>

<sup>130</sup> FAO. Livestock in a Changing Landscape – Drivers, Consequences, Responses. 2010. <https://www.fao.org/3/am074e/am074e00.pdf>

has caught up with the problem, leaving opportunities to reduce emissions and mitigate impacts on biodiversity loss largely unexploited. This was written over a decade ago, and it remains true today. However, it is worth noting that the focus is on livestock systems, rather than food systems as a whole, including necessary dietary change.

The **FAO's Livestock environmental assessment and performance partnership (LEAP)** is a multi-stakeholder initiative launched in July 2012 with the goal of improving the environmental performance of livestock supply chains. LEAP has used over 300 experts to create guidance documents in areas considered critical to the sustainability of global food and agricultural production systems. One is an overview of methodological approaches for the transition to sustainable food and agriculture. Another is a review of indicators and methods for biodiversity assessment at global scale. Here is an **Overview of LEAP products**.<sup>131</sup>

FAO LEAP's 2020 report on "**Biodiversity and the livestock sector – Guidelines for quantitative assessment**" refers to the loss of domestic animal genetic diversity – due to industrial animal systems, and the fact that these share many drivers of loss with wild biodiversity (e.g., increased demand for animal products, intensification, degradation of natural resources, climate change). The report also mentions the potential for integration and synergies between biodiversity, climate change mitigation and nutrient management in the transition towards sustainable livestock production. It is stressed that inappropriate management practices can occur in both low-input extensive systems (e.g., overgrazing, abandonment) and high-input intensive systems (e.g., off-farm feed produced in simplified landscapes, nutrient pollution due to animal density). However, the ecological diversity within these extensive ecosystems often provides favourable conditions for plants and animals (especially invertebrates) to find habitats suitable for the completion of their life cycles.<sup>132</sup>

FAO's annual flagship publications also include **The State of Food and Agriculture**<sup>133</sup> and the **State of the World's Fisheries and Aquaculture**<sup>134</sup>. There is also a series of reports on **The Future of Food and Agriculture (FOFA)**.<sup>135</sup> The FOFA series portrays recent global trends and alternative future scenarios to analyse possible pathways of food and agricultural systems. The latest issue is "The future of food and agriculture: Alternative pathways to 2050". This recognises that agriculture, including fisheries and forestry, is far from being sustainable, and that much of humanity's progress has come at considerable cost to the environment. The report states that "To produce more food and other non-food agricultural goods, a combination of intensified agricultural production processes and the clearing of forests has led to the degradation of natural resources and is contributing to climate change" and

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<sup>131</sup> FAO. Livestock environmental assessment and performance partnership (LEAP). Overview of LEAP Products. <https://www.fao.org/3/i8253e/i8253e.pdf>

<sup>132</sup> FAO. 2020. Biodiversity and the livestock sector – Guidelines for quantitative assessment – Version 1. Rome, Livestock Environmental Assessment and Performance Partnership (FAO LEAP). <https://www.fao.org/documents/card/en/c/ca9295en>

<sup>133</sup> FAO. The State of Food and Agriculture. <https://www.fao.org/publications/sofa/sofa-2021/en/>

<sup>134</sup> FAO. The State of the World's Fisheries and Aquaculture. <https://www.fao.org/documents/card/en/c/ca9229en/>

<sup>135</sup> FAO. The Future of Food and Agriculture. <https://www.fao.org/publications/fofa/en/>

““Business as usual” is no longer an option if the targets set by the 2030 Agenda for Sustainable Development – and specifically those directly concerning food and agriculture – are to be met. The high-input, resource-intensive farming systems that have caused massive deforestation, water scarcity, soil depletion, the loss of biodiversity, antimicrobial resistance of pests and diseases and high levels of GHG emissions cannot guarantee the sustainability of food and agricultural systems.”

This FOFA report bridges the knowledge gap regarding the future of food and agriculture. It does not provide a detailed list of specific policy measures to achieve an ideal future, which is beyond the scope of a global long-term foresight exercise. Rather, this report highlights global challenges for the future of food and agricultural systems, and discusses how tackling these challenges – or leaving them unaddressed – will affect the sustainability of food and agricultural systems. The report does address the question of managing food demand and changing peoples’ dietary preferences, with specific references to the need for high-income countries to consume less animal products, and for food waste and loss to be considerably reduced. Improved livestock management is also covered, in terms of “enhanced production technologies (such as agroforestry, organic agriculture, agroecology)”.

The report on the “**Economics of Biodiversity**”<sup>136</sup> – known as **the Dasgupta Review** - presents a comprehensive economic review of biodiversity and calls for an urgent and transformative change in how we think about and act towards the natural world and its economic value. The framework presented by the review is grounded in a deep understanding of ecosystem processes and how they are affected by human economic activity. The report argues that nature is our most precious asset but that rapid declines in biodiversity are undermining the resiliency and adaptability of nature. This, in turn, places human economies, livelihoods and well-being at risk.

David Attenborough is quoted in the foreword:

“Now we are plundering every corner of the world, apparently neither knowing or caring what the consequences might be. Each nation is doing so within its own territories. Those with lands bordering the sea fish not only in their offshore waters but in parts of the ocean so far from land that no single nation can claim them. So now we are stripping every part of both the land and the sea in order to feed our ever-increasing numbers.”<sup>137</sup>

“Today, we ourselves, together with the livestock we rear for food, constitute 96% of the mass of all mammals on the planet. Only 4% is everything else – from elephants to badgers, from moose to monkeys.” “We are destroying biodiversity, the very characteristic that until recently enabled the natural world to flourish so abundantly. If we continue this damage, whole ecosystems will collapse. That is now a real risk.”

*For interest, humans constitute 36% and livestock 60% of the 96% given above.*<sup>138</sup>

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<sup>136</sup> Wellbeing International Studies Repository. The Economics of Biodiversity: The Dasgupta Review. [https://www.wellbeingintlstudiesrepository.org/cgi/viewcontent.cgi?article=1000&context=es\\_gen](https://www.wellbeingintlstudiesrepository.org/cgi/viewcontent.cgi?article=1000&context=es_gen)

<sup>137</sup> Wellbeing International Studies Repository. The Economics of Biodiversity: The Dasgupta Review. [https://www.wellbeingintlstudiesrepository.org/cgi/viewcontent.cgi?article=1000&context=es\\_gen](https://www.wellbeingintlstudiesrepository.org/cgi/viewcontent.cgi?article=1000&context=es_gen)

<sup>138</sup> Rosane, Olivia. Humans and Big Ag Livestock Now Account for 96 Percent of Mammal Biomass. 23 May 2018. <https://www.ecowatch.com/biomass-humans-animals-2571413930.html#:~:text=Humans%20account%20for%20about%2036,than%20that%20of%20wild%20birds>.

The Headliner is: “We need a financial system that channels financial investments – public and private – towards economic activities that enhance our stock of natural assets and encourage sustainable consumption and production activities. Governments, central banks, international financial institutions and private financial institutions all have a role to play.” Major points that emerge: Current human activities are hugely damaging to the planet; Advocates regenerative agriculture and states “Diets rich in animal products have much higher footprints than those based on plant products”; Stresses need for a rethink of our ways of measuring economic success – a move away from GDP to a form of true cost accounting; Stresses the need for a rethink of human production and consumption; Highlights that taxes can be used to reduce environmentally damaging behaviour. Like the Stern report on climate, Dasgupta makes it clear that the cost of action to tackle biodiversity loss will be considerably lower than the cost of inaction leading to further biodiversity loss. This report shows the vital need for true cost accounting in the food system.

In 2022, IPBES produced a report which was a “**Methodological Assessment of the Diverse Values and Valuation of Nature**”<sup>139</sup>. This built on the Dasgupta work and the 2019 IPBES Global Assessment, which identified the role of economic growth as a key driver of nature loss, with 1 million species of plants and animals now at risk of extinction. The valuation of nature assessment found that humans need to value nature as well as profits to survive. The market-based focus on short-term profits and economic growth has led to the wider benefits of nature being ignored, which has led to bad decisions that have reduced people’s wellbeing and contributed to climate and nature crises. To achieve sustainable development, qualitative approaches need to be incorporated into decision making. This means properly valuing the spiritual, cultural and emotional values that nature brings to humans.<sup>140</sup>

This IPBES valuation of nature assessment included more than 13,000 references, including scientific papers, and indigenous and local sources of information. It was prepared in collaboration with experts in social science, economics and humanities. It pointed to the way nature is valued in political and economic decisions as both a key driver of the global biodiversity crisis and a vital opportunity to address it. Economic and political decisions have predominantly prioritised certain values of nature, particularly market-based instrumental values of nature, such as those associated with food produced intensively. Although often privileged in policymaking, these market values do not adequately reflect how changes in nature affect people’s quality of life. Furthermore, policymaking overlooks the many non-

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<sup>139</sup> IPBES (2022): Summary for policymakers of the methodological assessment of the diverse values and valuation of nature of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. U. Pascual, P. Balvanera, M. Christie, B. Baptiste, D. González-Jiménez, C.B. Anderson, S. Athayde, R. Chaplin-Kramer, S. Jacobs, E. Kelemen, R. Kumar, E. Lazos, A. Martin, T.H. Mwampamba, B. Nakangu, P. O’Farrell, C.M. Raymond, S.M. Subramanian, M. Termansen, M. Van Noordwijk, A. Vatn (eds.). IPBES secretariat, Bonn, Germany. 37 pages.  
<https://doi.org/10.5281/zenodo.6522392>  
[https://ipbes.net/media\\_release/Values\\_Assessment\\_Published#:~:text=Living%20from%20nature%20emphasizes%20nature's,thrive%20independently%20of%20human%20needs.](https://ipbes.net/media_release/Values_Assessment_Published#:~:text=Living%20from%20nature%20emphasizes%20nature's,thrive%20independently%20of%20human%20needs.)

<sup>140</sup> Weston, Pheobe. The Age of Extinction. Humans need to value nature as well as profits to survive, UN report finds. 11 July 2022. The Guardian. <https://amp.theguardian.com/cdn.ampproject.org/c/s/amp.theguardian.com/environment/2022/jul/11/humans-value-nature-survive-un-report-age-of-extinction>

market values associated with nature's contributions to people, such as climate regulation and cultural identity.

Clearly, predominant economic and political decisions have prioritised certain values of nature, particularly market-based instrumental values, often at the expense of non-market instrumental, relational and intrinsic values.<sup>141</sup>

The **EAT-Lancet Report** is an analysis of what could constitute a healthy diet from a sustainable food system, and which actions can support and speed up food system transformation. The full report is entitled: "Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems"<sup>142</sup>, and there is also a Summary Report.<sup>143</sup> This report stressed that current food systems threaten both human health and the environment. Among the key elements of sustainable food systems not included in the analysis was animal welfare. The authors wrote: "Furthermore, we acknowledge that food systems also affect society, culture, economy, and animal welfare. However, given the breadth and depth of the topics discussed, many important issues could not be discussed. These and other issues should be considered to achieve healthy diets from sustainable food systems".

Many aspects of the Eat-Lancet report were welcomed. However, the omission of many important aspects, including animal welfare has adversely impacted parts of the analysis. One concern is that the report overstates the value, and understates the adverse impacts, of increased fish consumption (with a dramatic increase in fish that would be consumed following the adoption of the reference diet, particularly if there is not massive reduction in food waste). Developing a reference diet that would increase by hundreds of billions, or by trillions, the number of sea creatures consumed appears to depend on 1) overstating the health benefits, specifically in respect to fish-derived omega 3 fatty acids<sup>144</sup> <sup>145</sup>; 2) understating the adverse environmental impacts of both marine fisheries and

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<sup>141</sup> IPBES (2022): Summary for policymakers of the methodological assessment of the diverse values and valuation of nature of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. U. Pascual, P. Balvanera, M. Christie, B. Baptiste, D. González-Jiménez, C.B. Anderson, S. Athayde, R. Chaplin-Kramer, S. Jacobs, E. Kelemen, R. Kumar, E. Lazos, A. Martin, T.H. Mwampamba, B. Nakangu, P. O'Farrell, C.M. Raymond, S.M. Subramanian, M. Termansen, M. Van Noordwijk, A. Vatn (eds.). IPBES secretariat, Bonn, Germany. 37 pages.

<https://doi.org/10.5281/zenodo.6522392>

[https://ipbes.net/media\\_release/Values\\_Assessment\\_Published#:~:text=Living%20from%20nature%20emphasizes%20nature's,thrive%20independently%20of%20human%20needs](https://ipbes.net/media_release/Values_Assessment_Published#:~:text=Living%20from%20nature%20emphasizes%20nature's,thrive%20independently%20of%20human%20needs).

<sup>142</sup> Prof Johan Rockström, PhD et al. The Lancet Commission. Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. Volume 393, Issue 10170. 2 February 2019. [https://doi.org/10.1016/S0140-6736\(18\)31788-4](https://doi.org/10.1016/S0140-6736(18)31788-4)

<sup>143</sup> Prof Johan Rockström, PhD et al. The Lancet Commission. Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. Summary Report. <https://eatforum.org/eat-lancet-commission/eat-lancet-commission-summary-report/>

<sup>144</sup> Visioli, Francesco and Agostoni, Carlo. Omega 3 Fatty Acids and Health: The Little We Know after All These Years. 6 January 2022. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8781196/>

<sup>145</sup> Thornton, Jacqui. Omega 3 supplements do not reduce risk of heart disease, stroke, or death, finds review. BMJ. 2018. <https://www.bmj.com/content/362/bmj.k3149>

aquaculture.<sup>146</sup>; and 3) inattention to animal welfare despite acknowledging it as a key element of sustainable food production practices.

More encouragingly, the authors pointed out that the “degree to which omega-3 fatty acids from plant sources can substitute omega-3 fatty acids from fish for other health outcomes is important to determine because plant sources are more widely available”. And asserted that reduced consumption of all animal products, including aquatic animals, could confer especially great benefits, stating: “Vegan and vegetarian diets were associated with the greatest reductions in greenhouse-gas emissions and land use, and vegetarian diets with the greatest reductions in water use. Diets that replaced ruminants with other alternatives, such as fish, poultry, and pork, also show reduced environmental effects, but to a smaller extent than plant-based alternatives. These studies show a diet including more plant-based foods than animal source foods would confer environmental benefits and improved health”.

The report stressed that current food systems threaten both human health and the environment and focussed on the need to feed a growing global population a healthy diet while reducing adverse impacts of food production on freshwater, biodiversity, climate change, nitrogen and phosphorus cycles, and land use. It stressed that transformation to healthy diets from sustainable food systems is necessary to achieve the UN Sustainable Development Goals and the Paris Agreement, and scientific targets for healthy diets and sustainable food production are needed to guide a “Great Food Transformation”.

The Commission quantitatively described a universal healthy reference diet, based on an increase in consumption of healthy foods (such as vegetables, fruits, whole grains, legumes, and nuts), and a decrease in consumption of unhealthy foods (such as red meat, sugar, and refined grains) that would provide major health benefits, and also increase the likelihood of attainment of the Sustainable Development Goals. This was set against the backdrop of defined scientific boundaries that would ensure a safe operating space within six Earth systems, towards sustaining a healthy planet.

Today, the double burden of malnutrition - the prevalence of both undernutrition and obesity - seems to represent the main food and nutrition security challenge. Inequality, not unavailability, is the main driver of food insecurity. The inability to access nutritious food due to poverty is the main reason people face undernutrition. What is increasingly of concern is that most of the poor and hungry people in the world - paradoxically - are farmers.<sup>147</sup>

Back in 2001, the World Bank was already pointing to the detrimental impacts of industrial livestock development. See ***Livestock Development - Implications for Rural Poverty, the***

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<sup>146</sup> Tyedmers, Peter H. et al. Fueling global fishing fleets. National Library of Medicine. Dec 2005. <https://pubmed.ncbi.nlm.nih.gov/16521840/>

<sup>147</sup> Roberts, Joanna. Inequality, not unavailability, is the main driver of food insecurity - Prof. Johan Swinnen. 6 May 2015. <https://ec.europa.eu/research-and-innovation/en/horizon-magazine/inequality-not-unavailability-main-driver-food-insecurity-prof-johan-swinnen>



***Environment and Global Food Security***<sup>148</sup> by Cornelius de Haan et al, World Bank, which explores not only detrimental environmental impacts, but also animal suffering. As well as environmental considerations, this report includes consideration of animal welfare. For example:

“Unbridled development of industrial production systems - high-density batteries for broilers and layers and sow tethering for intensive pig production - is likely to induce the use of livestock rearing techniques unfriendly to animals. These practices will be phased out in the European Union over the next decade, and they will become an increasingly important issue in the political economy of international development support and international trade.”

“Moreover, the increased climatic variability and recurrent drought induces great animal suffering.”

The report also suggests as an “efficient approach” seeking “policy changes that promote the internalisation of negative environmental externalities and thereby encourages animal-friendly forms of smallholder farming.”

***Compassion in World Farming (CIWF)*** has also compiled significant research on various environmental impacts of factory farming, the impacts on the SDGs, and what is needed to move towards sustainable food systems. Their reports are referenced below.<sup>149</sup>

## **4.3. Climate**

### **4.3.1. Climate Overview**

Climate change presents an existential threat of such magnitude that it has even been considered by the UN Security Council. The UN Secretary General, António Guterres, told the Security Council that climate change is a “crisis multiplier” that has profound implications for international peace and stability. Renowned Naturalist David Attenborough addressed the Security Council, calling climate change “the biggest threat to security that modern humans have ever faced”. In video remarks telecast at the outset, he warned that concentrations of carbon dioxide currently in the atmosphere have not been equalled for millions of years.

“If we continue on our current path, we will face the collapse of everything that gives us our security”, he said: “food production, access to fresh water, habitable ambient temperature and ocean food chains. The poorest — those with the least security — are certain to suffer”.<sup>150</sup>

The two largest carbon sinks on the planet, namely the ocean and the tropical forests, both depend in large part on the free movement of animals to maintain their capacity to

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<sup>148</sup> The World Bank. Directions in Development. Livestock Development. Implications for Rural Poverty, the Environment, and Global Food Security. November 2001. <https://documents1.worldbank.org/curated/en/306051468740146162/pdf/multi0page.pdf>

<sup>149</sup> CIWF. Research. Environment. <https://www.ciwf.org.uk/research/environment/?page=1> & <https://www.ciwf.org.uk/research/environment/?page=2>

<sup>150</sup> UN Security Council Press Release. Climate Change ‘Biggest Threat Modern Humans Have Ever Faced’, World-Renowned Naturalist Tells Security Council, Calls for Greater Global Cooperation. 23 February 2021. <https://www.un.org/press/en/2021/sc14445.doc.htm>

sequester carbon. Oceans and terrestrial ecosystems sequester approximately 5.6 gigatons of carbon per year. This is the equivalent of 60 percent of global anthropogenic emissions.<sup>151</sup> Many large tropical trees with a sizable contribution to carbon stock (for instance, 50 percent of all trees in the Amazon Forest) rely on large vertebrate animals for seed dispersal and regeneration.

A recent study found that defaunation (i.e., the reduction of large vertebrate animals) has the potential to significantly erode carbon storage.<sup>152</sup> Similarly, marine animals are responsible for much of the carbon sequestration in the ocean.<sup>153</sup>

In a vicious circle, the more climate change affects animal populations, their habitats and their migratory ranges, then the greater will be the disruption to seed dispersal, which is needed to bring plants and trees to certain areas. This will, in turn, impact climate change.

For many types of vegetation, the only way to migrate to a more favourable range is through the guts of mammals and birds. Half of all plant species rely on animals to scatter their seeds through scat, fur, or beaks. When animal populations decline, so does the ability plants have to disperse their seeds and adapt to climate change. Against the backdrop of a heating planet, species are shifting away from their historically-adapted climate conditions. Threats like deforestation, poaching and urbanisation are causing declines in mammals and bird species that can scatter seeds and help plants enter more liveable ranges. Sixty percent of all plants globally are already having trouble keeping up with climate change as seed-spreading species face major drops in population numbers. This strong reduction in the ability of plants to adapt to climate change through range shifts shows a synergy between defaunation and climate change that undermines vegetation resilience. The researcher, Fricke said in a statement: “We found regions where climate-tracking seed dispersal declined by 95%, even though they’d lost only a few percent of their mammal and bird species”, and he pointed to the vicious cycle in these words: “Plants rely on animals, and animals rely on plants. The disruption of those mutualistic interactions has the potential for cascading negative impacts on animals themselves.”<sup>154</sup> <sup>155</sup>

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<sup>151</sup> IPBES (2019). The global assessment report on Biodiversity and Ecosystem Services - [https://ipbes.net/sites/default/files/2020-02/ipbes\\_global\\_assessment\\_report\\_summary\\_for\\_policymakers\\_en.pdf](https://ipbes.net/sites/default/files/2020-02/ipbes_global_assessment_report_summary_for_policymakers_en.pdf)

<sup>152</sup> Bello, Carolina & Galetti, Mauro & Pizo, Marco & Luiz, Fernando & Magnago, Luiz & Rocha, Mariana & Lima, Renato & Peres, Carlos & Ovaskainen, Otso & Jordano, Pedro. (2015). Defaunation affects carbon storage in tropical forests. *Science Advances*. 1. e1501105. 10.1126/sciadv.1501105 - <https://advances.sciencemag.org/content/1/11/e1501105>

<sup>153</sup> UNEP. Business unusual: How “fish carbon” stabilizes our climate. <https://www.unenvironment.org/news-and-stories/story/business-unusual-how-fish-carbon-stabilizes-our-climate>

<sup>154</sup> Gamillo, Elizabeth. With Fewer Animals to Move Their Seeds, Plants Are Stuck in Threatened Habitats. *Smithsonian Magazine*. 24 January 2022. <https://www.smithsonianmag.com/smart-news/declines-in-seed-eating-animal-populations-are-affecting-plants-abilities-to-adapt-to-climate-change-180979448/#:~:text=an%20alarming%20rate,-,Mammal%20and%20bird%20losses%20cut%20a%20plant's%20ability%20to%20adapt,Fricke%20says%20in%20a%20statement>

<sup>155</sup> Fricke, C Evan. The effects of defaunation on plants’ capacity to track climate change. 13 January 2022. [https://www.science.org/doi/10.1126/science.abk3510?adobe\\_mc=MCMID%3D23496237109330321](https://www.science.org/doi/10.1126/science.abk3510?adobe_mc=MCMID%3D23496237109330321)



### 4.3.2. Climate and Food Systems

The food system today is destroying the environment upon which future food production depends.<sup>156</sup> The global food system as a whole (farming, transportation, packing, etc.) contributes 20 to 30 percent of anthropogenic greenhouse gas emissions – which are responsible for global warming because they trap heat that would otherwise escape from the atmosphere – and is the leading cause of deforestation (further exacerbating climate change).<sup>157</sup> According to the FAO, global livestock supply chains account for 14.5 percent of anthropogenic greenhouse gas (GHG) emissions.<sup>158</sup> More recent studies indicate that this may be even higher, and recommend updating this figure to 16.5%.<sup>159</sup> <sup>160</sup>

One easily readable overview of the nexus between farm animal welfare and climate change is the Compassion in World Farming (CIWF) report “Global Warning: Climate Change and Farm Animal Welfare”.<sup>161</sup>

Carbon dioxide is released via soil tilling and the transport of livestock and feed grains, such as corn and soy. It is also released by treating livestock-feed grains with nitrogen-based fertilisers and petroleum-based pesticides.<sup>162</sup> Methane, though lower in concentration in Earth’s atmosphere than CO<sub>2</sub>, is much more efficient in trapping heat. Methane emissions result mainly through the belching and flatulence of ruminant livestock, as well as storage of manure.<sup>163</sup> <sup>164</sup> Nitrous oxide, another major greenhouse gas, is also released primarily through animal waste.<sup>165</sup> According to the World Resources Institute, global emissions from

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[090067896552869644298%7CMCORGID%3D242B6472541199F70A4C98A6%2540AdobeOrg%7C  
TS%3D1643032255](https://www.cgispace.cgiar.org/bitstream/handle/10568/35584/FCRN-sustainable-healthy-diet.pdf)

<sup>156</sup> Garnett T. 2014. What is a sustainable healthy diet? A discussion paper. Oxford, United Kingdom: Food Climate Research Network (FCRN).

<https://cgispace.cgiar.org/bitstream/handle/10568/35584/FCRN-sustainable-healthy-diet.pdf>

<sup>157</sup> Garnett T. 2014. What is a sustainable healthy diet? A discussion paper. Oxford, United Kingdom: Food Climate Research Network (FCRN).

<https://cgispace.cgiar.org/bitstream/handle/10568/35584/FCRN-sustainable-healthy-diet.pdf>

<sup>158</sup> FAO. Livestock Environmental Assessment and Performance Partnership.

<https://www.fao.org/partnerships/leap/en/>

<sup>159</sup> Twine, Richard. Emissions from Animal Agriculture—16.5% Is the New Minimum Figure. 2 June 2021. <https://www.mdpi.com/2071-1050/13/11/6276>

<sup>160</sup> Xu, Xiaoming et al. Global greenhouse gas emissions from animal-based foods are twice those of plant-based foods. 13 September 2021. <https://www.nature.com/articles/s43016-021-00358-x>

<sup>161</sup> CIWF. GLOBAL WARNING: Climate Change and Farm Animal Welfare A Report by Compassion in World Farming. 2008, Revised 2009. <https://www.ciwf.org.uk/research/environment/global-warning/>

<sup>162</sup> Vermeulen, S. J. et al. (2012): Climate Change and Food Systems. Annual Review of Environment and Resources 37, p.195–222. <https://www.annualreviews.org/doi/abs/10.1146/annurev-environ-020411-130608>

<sup>163</sup> Bajželj, B., J. M. Allwood & J. M. Cullen (2013): Designing Climate Change Mitigation Plans That Add Up. Environ Sci Technol. 47, p.8062–8069. <https://pubs.acs.org/doi/10.1021/es400399h>

<sup>164</sup> Jackson, R. B. Increasing anthropogenic methane emissions arise equally from agricultural and fossil fuel sources. 15 July 2020. [https://iopscience.iop.org/article/10.1088/1748-9326/ab9ed2?hss\\_channel=tw-456864723](https://iopscience.iop.org/article/10.1088/1748-9326/ab9ed2?hss_channel=tw-456864723)

<sup>165</sup> Heinrich Böll Stiftung, GRAIN & Institute for Agriculture & Trade Policy (2017): Big Meat and Dairy’s supersized Climate Footprint. [03.03.2018] Available at <https://www.grain.org/article/entries/5825-big-meat-and-dairy-s-supersized-climate-footprint>

agriculture increased eight percent from 1990 to 2010, with population growth and dietary change being the greatest drivers.<sup>166</sup>

Feed production and processing, and digestive fermentation from ruminants are the two main sources of emissions, representing 45% and 39% of sector emissions, respectively. Manure storage and processing represent 10%. The remainder is attributable to the processing and transportation of animal products. Included in feed production, the expansion of pasture and feed crops into forests accounts for about 9% of the sector's emissions. Not included in those figures for livestock supply chain emissions are those caused by producing fish and other marine animals for human consumption, including via energy-intensive recirculating aquaculture systems (RAS). Cutting across categories, the consumption of fossil fuel along the sector supply chains accounts for about 20% of sector emissions.<sup>167</sup>

Beef and cattle milk production account for the majority of emissions, respectively contributing 41% and 20% of the sector's emissions. While pig meat and poultry meat and eggs contribute respectively 9% and 8% to the sector's emissions. The strong projected growth of this production will result in higher emission shares and volumes over time.<sup>168</sup>

A 2020 report by Feedback entitled: "It's Big Livestock versus the Planet: A case to cut off meat and dairy corporations' financial fodder"<sup>169</sup> stated that if industrial animal agriculture continues with its business-as-usual, the industry's growth will cause us to exceed our global emissions budget for 1.5°C. Within ten years, the livestock sector will account for almost half (49%) of the world's emissions budget for 1.5°C by 2030.<sup>170</sup> and 80% by 2050.<sup>171</sup> We have reached peak livestock. Industrial meat and dairy production are incompatible with a safe, ecologically sustainable life on earth. Meat and dairy production are as damaging to our planet as the fossil fuel industry. There is no version of industrial animal agriculture that is compatible with climate justice, and a zero-carbon future. Like other globalised sectors, the livestock industry relies on the financial, moral and political backing of thousands of institutional investors and creditors around the world: university endowments, sovereign wealth funds, banks, asset managers and public pensions. Vast flows of public and private finance prop up a fundamentally extractive business model, including staggering subsidies.

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<sup>166</sup> Ranganathan, Janet; Vennard, Daniel; Waite, Richard; Dumas, Patrice; Lipinski, Brian; Searchinger, Tim. (April 2016). "Installment 11 of 'Creating a Sustainable Food Future': Shifting Diets for a Sustainable Food Future." World Resources Institute. [https://kipdf.com/installment-11-of-creating-a-sustainable-food-future-shifting-diets-for-a-sustai\\_5aca2d681723dd4c5c7a7272.html](https://kipdf.com/installment-11-of-creating-a-sustainable-food-future-shifting-diets-for-a-sustai_5aca2d681723dd4c5c7a7272.html)

<sup>167</sup> FAO. Tackling Climate Change through Livestock. A global assessment of emissions and mitigation opportunities. <https://www.fao.org/3/i3437e/i3437e.pdf>

<sup>168</sup> FAO. Tackling Climate Change through Livestock. A global assessment of emissions and mitigation opportunities. <https://www.fao.org/3/i3437e/i3437e.pdf>

<sup>169</sup> Feedback., It's Big Livestock versus the Planet: A case to cut off meat and dairy corporations' financial fodder. Feedback Global. London, 2020. <https://feedbackglobal.org/wp-content/uploads/2020/04/Feedback-Big-Livestock-versus-the-Planet-Final-April-2020.pdf>

<sup>170</sup> Harwatt, H. Including animal to plant protein shifts in climate change mitigation policy: a proposed three-step strategy. Clim. Policy (2019) doi:10.1080/14693062.2018.1528965.

<sup>171</sup> GRAIN & IATP. Emissions impossible: How big meat and dairy are heating up the planet. (2018). <https://grain.org/article/entries/5976-emissions-impossible-how-big-meat-and-dairy-are-heating-up-the-planet>

Without concerted targeting of these financial flows, change is unlikely to occur at the pace required for a climate crisis.<sup>172</sup>

Worldwide, the top 20 meat and dairy corporations produce more greenhouse gas emissions than the whole of Germany.<sup>173</sup>

Food waste is also a significant problem. According to the FAO, a third of global food production is lost or wasted annually<sup>174</sup>, and food is the primary source of landfill gas. In the USA, for example, landfill gas is responsible for 17 percent of USA methane emissions. If integrated into a country ranking of top greenhouse gas emitters, food wastage would appear third, after USA and China, according to the latest data available. Furthermore, the problem keeps growing.<sup>175</sup>

92 countries have already included livestock in their Nationally Determined Contributions (NDCs) under the Paris Agreement.<sup>176</sup>

A 2021 CGIAR report on “Livestock management ambition in the new and updated nationally determined contributions: 2020-2021” analysed agricultural sub-sectors in national climate change strategies in more detail. For example, 34% of countries included livestock mitigation measures in new and updated NDCs (50 of 148 countries) compared to 35% in the previous NDCs (68 of 192 countries).<sup>177</sup>

However, GEO 6 reports that few governments have developed strategies for reducing greenhouse gas emissions from the agriculture and land-use sector (with the notable exception of forests); to date, no national government has fully included agriculture in a carbon pricing scheme.<sup>178</sup>

One interesting resource is Project Drawdown, which provides information and insight about climate solutions, including technical references.<sup>179</sup> For example, this has information

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<sup>172</sup> Feedback., It's Big Livestock versus the Planet: A case to cut off meat and dairy corporations' financial fodder. Feedback Global. London, 2020. <https://feedbackglobal.org/wp-content/uploads/2020/04/Feedback-Big-Livestock-versus-the-Planet-Final-April-2020.pdf>

<sup>173</sup> Heinrich Böll Stiftung, GRAIN & Institute for Agriculture & Trade Policy (2017): Big Meat and Dairy's supersized Climate Footprint. [03.03.2018] Available at <https://www.grain.org/article/entries/5825-big-meat-and-dairy-s-supersized-climate-footprint>

<sup>174</sup> FAO. Food Loss and Food Waste. <http://www.fao.org/food-loss-and-food-waste/en/>

<sup>175</sup> World Animal Net. Food Waste. <https://worldanimal.net/images/stories/documents/UNEA/Food-Waste.pdf>

<sup>176</sup> FAO. Livestock Environmental Assessment and Performance Partnership. <https://www.fao.org/partnerships/leap/en/>

<sup>177</sup> Rose, Sabrina et al. Livestock management ambition in the new and updated nationally determined contributions: 2020-2021. Analysis of agricultural sub-sectors in national climate change strategies. November 2021. <https://cgspace.cgiar.org/bitstream/handle/10568/115885/CCAFS%20Info%20Note%20Livestock%202021%20NDCs.pdf>

<sup>178</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6>

<sup>179</sup> Project Drawdown. <https://drawdown.org/about>

on the impacts of conservation agriculture.<sup>180</sup>, multi-strata agroforestry.<sup>181</sup> (of which silvopastoralism would be an example) and the change to plant-rich diets.<sup>182</sup> The latter begins by stating that: “Shifting to a diet rich in plants is a demand-side solution to global warming that runs counter to the meat-centric Western diet on the rise globally. That diet comes with a steep climate price tag: one-fifth of global emissions. If cattle were their own nation, they would be the world’s third-largest emitter of greenhouse gases. Plant-rich diets reduce emissions and also tend to be healthier, leading to lower rates of chronic disease. According to a 2016 study.<sup>183</sup>, business-as-usual emissions could be reduced by as much as 70 percent through adopting a vegan diet and 63 percent for a vegetarian diet, which includes cheese, milk, and eggs. \$1 trillion in annual health-care costs and lost productivity would be saved.

In June 2022, Project Drawdown updated world’s leading set of climate solutions - adding 11 new solutions for addressing the climate crisis. Plant-Rich Diets and Reduced Food Waste are now at the top of the potential impact list (Scenario 1).<sup>184</sup>

Livestock accounts for up to half of the technical mitigation potential of the agriculture, forestry and land-use sectors, through management options such as sustainable systems, improved waste management and reductions in the demand for livestock products. The mitigation potential of reductions in livestock product consumption is large.<sup>185</sup>

The GEO 6 report confirms that the agri-food system is responsible for significant environmental externalities, including greenhouse gas emissions, and is highly inefficient on an energy basis. Achieving the Sustainable Development Goals (SDGs) requires urgent action to reduce the agri-food system’s environmental footprint and increase its overall efficiency.<sup>186</sup>

The FAO’s Livestock’s Long Shadow report had this to say about livestock and climate change:

“The livestock sector accounts for 9 percent of anthropogenic CO2 emissions (those stemming from the burning of fossil fuels and the manufacture of cement). The largest share of this derives from land-use changes – especially deforestation – caused by expansion of pastures and arable land for feed crops. Livestock are responsible for much larger shares of some gases with far higher potential to warm the atmosphere. The sector emits 37 percent of anthropogenic methane (with 23 times the global warming potential (GWP) of CO2) most of

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<sup>180</sup> Drawdown Project. <https://drawdown.org/solutions/conservation-agriculture>

<sup>181</sup> Drawdown Project. <https://drawdown.org/solutions/multistrata-agroforestry>

<sup>182</sup> Drawdown Project. <https://drawdown.org/solutions/plant-rich-diets>

<sup>183</sup> Oxford Martin School. Plant-based diets could save millions of lives and dramatically cut greenhouse gas emissions. 21 March 2016. <https://www.oxfordmartin.ox.ac.uk/news/201603-plant-based-diets/>

<sup>184</sup> Hoff, Mary. Project Drawdown updates world’s leading set of climate solutions—adding 11 new solutions for addressing the climate crisis. 27 June 2022. <https://drawdown.org/news/insights/project-drawdown-updates-world%E2%80%99s-leading-set-of-climate-solutions%E2%80%99s-adding-11-new>

<sup>185</sup> Herrero, M., B. Henderson, P. Havlík, et al. (2016): Greenhouse gas mitigation potentials in the livestock sector. *Nature Clim. Change*. 6, p.452–461. <https://www.nature.com/articles/nclimate2925>

<sup>186</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6>

that from enteric fermentation by ruminants. It emits 65 percent of anthropogenic nitrous oxide (with 296 times the GWP of CO<sub>2</sub>), the great majority from manure.”<sup>187</sup>

Poor manure management practices are common on much of the world’s farms. Manure is often disposed of in piles, slurries or lagoons, which can lead to significant emissions of methane. Livestock manure also contributes to short-lived climate pollutant emissions through the burning of pastureland and the use of dung as a fuel for heating and cooking, which emit black carbon.<sup>188</sup> Whilst there is some potential for mitigation through improved manure management practices, this is far more difficult within confined intensive production systems.

Different production systems can also impact climate change. For example, a 2007 study by veterinary and animal production researchers carried out an environmental assessment of the raising of fattening pigs on the welfare-friendly straw-flow system compared to barren slatted floor systems. The conclusion was that the impact on global warming was greater for the slatted-floor system, so higher welfare had also helped climate change mitigation.<sup>189</sup>

The extensive grazing of livestock can provide some mitigation, although this effect is reversed if pastures are “over-grazed”, in particular by high stocking densities. Studies have shown that well-managed grazing can limit global warming impacts, whereas increasing livestock numbers are associated with more CH<sub>4</sub> and N<sub>2</sub>O emissions.<sup>190</sup> The global trend whereby grasslands are transitioning from a net cooling towards a net warming effect on climate can be attributed to the recent grassland management intensification for livestock production and the conversion of tropical forest to pasture. The projected continual growth in bovine and ovine meat production and consumption, especially an accelerated growth of milk demand and production, would result in a continual increase in grass biomass demand and thus increases in CH<sub>4</sub> and N<sub>2</sub>O emissions.<sup>191</sup> In addition to reduced animal stocking densities, grazing management that can increase carbon sequestration includes rotational grazing and excluding degraded pasturelands from livestock grazing.<sup>192</sup> Thus, there is a correlation between more extensive stocking densities on higher-quality pasture, and thus improved animal welfare potential, and climate change mitigation.

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<sup>187</sup> FAO. Livestock’s Long Shadow: Environmental Issues and Options 2006.

<https://www.fao.org/3/a0701e/a0701e.pdf>

<sup>188</sup> Climate and Clean Air Coalition. Livestock and Manure management.

<https://www.ccacoalition.org/en/activity/livestock-and-manure-management>

<sup>189</sup> Philippe, F. X et al. Gaseous emissions during the fattening of pigs kept either on fully slatted floors or on straw flow. *Animal* (2007), 1:10, pp 1515–1523 & The Animal Consortium 2007. doi: 10.1017/S1751731107000845

<sup>190</sup> Gosnell, Hannah and Stanley, Paige. Climate change mitigation as a co-benefit of regenerative ranching: insights from Australia and the United States. 14 August 2020

<https://doi.org/10.1098/rsfs.2020.0027> & Hawken P. 2017 Drawdown: the most comprehensive plan ever proposed to reverse global warming. New York, NY: Penguin.

<sup>191</sup> Chang, J., Ciais, P., Gasser, T. et al. Climate warming from managed grasslands cancels the cooling effect of carbon sinks in sparsely grazed and natural grasslands. *Nat Commun* 12, 118 (2021).

<https://doi.org/10.1038/s41467-020-20406-7>  
<https://www.nature.com/articles/s41467-020-20406-7>

<sup>192</sup> Rojas-Downing, Melissa et al. Science Direct. Climate change and livestock: Impacts, adaptation, and mitigation. *Climate Risk Management*, Vol 16 (2017).

<https://www.sciencedirect.com/science/article/pii/S221209631730027X>

However, the Food Climate Research Network's "Grazed and Confused" report<sup>193</sup> suggested that in many parts of the world the potential for grazing management to achieve sequestration is limited or absent, with ruminants remaining a substantial net contributor to greenhouse gas emission. That report also noted:

- Heavy grazing is a problem on many grazing lands: by reducing plant growth, it causes carbon losses from the system.
- Evidence as to the sequestration benefits of holistic, adaptive and other variants of rotational grazing is patchy and highly contradictory. Where there are benefits, these are small.
- The highly ambitious claims made about the potential for holistic grazing to mitigate climate change are wrong.
- The sequestration potential from grazing management is between 295–800 Mt CO<sub>2</sub>-eq/year: this offsets only 20-60% of annual average emissions from the grazing ruminant sector, and makes a negligible dent on overall livestock emissions.
- Expansion or intensification in the grazing sector as an approach to sequestering more carbon would lead to substantial increases in methane, nitrous oxide and land use change-induced CO<sub>2</sub> emissions.
- Practices that are optimal for achieving soil carbon sequestration may not be so for other environmental goals, such as biodiversity conservation.

However, agroecological systems can go further than this, providing sustainable production in environments that supply the needs of the animals resulting in good welfare, allow coexistence with a wide diversity of organisms native to the area, and minimise carbon footprint. There can be great increases in biodiversity in farmed areas. Conservation need not just involve tiny islands of natural vegetation in a barren world of agriculture. Herbivores, especially ruminants that consume materials inedible by humans, are important, but their diet should not be just ground-level plants. Silvopastoral systems, pastures with shrubs and trees as well as herbage are normally more productive than pasture alone, and have significant benefits for climate change and biodiversity.<sup>194</sup>

The use of shrubs and trees, as well as pasture plants, in animal production systems reduces greenhouse gas production in several ways. First, carbon loss from growing plants in silvopastoral systems is lower. Second, the loss of carbon from soil is less, because the structure of the soil is maintained better. Third, where trees are browsed, the area is more likely to be used continuously rather than for a short period, so there is less carbon loss when the trees or other plants are removed. Fourth, there is reduced methane production from ruminant animals feeding in the system.<sup>195</sup>

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<sup>193</sup> Food Climate Research Network. Grazed and confused? Oxford Martin. 2017.  
[https://www.oxfordmartin.ox.ac.uk/downloads/reports/fcrn\\_gnc\\_report.pdf](https://www.oxfordmartin.ox.ac.uk/downloads/reports/fcrn_gnc_report.pdf)

<sup>194</sup> Broom DM, Galindo FA, Murgueitio E. 2013 Sustainable, efficient livestock production with high biodiversity and good welfare for animals. *Proc R Soc B* 280: 20132025.  
<http://dx.doi.org/10.1098/rspb.2013.2025>

<sup>195</sup> Broom DM, Galindo FA, Murgueitio E. 2013 Sustainable, efficient livestock production with high biodiversity and good welfare for animals. *Proc R Soc B* 280: 20132025.  
<http://dx.doi.org/10.1098/rspb.2013.2025>



Whilst most studies have focused on reducing GHG emissions on the supply-side of the livestock production system, less research has focused on the demand section related to consumption of livestock products. However, shifting human dietary trends to achieve a reduction in meat and consumption has the potential to significantly reduce GHG emissions..<sup>196</sup>

The investor network FAIRR, which represents investors with \$52 trillion of assets under management who are concerned about the long-term sustainability of animal-based agriculture in its current guise, has published reports (February 2022 and April 2022) examining the global livestock and dairy sectors in the light of the IPCC's latest report on climate adaptation and mitigation. The reports emphasise the need for rapid, large-scale, globally coordinated efforts to improve climate resilience and rapidly cut emissions by accelerating the transition away from fossil fuels and reshaping systems of natural resource extraction, including agriculture and forestry. Without these changes, at least one-third of the global population will face an 'unliveable' future by 2050..<sup>197</sup>

FAIRR states that, in a business-as-usual scenario, the global beef production sector will lose \$38bn of value by 2050. There will also be losses of \$22bn for the dairy sector. A major cause of these losses is a decrease in the suitable land available for these sectors. The report forecasts that 10% of land currently suitable for animal agriculture and crops will be rendered unsuitable by 2050 in most warming scenarios. This will impact end-user farms and their feed supply chains. Cows and other animals will also be at greater risk of death from heat stress and dehydration – particularly in Australia and South America. FAIRR estimates that, in 2021, the US's dairy industry alone recorded revenue losses of at least \$897m due to heat stress. The cost for the US's beef industry stood at \$389m. Heat stress and poor nutrition are also linked to higher rates of infertility in animals like cows and pigs. Another driver of losses will be the implementation of new policies that support long-term net-zero ambitions, including carbon taxing. FAIRR argues that corporates are better prepared for these impacts than for the physical impacts of the climate crisis. The IPCC's mitigation report stated that "realising the full mitigation potential from the food system requires change at all stages from producer to consumer and waste management"..<sup>198</sup> <sup>199</sup>

A 2022 study showed that high-income countries could cut their agricultural emissions by 61% while sequestering as much as 98.3 (55.6–143.7) GtCO<sub>2</sub> equivalent, equal to

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<sup>196</sup> Rojas-Downing, Melissa et al. Science Direct. Climate change and livestock: Impacts, adaptation, and mitigation. Climate Risk Management, Vol 16 (2017). <https://www.sciencedirect.com/science/article/pii/S221209631730027X>

<sup>197</sup> George, Sarah. Report: Meat and dairy industry must urgently innovate towards plant-based in face of climate crisis. FAIRR. 4 May 2022. <https://www.edie-net.cdn.ampproject.org/c/s/www.edie.net/report-meat-and-dairy-industry-must-urgently-innovate-towards-plant-based-in-face-of-climate-crisis/?amp=true> & <https://www.fairr.org/article/food-systems-and-livestock-production-under-climate-change/>

<sup>198</sup> George, Sarah. FAIRR. Report: Meat and dairy industry must urgently innovate towards plant-based in face of climate crisis. 4 May 2022. <https://www.edie-net.cdn.ampproject.org/c/s/www.edie.net/report-meat-and-dairy-industry-must-urgently-innovate-towards-plant-based-in-face-of-climate-crisis/?amp=true> & <https://www.fairr.org/article/food-systems-and-livestock-production-under-climate-change/>

<sup>199</sup> IPCC. IPCC Sixth Assessment Report: Mitigation of Climate Change. [https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC\\_AR6\\_WGIII\\_Full\\_Report.pdf](https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_Full_Report.pdf)



approximately 14 years of current global agricultural emissions until natural vegetation matures, through a dietary shift from animal-based to plant-based food; and free up a land area as large as the European Union by substantially reducing their intake of animal products.<sup>200</sup> Another study by Oxford Martin School researchers published in the journal Proceedings of National Academy of Sciences showed that a global switch to diets that rely less on meat and more on fruit and vegetables could save up to 8 million lives by 2050, reduce greenhouse gas emissions by two thirds, and lead to healthcare-related savings. It could also avoid climate-related damages of US\$1.5 trillion.<sup>201</sup>

In a recent report entitled “The Untapped Climate Opportunity in Alternative Proteins”<sup>202</sup>, the Boston Consulting Group (BCG) confirmed the value of investing in alternative proteins as a climate change strategy:

“Investing in the alternative proteins segment has one of the biggest impacts on decarbonisation when assessed in terms of the market value of avoided CO<sub>2</sub>e emissions per dollar invested in mitigation efforts. We call this impact of capital employed (IoCE) - and investments in alternative proteins produce IoCE that is magnitudes greater than corresponding decarbonisation investments in other high-emitting sectors of the economy, such as transportation or buildings, can achieve”. This is clearly based on the assumption that alternative proteins replace animal-based proteins.

“For each dollar, investment in improving and scaling up the production of meat and dairy alternatives resulted in three times more greenhouse gas reductions compared with investment in green cement technology, seven times more than green buildings and 11 times more than zero-emission cars. Investment in alternative proteins, also including fermented products and cell-based meat, has jumped from \$1bn (£830m) in 2019 to \$5bn in 2021, BCG said. Alternatives make up 2% of meat, egg and dairy products sold, but will rise to 11% in 2035 on current growth trends, the report said. This would reduce emissions by an amount almost equivalent to global aviation’s output. But BCG said meat alternatives could grow much faster with technological progress resulting in better products, scaled-up production and regulatory changes making marketing and sales easier.”<sup>203</sup>

Representative surveys in various countries carried out in connection with the Meat Atlas 2021 found a surprising amount of public support for reduced consumption of meat. Another example is that a recent survey for the European Investment Bank of 30,000

<sup>200</sup> Sun, Zhongxiao et al. Nature Food, Volume 3. Dietary change in high-income nations alone can lead to substantial double climate dividend. January 2022. [www.nature.com/natfood](https://www.nature.com/natfood) 29. [https://www.nature.com/articles/s43016-021-00431-5.epdf?sharing\\_token=Uy1qkqxSXRCFFxqXMC-juNRqN0jAjWel9jnR3ZoTv0N2FyxYfUZnImV-FtBguc\\_Z3evcJzAo3FJKL2SiZ5fsD1sXAZT9UfcnDkoDcnB-S0BM16kgeEgNim5Zqod\\_BU8BChZEHPHOFOLojolJmT1ek4e-Ai14a7kMqyT983zMQ%3D](https://www.nature.com/articles/s43016-021-00431-5.epdf?sharing_token=Uy1qkqxSXRCFFxqXMC-juNRqN0jAjWel9jnR3ZoTv0N2FyxYfUZnImV-FtBguc_Z3evcJzAo3FJKL2SiZ5fsD1sXAZT9UfcnDkoDcnB-S0BM16kgeEgNim5Zqod_BU8BChZEHPHOFOLojolJmT1ek4e-Ai14a7kMqyT983zMQ%3D)

<sup>201</sup> Oxford University. Veggie-based diets could save 8 million lives by 2050 and cut global warming. 22 March 2016. <https://www.ox.ac.uk/news/2016-03-22-veggie-based-diets-could-save-8-million-lives-2050-and-cut-global-warming>

<sup>202</sup> Morach, Benjamin et al. The Untapped Climate Opportunity in Alternative Proteins. Food for Thought. 8 July 2022. <https://www.bcg.com/ja-jp/publications/2022/combating-climate-crisis-with-alternative-protein>

<sup>203</sup> Carrington, Damian. Plant-based meat by far the best climate investment, report finds. 7 July 2022. The Guardian. [https://www.theguardian.com/environment/2022/jul/07/plant-based-meat-by-far-the-best-climate-investment-report-finds?fbclid=IwAR2pbYepdsB9MsGAAtj3eOX0G6yTr7Xa\\_tq1xiVRBuc0suUMbpwPgX09aJrw](https://www.theguardian.com/environment/2022/jul/07/plant-based-meat-by-far-the-best-climate-investment-report-finds?fbclid=IwAR2pbYepdsB9MsGAAtj3eOX0G6yTr7Xa_tq1xiVRBuc0suUMbpwPgX09aJrw)

respondents in 30 countries found that 78 percent of Chinese respondents, 65 percent of those in the EU, and 54 percent of those in the United States, supported reductions in red meat consumption to fight climate change.<sup>204</sup> Some countries are already taking or considering policy measures in this direction. For example, the Chinese government has for some time spoken of plans to decrease the country's meat consumption by 50% by 2030 to reduce carbon emissions and prevent obesity. But this has yet to be translated into a national strategy, although dietary guidelines recommend eating less red meat.<sup>205</sup> In its official five-year agricultural plan, which was launched on January 26<sup>th</sup> 2020, China included cultivated meats and other “future foods” like plant-based eggs as part of its blueprint for food security going forward.<sup>206</sup> Singapore has also been looking at the inclusion of alternative proteins as part of their food security/resilience plans. The country has no desire to resume animal agriculture to achieve food security, so the only option would be to ramp up the production of alternative proteins (proteins from alternative sources - examples include plants, microalgae and cell-based, or cultivated meat).<sup>207</sup>

There has also been discussion of a possible meat tax in some European countries, with the latest being a call from the German Federal Health Minister for a meat tax combined with subsidies for alternative products. He called for a dramatic reduction in meat consumption worldwide (which could be 80% over the long-term) because it is “simply very difficult to produce meat without massive CO2 waste”. Meat consumption is declining rapidly in Germany. A new coalition government was formed in Germany in 2021 and the coalition agreement included a commitment to promote and advocate for alternative protein products.<sup>208</sup>

A recent paper includes useful estimates of the environmental social costs associated with meat consumption, and finds that meat is significantly under-priced. The authors conclude by identifying several directions for future research on optimal meat taxation.<sup>209</sup>

### 4.3.3. Climate Change and Oceans

The main natural carbon sinks are plants, trees, the ocean and the soil. Phytoplankton are the main reason the ocean is one of the biggest carbon sinks. These microscopic marine

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<sup>204</sup> Heinrich Boll Stiftung, EU. Active state: the political economy of transforming the meat system. 7 September 2021. <https://eu.boell.org/en/2021/09/07/active-state-political-economy-transforming-meat-system>

<sup>205</sup> The Lancet Regional Health – Western Pacific. What to eat for a healthier China? 1 June 2022. DOI: <https://doi.org/10.1016/j.lanwpc.2022.100525>

<sup>206</sup> China's five-year agricultural plan. <http://www.moa.gov.cn/govpublic/KJJYS/202112/P020220106615353271383.pdf>

<sup>207</sup> Wan, Dr. Andrew. Alternative Proteins: Can They Boost Singapore's 30 by 30 and Our Chicken Supply? 5 July 2022. <https://www.a-star.edu.sg/News/a-star-news/news/features/alternative-proteins-can-they-boost-singapore-s-30-by-30-and-our-chicken-supply>

<sup>208</sup> Vegconomist. German Federal Health Minister Calls for 80% Cut in Meat Consumption. 28<sup>th</sup> January 2022. <https://vegconomist.com/politics-law/german-federal-health-minister/>

<sup>209</sup> Funke, Franzisca at al. Here's an additional recent paper on how a meat tax could work: Toward Optimal Meat Pricing: Is It Time to Tax Meat Consumption? Review of Environmental Economics and Policy. Summer 2022. <https://www.journals.uchicago.edu/doi/10.1086/721078>

algae and bacteria play a huge role in the world's carbon cycle – absorbing about as much carbon as all the plants and trees on land combined..<sup>210</sup>

The oceans cover over 70% of the Earth's surface and play a crucial role in taking up CO<sub>2</sub> from the atmosphere. Estimates have suggested that around a quarter of CO<sub>2</sub> emissions that human activity generates each year is absorbed by the oceans..<sup>211</sup> However, recently scientists have shown that the ocean carbon “sink” could be even larger..<sup>212</sup>

Before the industrial era, the ocean was a net source of CO<sub>2</sub>. However, the increasing atmospheric CO<sub>2</sub> concentrations, driven by human-caused emissions are forcing the ocean to now absorb this gas. While the ability of the ocean to capture and store carbon has helped to slow the accumulation of atmospheric CO<sub>2</sub> – and, hence, the pace of global warming – it has come at a cost. Increasing CO<sub>2</sub> in the ocean alters the chemistry of seawater – an effect known as ocean acidification – which has negative impacts on marine life..<sup>213</sup> This is due to increase with the higher temperatures of global warming.

Another serious impact of livestock farming is its contribution to dead zones in the ocean, which are like oceanic deserts unable to support marine life. These areas are caused by eutrophication, leading to excessive blooms of algae that deplete underwater oxygen levels. Dead zones occur around the world, but primarily near areas where heavy agricultural and industrial activity spill nutrients in fields and waterways, some of which ends up in the ocean. In developed countries, animal manure and heavy use of commercial fertilisers are the main cause of eutrophication. (Whereas in developing countries, dumped untreated sewage and industrial wastes are the main contributors.)<sup>214</sup>

Scientists have identified 415 dead zones worldwide. The largest dead zone in the world lies in the Arabian Sea, covering almost the entire 63,700 square mile Gulf of Oman. The second-largest dead zone is probably the most infamous, and is located in the Gulf of Mexico in the USA close to where the Mississippi River joins the ocean. The Mississippi river is nutrient-laden because it – and its tributaries – drain farms up and down the US Midwest. This dead zone changes in size each year, but in 2021 measured around 6,334 square

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<sup>210</sup> Lisbdnet.com When an Animal or Plant Dies, Where Does the Carbon Go?? 24 November 2021. <https://lisbdnet.com/when-an-animal-or-plant-dies-where-does-the-carbon-go/>

<sup>211</sup> Shutler, Dr. Jamie & Watson, Prof. Andy. Guest post: The oceans are absorbing more carbon than previously thought. 28 September 2020. <https://www.carbonbrief.org/guest-post-the-oceans-are-absorbing-more-carbon-than-previously-thought>

<sup>212</sup> Watson, A.J., Schuster, U., Shutler, J.D. *et al.* Revised estimates of ocean-atmosphere CO<sub>2</sub> flux are consistent with ocean carbon inventory. *Nat Commun* **11**, 4422 (2020). <https://doi.org/10.1038/s41467-020-18203-3>

<sup>213</sup> Shutler, Dr. Jamie & Watson, Prof. Andy. Guest post: The oceans are absorbing more carbon than previously thought. 28 September 2020. <https://www.carbonbrief.org/guest-post-the-oceans-are-absorbing-more-carbon-than-previously-thought>

<sup>214</sup> FoodPrint. How Industrial Agriculture Affects Our Water. Published 18 October 2018. Last updated 18 September 2019. <https://foodprint.org/issues/how-industrial-agriculture-affects-our-water/>

miles.<sup>215</sup> These dead zones are releasing one of the worst greenhouse gases, nitrous oxide (N<sub>2</sub>O).<sup>216</sup>

When human-caused emissions of carbon dioxide enter the atmosphere, some of the gas is absorbed by the ocean, a process that can help to slow carbon accumulation in the atmosphere and the global temperature increases that go with it. Part of this is due to upwelling of cold water from the deep ocean. Once at the surface, colder, nutrient-rich water absorbs CO<sub>2</sub> from the atmosphere—usually with the help of photosynthesizing organisms called phytoplankton—before sinking again.<sup>217</sup>

Historically, there has been insufficient knowledge of marine vertebrates' climate change functions and so these have been largely overlooked in policy-making. However, there is much known about marine vertebrate biology, behaviour and ecology, and this can be used through the lens of nutrient cycling and climate change. Marine vertebrates influence carbon outcomes in the ocean, including the capacity of ecosystems to release, fix, store, or sequester carbon. Marine vertebrates themselves also function as carbon stores and contribute to carbon flux (downward movement of carbon to deeper waters and sediment).<sup>218</sup> There is now a clear need to include consideration of these functions both in policies on climate change mitigation and adaptation, and in the protection of marine vertebrate populations.

UNEP itself has recognised the fact that oceans, and all marine life that lives under and above the water, play a central role in stabilising the Earth's climate – providing a vital source of food to a vast number of land and water species and regulating the amount of CO<sub>2</sub> that stays in the atmosphere by absorbing 30 per cent of global emissions. “Fish carbon” is a term used to describe the carbon interactions of all marine vertebrates that contribute to the oceans' carbon sequestration: turtles, sea birds, mammals such as whales and dolphins, and fish such as sharks, tuna and sardines. UNEP has links to various relevant resources on fish carbon, whale carbon and blue carbon on its webpage on this subject.<sup>219</sup>

Fish Carbon interactions are summarised in the 2014 report “Fish Carbon: Exploring Marine Vertebrate Carbon Services”.<sup>220</sup> Fish Carbon mechanisms are the natural life processes of

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<sup>215</sup> Howard, Jenny. Dead zones, explained: Few marine organisms can survive the toxic low-oxygen conditions of dead zones. Here's how our agricultural practices make them worse. National Geographic. 31 July 2019. <https://www.nationalgeographic.com/environment/article/dead-zones> \

<sup>216</sup> Science Alert. Jameson, Brett. Ocean 'Dead Zones' Are Releasing One of The Worst Greenhouse Gases. The Conversation. 6 July 2021. <https://www.sciencealert.com/this-powerful-greenhouse-gas-is-on-the-rise-from-ocean-dead-zones>

<sup>217</sup> Earth Observatory. Study Confirms Southern Ocean is Absorbing Carbon. 15 August 2012. <https://earthobservatory.nasa.gov/images/149274/study-confirms-southern-ocean-is-absorbing-carbon>

<sup>218</sup> Martin, Angela Helen et Al. Integral functions of marine vertebrates in the ocean carbon cycle and climate change mitigation. One Earth, Volume 4, Issue 5, Pages 680-693. 21 May 2021. <https://doi.org/10.1016/j.oneear.2021.04.019>

<sup>219</sup> UNEP. Business unusual: How “fish carbon” stabilizes our climate. <https://www.unenvironment.org/news-and-stories/story/business-unusual-how-fish-carbon-stabilizes-our-climate>

<sup>220</sup> Lutz SJ, Martin AH. Blue Solutions. Fish Carbon: Exploring marine vertebrate carbon services. 2014. <http://bluesolutions.org/dev/wp-content/uploads/2015/07/Fish-Carbon-2014.pdf>

marine vertebrates that enable capture of atmospheric carbon, allow carbon storage in benign form in the ocean, and provide a potential buffer against ocean acidification. While these marine vertebrate carbon services are not included in most models of carbon cycling, mounting scientific evidence suggests that animals such as whales, sharks, tuna, turtles, otters, dugongs, sea birds and deep-sea fish can provide critical pathways, pumps and trophic cascades that:

1. Enhance uptake of carbon in the oceans by plants;
2. Facilitate transport of carbon from ocean surface to deep water and sediment; and
3. Provide a pH buffer against ocean acidification.

While reducing emissions remains at the forefront of national and international climate change initiatives, the vital function of healthy ocean ecosystems as carbon sinks, including the contribution of marine vertebrates, is largely overlooked in the policy arena and may be undervalued.<sup>221</sup>

Marine biologists discovered some time ago that whales—especially the great whales—play a significant role in capturing carbon from the atmosphere. The carbon capture potential of whales is startling. Whales accumulate carbon in their bodies during their long lives. When they die, they sink to the bottom of the ocean; each great whale sequesters 33 tons of CO<sub>2</sub> on average, taking that carbon out of the atmosphere for centuries. A tree, meanwhile, absorbs only up to 48 pounds of CO<sub>2</sub> a year. So, protecting whales could add significantly to carbon capture.<sup>222</sup>

The U.S. government estimates that 90 percent of the world's global warming has taken place in the oceans. The phenomenon is exacerbated by other factors in the water, including overfishing and destructive fishing practices, seabed mining, and plastic and chemical pollution.<sup>223</sup>

A ground-breaking study<sup>224</sup> written by 26 marine biologists, climate experts and economists, published in *Nature* in March 2021, concluded that fishing boats that trawl the ocean floor release as much carbon dioxide as the entire aviation industry. Bottom trawling, a widespread practice in which heavy nets are dragged along the seabed, pumps out 1 gigaton of carbon every year.<sup>225</sup>

Contrary to most terrestrial organisms, which release their carbon into the atmosphere after death, carcasses of large marine fish sink and sequester carbon in the deep ocean.

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<sup>221</sup> Lutz SJ, Martin AH. Blue Solutions. Fish Carbon: Exploring marine vertebrate carbon services. 2014. <http://bluecsolutions.org/dev/wp-content/uploads/2015/07/Fish-Carbon-2014.pdf>

<sup>222</sup> Chami, Ralph et al. Nature's Solution to Climate Change. Finance & Development. December 2019, Vol 56, No 4. <https://www.imf.org/external/pubs/ft/fandd/2019/12/natures-solution-to-climate-change-chami.htm>

<sup>223</sup> Julin, Rosie. The U.N. Treaty That Could Be the Oceans' Last Great Hope  
With a big push from a coalition of nearly 50 countries, can the landmark agreement pass?  
Foreign Policy. 10 March 2022. <https://foreignpolicy.com/2022/03/10/un-high-seas-treaty-oceans-climate-bbnj/>

<sup>224</sup> Sala, Enric. Protecting the global ocean for biodiversity, food and climate. *Nature*. 17 March 2021. <https://www.nature.com/articles/s41586-021-03371-z>

<sup>225</sup> McVeigh, Karen. Bottom trawling releases as much carbon as air travel, landmark study finds. *The Guardian*. 17 March 2021. <https://www.theguardian.com/environment/2021/mar/17/trawling-for-fish-releases-as-much-carbon-as-air-travel-report-finds-climate-crisis>

Marine fisheries have depleted most fish stocks relative to preindustrial levels, thereby removing enormous amounts of blue carbon from the ocean when fisheries catches were landed, processed, and consumed, therefore emitting atmospheric CO<sub>2</sub>. Furthermore, government policies - including subsidies - have enabled fishing fleets to travel vast distances and burn large amounts of fossil fuel to reach remote fishing grounds in the high seas. It has been estimated that more than half of the high-seas fishing grounds would be economically unprofitable for fishing fleets to operate in the absence of subsidies. Therefore, overexploiting fish stocks has likely reduced or even annihilated the contribution of marine vertebrates to blue carbon sequestration over vast ocean areas for decades.<sup>226</sup>

United Nations Member States have tried for years to reach a global agreement that would protect marine life on the high seas—those parts of the world’s oceans that fall beyond the jurisdiction of any individual country. A high seas treaty would regulate marine activity on the high seas, curbing overfishing, mining, polluting, and other actions that threaten biodiversity and accelerate climate change, and expand the area of marine protected areas. This is hugely important for protecting the world’s biodiversity and limiting the impact of climate change. However, Member States have been criticised for dragging their feet over the glacial progress.<sup>227 228</sup>

Marine protected areas help to protect and restore ecosystems and rebuild fish populations. They also play an important role in sequestering carbon and reducing emissions from sources such as habitat degradation. The Aichi targets agreed under the Convention for Biological Diversity (CBD) required at least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas to be protected by 2020.<sup>229</sup> Although the SDGs do not require a specific percentage of terrestrial areas to be protected, they do require (Target 14.5) at least 10 per cent of coastal and marine areas to be conserved by 2020, consistent with national and international law and based on the best available scientific information.<sup>230</sup> However, many marine protected areas are placed where they minimise conflict with stakeholders, rather than where biodiversity is most threatened. The majority of MPAs are situated within jurisdictional waters, and coverage of the high seas remains low.<sup>231</sup> While progress is being made towards increasing the global coverage of marine protected areas, significantly greater efforts are needed to ensure these are also being located in areas that are under threat and can therefore yield greatest environmental benefits, and that they are effectively managed. It is one thing to draw a line on a map, and another to effectively monitor, manage and enforce protected areas.<sup>232</sup> Many marine

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<sup>226</sup> Mariani, Gaël et al. Let more big fish sink: Fisheries prevent blue carbon sequestration—half in unprofitable areas. *Science Advances*. <https://www.science.org/doi/10.1126/sciadv.abb4848>

<sup>227</sup> McVeigh, Karen. UN ocean treaty summit collapses as states accused of dragging out talks. *The Guardian*. 21 March 2022. [https://www.theguardian.com/environment/2022/mar/21/un-ocean-treaty-summit-collapses-as-states-accused-of-dragging-out-talks?CMP=Share\\_iOSApp\\_Other](https://www.theguardian.com/environment/2022/mar/21/un-ocean-treaty-summit-collapses-as-states-accused-of-dragging-out-talks?CMP=Share_iOSApp_Other)

<sup>228</sup> Also noting the most recent round in August:

IISD. 5th Session of the Intergovernmental Conference (IGC) on the BBNJ. 15–26 August 2022. <https://enb.iisd.org/marine-biodiversity-beyond-national-jurisdiction-bbnj-igc5>

<sup>229</sup> CBD. Aichi target 11. <https://www.cbd.int/aichi-targets/target/11>

<sup>230</sup> Global Goals. SDG 14 Life below water. <https://www.globalgoals.org/goals/14-life-below-water/>

<sup>231</sup> CBD. Progress Towards the Aichi Targets: An Assessment of Biodiversity trends, Policy Scenarios and Key Actions. 2014. <https://www.cbd.int/doc/publications/cbd-ts-78-en.pdf>

<sup>232</sup> OECD. Marine Protected Areas Economics, Management and Effective Policy Mixes. 2017.



ecologists believe that the eventual MPA coverage will need to be much larger, with 30 per cent of the global ocean protected and another 50 per cent under sustainable management.<sup>233</sup>

The important role of oceans as carbon sinks has largely been neglected in international climate talks. Oceans are better at storing carbon than forests. In an even warmer future, ocean carbon sinks could help stabilise our planet. The Glasgow climate negotiations made some progress by, for the first time, anchoring oceans permanently into the multilateral climate change regime. But the Glasgow Climate Pact was still leagues from where it needed to be to adequately reflect the importance of oceans to our climate system. Since industrialisation, the ocean has absorbed 93% of human-generated heat and one-third of anthropogenic carbon dioxide (CO<sub>2</sub>). The consequences of this are profound, including the thermal expansion of water (the key cause of sea level rise), ocean acidification, deoxygenation (oxygen loss), and forcing marine life to redistribute to other places. Alarming, this may one day lead the ocean to reverse its current role as a carbon sink and release CO<sub>2</sub> back into the atmosphere, as its absorption ability declines.<sup>234</sup>

However, governments at COP26 in Glasgow set in place an annual dialogue under the UNFCCC to strengthen ocean and climate change action. The first mandated dialogue took place in Bonn in June 2022. This dialogue highlighted the vital importance of the ocean to livelihoods and biodiversity and as a fundamental component of the climate system, while highlighting the need for greater ocean-related climate action. The Ocean and Climate Change Dialogue is intended to act as a yearly stepping stone to greater ambition and action for ocean-climate action at national and international level - an imperative according to the UN.<sup>235</sup>

The aquaculture industry is often touted as an expanding source of protein. However, it also contributes to global warming, and has other destructive environmental impacts. The FAO quoted that an estimated that 385 million tonnes of CO<sub>2</sub> equivalent were emitted in 2010, around 7 percent of the emissions from agriculture.<sup>236</sup> Against these figures, consideration also needs to be given to the fact that fish compose a small amount of global protein intake (6.7%), which includes both fisheries and aquaculture.<sup>237</sup> Furthermore, aquaculture has been over-reliant on wild caught fish as feed (fish meal and fish oil), taking food away from

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<https://www.oecd.org/environment/resources/Marine-Protected-Areas-Policy-Highlights.pdf>

<sup>233</sup> Dudley, Nigel et al. Protected areas and the sustainable development goals. November 2017.

DOI: [10.2305/IUCN.CH.2017.PARKS-23-2ND.en](https://doi.org/10.2305/IUCN.CH.2017.PARKS-23-2ND.en) &

[https://www.researchgate.net/publication/321908693\\_Protected\\_areas\\_and\\_the\\_sustainable\\_development\\_goals](https://www.researchgate.net/publication/321908693_Protected_areas_and_the_sustainable_development_goals)

<sup>234</sup> The Conversation. The ocean is essential to tackling climate change. So why has it been neglected in global climate talks? 19 November 2021. <https://theconversation.com/the-ocean-is-essential-to-tackling-climate-change-so-why-has-it-been-neglected-in-global-climate-talks-171309>

<sup>235</sup> UN Climate Change. Bonn Dialogue Urges Ocean-Based Climate Action. 22 June 2022.

<https://unfccc.int/news/bonn-dialogue-urges-ocean-based-climate-action>

<sup>236</sup> FAO. Impacts of climate change on fisheries and aquaculture. Synthesis of current knowledge, adaptation and mitigation options. FAO Fisheries and Aquaculture Technical Paper 627. 2018.

<http://www.fao.org/3/i9705en/i9705EN.pdf>

<sup>237</sup> Sustainable Fisheries. What Does the World Eat? <https://sustainablefisheries-uw.org/seafood-101/what-does-the-world-eat/>



marine predators and impacting ecosystems and sustainability.<sup>238</sup> But against this backdrop, and the slow progress of the industry to move towards more sustainable production, there are now several initiatives world-wide that are developing cell-based fish, and plant-based fish alternatives are already on the shelves.<sup>239</sup> There are also other plant-based marine products such as "enriched seaweed", a natural superfood with extremely high nutritional value, which can be used in the future for the health food industry and to secure an unlimited food source.<sup>240</sup>

#### 4.3.4. Impact of Climate Change on Animals

Climate change will have a deep and wide impact on animals' lives and their welfare. Tolerance to environmental changes varies from one species to another, but many are unable to cope with the rapid pace of climate change. Some mammals have very specific climatic adaptations, such as requirements for snow, ice, or temperatures within a narrow range (such as for hibernation).<sup>241</sup> Climate change can also alter a species' food or water supply or its reproductive timing, thereby affecting its fitness. Animals can be stressed by the climate emergency and the challenges it brings, which can in turn exacerbate other ongoing threats including habitat destruction, hunting and other human-animal conflicts.<sup>242</sup> Indeed, this is already being witnessed, as in the case of hungry polar bears moving into areas closer to humans.<sup>243</sup>

Disasters exacerbated by climate change have already caused billions of animal injuries and deaths. For example, according to WWF, nearly three billion animals were harmed by Australia's fires<sup>244</sup>, and Hurricane Florence caused the deaths of at least 3.4 million farmed chickens in North Carolina alone.<sup>245</sup> Recent unprecedented heatwaves have caused animal

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<sup>238</sup> Shannon, Lynne and Waller, Lauren. A cursory look at the fishmeal/oil industry from an ecosystem perspective. *Frontiers in Ecology and Evolution*. 22 April 2021. <https://www.frontiersin.org/articles/10.3389/fevo.2021.645023/full>

<sup>239</sup> Richens, James et al. A Sustainable Ocean Economy in 2030. World Ocean Initiative. 2020. [https://cdn.vex.design/private/Y00jvgKIBvZ1anyDSJNPOAQcl082/\\_jLT9hiqu\\_A\\_sustainable\\_ocean\\_economy\\_in\\_2030\\_%20copy.pdf.pdf](https://cdn.vex.design/private/Y00jvgKIBvZ1anyDSJNPOAQcl082/_jLT9hiqu_A_sustainable_ocean_economy_in_2030_%20copy.pdf.pdf)

<sup>240</sup> Tel-Aviv University. New aquaculture technology can help ease the global food crisis 'Enriched seaweed' with extremely high nutritional value. *Science Daily*. 31 August 2022. <https://www.sciencedaily.com/releases/2022/08/220831094703.htm>

<sup>241</sup> United States Department of Agriculture. The effects of climate change on mammals. <https://www.fs.usda.gov/rmrs/effects-climate-change-mammals>

<sup>242</sup> Pilling, Dafydd and Hoffman, Irene. FAO. Climate Change and Animal Genetic Resources for Food and Agriculture: State of Knowledge, Risks and Opportunities. <https://www.fao.org/3/mb386e/mb386e.pdf>

<sup>243</sup> Lymbery, Philip. What Do Polar Bears Tell Us About Our Own Future? March 2022. <https://philip-ciwf.medium.com/what-do-polar-bears-tell-us-about-our-own-future-72dab8db22f7?source=social.linkedin>

<sup>244</sup> WWF. 3 billion animals harmed by Australia's fires. <https://www.worldwildlife.org/stories/3-billion-animals-harmed-by-australia-s-fires>

<sup>245</sup> CNBC. North Carolina's poultry sector suffered the loss of at least 3.4 million chickens and turkeys as a result of impacts from Hurricane Florence. <https://www.cnbc.com/2018/09/18/florence-hits-north-carolina-agriculture-drowns-1point7-million-chickens.html>

suffering and deaths. Some examples include: cattle in the USA<sup>246</sup>, millions of factory-farmed chickens in the UK<sup>247</sup>, livestock from desert regions of Pakistan, which were the primary source of income for the local population of 200,000<sup>248</sup>, and 7 million livestock in East Africa (Ethiopia, Kenya and Somalia)<sup>249</sup>.

Over the next 50 years, climate change could drive more than 15,000 new cases of mammals transmitting viruses to other mammals, according to a study published in *Nature*<sup>250</sup>. This modelling study is first to project how global warming will increase virus swapping between species through shifting wildlife habitats and increased encounters. The research predicts that much of the new virus transmission will happen when species meet for the first time as they move to cooler locales because of rising temperatures. Assuming that the planet warms by no more than 2 °C above pre-industrial temperatures this century the number of first-time meetings between species will double by 2070, creating virus-transmission hotspots, the study says.<sup>251</sup> This will have enormous impacts on both animal and human health and lives, increasing the risk of zoonotic pathogen emergence and future pandemics.

The climate emergency is also a major contributor to insect loss. In April 2022, researchers reported that the world's insects were in dramatic decline in both population and diversity due to the combination of climate change and expanding agriculture. In some areas, overall insect populations dropped nearly in half, with more than a quarter fewer species found.<sup>252</sup> Another study found that global warming contributed to a staggering 98% decline in Puerto Rico's tropical rainforest insect population between 1976 and 2013. This loss of insect species has devastating impacts on animals who rely on them as a food source. The loss of pollinating insects and those needed to keep soils healthy also has catastrophic consequences for agriculture.<sup>253</sup>

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<sup>246</sup> Chappell, Bill. Days of intense heat have killed thousands of cattle in Kansas. NPR. 16 June 2022. <https://www.npr.org/2022/06/16/1105482394/cattle-kansas-heat-wave>

<sup>247</sup> Isaac, Anna and Dalton, Jane. 'Carnage' as millions of factory farm chickens die in sweltering sheds during record heatwave. The Independent. 2 August 2022. <https://www.independent.co.uk/climate-change/news/factory-farm-chickens-die-heatwave-b2135519.html>

<sup>248</sup> Farrukh, Rimal. Record-Breaking Heatwave Is Killing Scores of Animals. Residents Blame the Government. Vice World News. 22 May 2022. <https://www.vice.com/en/article/m7v84a/heatwave-cholistan-pakistan-animals-death>

<sup>249</sup> Naidoo, Dominic. WATCH: Drought kills 7 million livestock in East Africa. IOL. <https://www.iol.co.za/news/environment/watch-drought-kills-7-million-livestock-in-east-africa-be72f4b9-45ce-424e-bb47-9cd2b9ea4be9>

<sup>250</sup> Carlson, C. J. et al. *Nature*. Climate change increases cross-species viral transmission risk. 2022. <https://doi.org/10.1038/s41586-022-04788-w>

<sup>251</sup> Gilbert, Natasha. Climate change will force new animal encounters — and boost viral outbreaks. 28 April 2022. <https://www.nature.com/articles/d41586-022-01198-w>

<sup>252</sup> Harvey, Chelsea. Insects Are Dying Off Because of Climate Change and Farming. 21 April 2022. <https://www.scientificamerican.com/article/insects-are-dying-off-because-of-climate-change-and-farming/>

<sup>253</sup> Lister, Bradford C and Garcia, Andres. PNAS. Climate-driven declines in arthropod abundance restructure a rainforest food web. 15 October 2018 <https://doi.org/10.1073/pnas.1722477115>

Another study announced in April 2022 that the climate crisis is pushing Earth's oceans toward a mass extinction event at a level not seen in about 250 million years, at the end of the Permian age when there was a catastrophic extinction of ocean species. Up to 90 percent of marine organisms went extinct due to overheated, acidic and deoxygenated oceans. The Great Dying, as it's sometimes called, wiped out more than half of all biological families, including more than 70 percent of land-dwelling vertebrates, leaving a clear mark in the fossil record. Yet carbon dioxide emissions from current human activity are twice as high as those that caused the Permian climate to shift.<sup>254</sup>

Climate change will increasingly impact marine ecosystems, fisheries and aquaculture alike. The FAO's Fisheries and Aquaculture Technical Paper on the impacts of climate change on fisheries and aquaculture documents a disturbing array of the impacts, and an even more disturbing picture of potential future trends. Short-term climate change impacts on aquaculture can include losses of production and infrastructure arising from extreme events such as floods, increased risks of diseases, parasites and harmful algal blooms. Long-term impacts can include reduced incomes and food security, as well as reduced precipitation leading to increasing competition for freshwater. A key message is that small-scale fishers and fish farmers are especially vulnerable to climate change because of both their geographical locations and their economic status.<sup>255</sup>

Research which modelled and mapped the effect of warming ocean conditions on marine aquaculture production potential over the next century found that coastal countries should expect their overall potential for aquaculture production to decline over time, as water temperatures rise and oceans undergo other shifts due to a changing climate. With over one-third of aquaculture produced in marine waters and this proportion increasing, this is a serious concern which needs to be addressed. The region that currently accounts for 90 percent of the world's total production – Indo-Pacific countries such as China, Bangladesh, and Indonesia – will likely feel the biggest impacts. Without intervention, by mid-century declines in finfish could be as high as 30 percent in some areas, and there is even the risk of a complete loss of suitable waters for bivalves. The authors stated: "Climate change is impacting marine aquatic farmers now, and it's likely to get worse for most of the world if we don't take mitigating measures."<sup>256</sup>

Climate change is an immediate and future threat to food security globally. The consequences for fisheries and agriculture production potential are well studied, yet the possible outcomes for aquaculture (that is, aquatic farming) - one of the fastest growing food sectors on the planet - remain a major gap in scientific understanding. At the same

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<sup>254</sup> Berwyn, Bob. The Current Rate of Ocean Warming Could Bring the Greatest Extinction of Seafife in 250-Million Years. Inside Climate News. 28 April 2022.

<https://insideclimatenews.org/news/28042022/ocean-extinction-climate-change/>

<sup>255</sup> FAO. Impacts of climate change on fisheries and aquaculture. Synthesis of current knowledge, adaptation and mitigation options. FAO Fisheries and Aquaculture Technical Paper 627. 2018.

<http://www.fao.org/3/i9705en/i9705EN.pdf> &

<https://www.fao.org/policy-support/tools-and-publications/resources-details/en/c/1152846/>

<sup>256</sup> Froehlich, H.E., Gentry, R.R. & Halpern, B.S. Global change in marine aquaculture production potential under climate change. *Nat Ecol Evol* 2, 1745–1750 (2018). <https://doi.org/10.1038/s41559-018-0669-1>

time, climate change will affect livestock production through competition for natural resources, quantity and quality of feeds, livestock diseases, heat stress and biodiversity loss while the demand for livestock products is expected to increase by 100% by mid-21st century.<sup>257</sup>

Climate change is also likely to impact whales, dolphins and porpoises, by affecting the areas of ocean in which they live and their migration patterns. In turn, the loss of these animals would reduce the ability of the oceans to limit climate change, further exacerbating the problem. For example, climate change, depletion in the ozone layer and the related rise in UV radiation may also lead to a fall in the population of krill, a primary food source for many marine species.<sup>258</sup>

#### 4.3.5. Prevention and Mitigation

Various versions of the reports from the Intergovernmental Panel on Climate Change (IPCC)<sup>259</sup> have included some aspects of these considerations. But not in very great detail, and with limited stress on the significant impacts of industrial animal agriculture, aquaculture and overfishing on climate change; and limited stress of the massive mitigation potential of dietary change. Conversely, there was also limited emphasis on the enormous impacts of climate change on the welfare and lives of animals (what was included was only framed as references to ecosystems, biodiversity and species). This ignores the sentience of animals and the importance of their welfare and lives.

The Emissions Gap Report 2017 - A UN Environment Synthesis Report<sup>260</sup> brought together various findings. It stated that studies of emission reduction potentials for the agriculture sector varied widely, pointing out that IPCC AR5 studies of mitigation potentials in the agriculture sector excluded demand-side options. However, demand side mitigation options were included in an assessment in the Emissions Gap Report, albeit using dietary change models based on World Health Organisation recommendations. As a result of less agricultural demand from less land- and resource-intensive diets, total greenhouse gas emissions decreased by 0.37 to 1.37 GtCO<sub>2</sub> e/year in 2030, according to their modelling.

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<sup>257</sup> Rojas-Downing, Melissa et al. Science Direct. Climate change and livestock: Impacts, adaptation, and mitigation. Climate Risk Management, Vol 16 (2017).  
<https://www.sciencedirect.com/science/article/pii/S221209631730027X>

<sup>258</sup> WWF International. Whales in Hot Water. The Impact of a Changing Climate on Whales, Dolphins and Porpoises: A Call for Action the Impact of a Changing Climate on Whales, Dolphins and Porpoises: A Call for Action.  
[https://wwf.panda.org/discover/knowledge\\_hub/endangered\\_species/cetaceans/threats/climate\\_change.cfm](https://wwf.panda.org/discover/knowledge_hub/endangered_species/cetaceans/threats/climate_change.cfm)

<sup>259</sup> IPCC. Reports. <https://www.ipcc.ch/reports/>

<sup>260</sup> UNEP. The Emissions Gap Report 2017 A UN Environment Synthesis Report. November 2017.  
[https://wedocs.unep.org/bitstream/handle/20.500.11822/22070/EGR\\_2017.pdf?sequence=1&isAllowed=y](https://wedocs.unep.org/bitstream/handle/20.500.11822/22070/EGR_2017.pdf?sequence=1&isAllowed=y)

The type of references included in the Summary for Policymakers of the Climate Change 2022 report on Impacts, Adaptation and Vulnerability<sup>261</sup> (AR6) included:

1. Reflection on the impacts on food security, increased disease risk and emergence of zoonoses.
2. Impacts on ecosystems and biodiversity loss.
3. Mention that unsustainable agricultural expansion, driven in part by unbalanced diets, increases ecosystem and human vulnerability and leads to competition for land and/or water resources.
4. The vulnerability of climate-sensitive livelihoods (e.g., smallholder farmers, pastoralists, fishing communities).
5. In terrestrial ecosystems, 3 to 14% of species assessed will likely face very high risk of extinction at global warming levels of 1.5°C, increasing up to 3 to 18% at 2°C, 3 to 29% at 3°C, 3 to 39% at 4°C, and 3 to 48% at 5°C.
6. Adaptation options included agroecological principles and practices, ecosystem-based management in fisheries and aquaculture, and other approaches that work with natural processes support food security, nutrition, health and well-being, livelihoods and biodiversity, sustainability and ecosystem services.
7. Adaptation strategies which reduce food loss and waste or support balanced diets increasing connectivity between conserved or protected areas, targeted intensive management for vulnerable species and protecting refugial areas where species can survive locally. *(This underlines the importance of the Convention on the Conservation of Migratory Species of Wild Animals' work on Connectivity as a Key of Migration Systems and a Biological Basis for Coordinated International Conservation Policies)*.<sup>262</sup>.

The main message of the full report for the sixth assessment (AR6 2022)<sup>263</sup> was that the extent and magnitude of climate change impacts are larger than estimated in previous assessments, with substantial damages, and increasingly irreversible losses, in terrestrial, freshwater and coastal and open ocean marine ecosystems. Much of the messaging appears designed to garner more political will for action. It does also include some more detail on linkages with animal issues, but due to the length of the report, much of this will be lost on policy-makers. And also, there is no joined-up coverage which could clearly point the way to the transformations needed in the field of animal use and animal welfare in order to effectively address the climate crises.

However, on a positive note, the report did include New Harvest-funded research to support the inclusion of cellular agriculture and cultured meat as a potential mitigation measure. Dietary change is one of the most promising approaches for addressing climate change and other environmental challenges, and cellular agriculture and cultured meat

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<sup>261</sup> IPCC. Impacts, Adaptation and Vulnerability Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Summary for Policymakers. 2022. <https://www.ipcc.ch/reports/>

<sup>262</sup> CMS. Migratory Animals connect the Planet: the Importance of Connectivity as a Key of Migration Systems and a Biological Basis for Coordinated International Conservation Policies. <https://www.cms.int/en/document/migratory-animals-connect-planet-importance-connectivity-key-migration-systems-and>

<sup>263</sup> Intergovernmental Panel on Climate Change. Sixth Assessment Report. Climate Change 2022: Impacts, Adaptation and Vulnerability. Full Report. <https://report.ipcc.ch/ar6wg2/>

could support this move (being particularly important for those not yet ready to adopt plant-based diets). Indeed, dietary change is essential to the achievement of the dismantling of industrial systems which are inherently bad for animal welfare, the environment and climate change.

A recent modelling study reported in *Nature* suggested that replacing just 20% of global beef consumption with a meat substitute within the next 30 years could reduce methane emissions by 11%, halve deforestation and the carbon emissions associated with it compared to the “business-as-usual” scenario. The mitigating effects on deforestation are so great because, under this scenario, global demand for beef does not increase, so there is no need to expand pasture areas or cropland for feeding cattle.<sup>264</sup>

The IPCCs Special Report on Climate Change and Land<sup>265</sup> specifically mentioned the role of dietary change, with reduction of meat consumption and a move towards plant-based proteins. It stated that: “a dietary pattern that is higher in plant-based foods, such as vegetables, fruits, whole grains, legumes, nuts, and seeds, and lower in animal-based foods is more health-promoting and is associated with lesser environmental impact (GHG emissions and energy, land, and water use) than is the current average ‘meat-based’ diet”. However, at this stage there was no mention of cellular agriculture and cultured meat.

A 2022 study found that dietary change in high-income nation alone could lead to a substantial double climate dividend. A dietary shift from animal-based foods to plant-based foods in high-income countries would reduce greenhouse gas emissions from direct agricultural production and increase carbon sequestration if the resulting spared land was restored to its antecedent natural vegetation. The researchers estimated this double effect by simulating the adoption of the EAT–Lancet planetary health diet by 54 high-income nations representing 68% of global gross domestic product and 17% of population. Their results showed that such dietary change could reduce annual agricultural production emissions of high-income nations’ diets by 61% while sequestering as much as 98.3 (55.6–143.7) GtCO<sub>2</sub> equivalent, equal to approximately 14 years of current global agricultural emissions until natural vegetation matures. This amount could potentially fulfil high-income nations’ future sum of carbon dioxide removal (CDR) obligations under the principle of equal per capita CDR responsibilities.<sup>266</sup>

The IPCC’s sixth assessment report “Climate Change 2022: Mitigation of Climate Change”<sup>267</sup> also stressed the mitigation impacts of dietary change – moving away from meat and dairy towards plant-based proteins. There is specific mention of food technologies such as cellular

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<sup>264</sup> Guglielmi, Giorgia. Eating one-fifth less beef could halve deforestation. Model suggests that switching to microbial ‘meat’ can cut carbon emissions. *Nature*. 4 May 2022. <https://www.nature.com/articles/d41586-022-01238-5>

<sup>265</sup> IPCC. Special Report on Climate Change and Land. Chapter 5: Food Security. 2021. <https://www.ipcc.ch/srccl/chapter/chapter-5/>

<sup>266</sup> Sun, Z., Scherer, L., Tukker, A. et al. Dietary change in high-income nations alone can lead to substantial double climate dividend. *Nat Food* 3, 29–37 (2022). <https://doi.org/10.1038/s43016-021-00431-5> & <https://www.nature.com/articles/s43016-021-00431-5#citeas>

<sup>267</sup> IPCC. Sixth Assessment Report. Climate Change 2022: Mitigation of Climate Change. Full Report. <https://www.ipcc.ch/report/ar6/wg3/>



fermentation, cultured meat and plant-based alternatives to animal-based food products. These can bring a substantial reduction in direct GHG emissions from food production, and have lower land, water and nutrient footprints, and address concerns over animal welfare. The high GHG emissions of ruminants was mentioned, along with the low calorific conversion efficiency of meat. Strategies such as meat taxes in higher-income countries and nationally recommended diets and food waste measures were included. However, it was disappointing that despite multiple such mentions in the Full Report, and recognition of the high mitigation potential of dietary change, very little of this was included in the Summary for Policy Makers<sup>268</sup>. This just has a reference to “balanced diets”, but does mention “agroecological principles and practices, ecosystem-based management in fisheries and aquaculture, and other approaches that work with natural processes support food security, nutrition, health and well-being, livelihoods and biodiversity, sustainability and ecosystem services”.

Given its significant contribution to climate change, the livestock sector has been given scant coverage in various climate Conferences of the Parties (COPs). This may be partly due to the lack of strong and coherent coverage in IPCC reports (and the impact of strong lobbying by powerful vested interests). Back in 2009, World Bank environmental experts Robert Goodland and Jeff Anhang were already highlighting this gross omission – and not much has changed since. They published a paper in the World Watch Magazine entitled: “Livestock and climate change. What if the key actors in climate change are cows, pigs, and chickens?” An accompanying article “Livestock Overlooked in Climate Talks”<sup>269</sup> highlighted the importance of this vital aspects, and explored many of the arguments rehearsed today: inefficiencies of feeding edible crops through livestock, the need to reduce meat consumption, plant-based alternatives, need for days where animal products are avoided etc.

One forum where agriculture was considered within the UNFCCC framework was the Koronivia joint work on agriculture (KJWA), which was reported in the draft conclusions of the chairs of the Subsidiary Body for Implementation (SBI) and the Subsidiary Body for Scientific and Technological Advice (SBSTA).<sup>270</sup> This included various topics of relevance, including topic 2(e) on improved livestock management systems, including agropastoral production systems and others and 2(f) on socio-economic and food security dimensions of climate change in the agricultural sector. These should now be considered in future work. While Parties have reached the end of the KJWA roadmap, this agenda item will be considered again at COP27, including consideration for the future/continuation of the KJWA.

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<sup>268</sup> IPCC. Sixth Assessment Report. Climate Change 2022: Mitigation of Climate Change. Summary for Policy Makers. <https://www.ipcc.ch/report/ar6/wg3/>

<sup>269</sup> Euractiv. Livestock Overlooked in Climate Talks says World Bank. 23 October 2009. <https://www.euractiv.com/section/agriculture-food/news/livestock-overlooked-in-climate-talks-says-world-bank/>

<sup>270</sup> UNFCCC. Koronivia joint work on agriculture Draft conclusions proposed by the Chairs. The Subsidiary Body for Implementation (SBI) and the Subsidiary Body for Scientific and Technological Advice (SBSTA). [https://unfccc.int/sites/default/files/resource/l01\\_2.pdf](https://unfccc.int/sites/default/files/resource/l01_2.pdf) & <https://unfccc.int/topics/land-use/workstreams/agriculture#:~:text=23%20on%20the%20%22Koronivia%20joint,of%20agriculture%20to%20climate%20change> & <https://unfccc.int/sites/default/files/resource/docs/2017/sbsta/eng/l24a01.pdf>



“A 2017 report on “Current available strategies to mitigate greenhouse gas emissions in livestock systems: an animal welfare perspective” examined and tabulated the likely relationships and trade-offs between the GHG mitigation strategies and their animal welfare consequences, focusing, in particular, on cattle and other ruminant species.” The authors concluded that:

“Animal welfare is a criterion of sustainability and any strategy designed to reduce the carbon footprint of livestock production should consider animal welfare amongst other sustainability metrics.”

They pointed out that there were win-win strategies available which can effectively reduce GHG emissions whilst simultaneously improving animal welfare (e.g., feed supplementation or improving health), and that these should be strongly supported as they address both environmental and ethical sustainability. They added: “In order to identify the most cost-effective measures for improving environmental sustainability of livestock production, the consequences of current and future strategies for animal welfare must be scrutinised and contrasted against their effectiveness in mitigating climate change.”<sup>271</sup>

Three former UN climate leaders have warned that the policies currently in place to tackle the climate crisis around the world will lead to “catastrophic” climate breakdown, because governments have failed to take the actions needed to fulfil their promises.<sup>272</sup> Meanwhile, a growing chorus of scientists worldwide calling for an immediate paradigm shift in the way humans consume goods, produce food and energy, and travel. Such a shift is necessary to tackle climate change, and is also critical to mitigating the threat of mass extinction, as a rapidly increasing number of species of plants and animals face the threat of losing their natural habitats to inhospitable heat and the growing footprint of human industry and agriculture.<sup>273</sup>

Animals are not only affected by climate change but they are also critical to the efforts to mitigate its impacts. Healthy ecosystems enable adaptation to climate change, while poor animal welfare and the loss of animals and plants exacerbate the negative impacts of climate change. Healthy ecosystems are imperative for the earth’s capacity to sequester and store carbon, and there is ever increasing evidence that animals play a key role in the maintenance of critical ecosystems. Stabilising the climate is only possible over the long-term by ensuring the health and protection of animals and their habitats. The biodiversity and climate change crises are inseparable. It is not possible to address these pressing sustainability issues in isolation from one another.

An interesting example of how animals can safeguard ecosystems against the impacts of climate change has been uncovered in recent studies of beavers. Beavers make dams, which

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<sup>271</sup> Llonch, P, Haskell, M J, Dewhurst, R J and Turner, S P. current available strategies to mitigate greenhouse gas emissions in livestock systems: an animal welfare perspective. Review. Animal. 11:2, pp 274–284. Feb 2017. <https://pubmed.ncbi.nlm.nih.gov/27406001/>

<sup>272</sup> Harvey, Fiona. Current policies will bring ‘catastrophic’ climate breakdown, warn former UN leaders. The Guardian. 2 June 2022. [https://www.theguardian.com/environment/2022/jun/02/current-policies-will-bring-catastrophic-climate-breakdown-warn-former-un-leaders?CMP=Share\\_iOSApp\\_Other](https://www.theguardian.com/environment/2022/jun/02/current-policies-will-bring-catastrophic-climate-breakdown-warn-former-un-leaders?CMP=Share_iOSApp_Other)

<sup>273</sup> Inside Climate News. ‘Apocalypse Papers’: Scientists Call for Paradigm Shift as Biodiversity Loss Worsens. 29 April 2022. <https://insideclimatenews.org/todaysclimate/apocalypse-papers-scientists-call-for-paradigm-shift-as-biodiversity-loss-worsens/>

can deepen streams, and deeper layers of water tend to be cooler. One study showed that their dams cooled the streams by more than 4 degrees Fahrenheit (2.3 Celsius) during certain times of the year, and another, published in 2017, saw similarly large drops in temperature after beavers built their dams. They not only drench certain landscapes in cold water but also help cool the air. They even make forests and grasslands less likely to burn.<sup>274</sup>

There is also an often-forgotten interlinkage between working Equidae and climate change which stretches across the world with horses, mules and donkeys used in sustainable cities, farming, rewilding or forestry. This helps to reduce carbon footprint and improve biodiversity. Ensuring good animal welfare is also crucial to the animals' work and resilience.<sup>275</sup>

## **4.4. Biodiversity Loss**

### **4.4.1. Biodiversity Loss Overview**

Biodiversity loss is, like climate change, an existential threat. The climate and biodiversity crises are closely interconnected and must be addressed as one, using a holistic approach which includes food systems. The Global Assessment Report on Biodiversity and Ecosystem Services, an important flagship report published by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) in 2019<sup>276</sup>, stressed that human society is in jeopardy from the accelerating decline of the Earth's natural life-support systems. It reported that an estimated one million of the world's eight million or so species of plants and animals, including insects, are threatened with extinction. Two in five amphibian species are at risk of extinction, and close to one-third of other marine species. Insect species are also in decline, with at least one in 10 threatened with extinction and some regions suffering massive declines – 75% vanishing over 25 years. Insects are crucial for pollination, so this impacts food security and causes significant economic losses.<sup>277</sup> The

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<sup>274</sup> Jones, Benji. Beavers are heat wave heroes. 2 July 2022.

<https://www.vox.com/down-to-earth/23273240/heat-wave-beavers-climate-change?fbclid=IwAR2sn3gE81JcMhguVQ8rviagDijYZ1ocbKoSue2aVOWDZzm5QnDgETaWdfo>

<sup>275</sup> Eurogroup for Animals, Protecting Animals to Protect the Planet, 2021.

[https://www.eurogroupforanimals.org/files/eurogroupforanimals/2021-11/Protecting%20Animals%20to%20Protect%20the%20Planet\\_11\\_2021\\_0.pdf](https://www.eurogroupforanimals.org/files/eurogroupforanimals/2021-11/Protecting%20Animals%20to%20Protect%20the%20Planet_11_2021_0.pdf)

<sup>276</sup> IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany. 1148 pages. <https://doi.org/10.5281/zenodo.3831673> & IPBES (2019): Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. S. Díaz, J. Settele, E. S. Brondizio, H. T. Ngo, M. Guèze, J. Agard, A. Arneth, P. Balvanera, K. A. Brauman, S. H. M. Butchart, K. M. A. Chan, L. A. Garibaldi, K. Ichii, J. Liu, S. M. Subramanian, G. F. Midgley, P. Miloslavich, Z. Molnár, D. Obura, A. Pfaff, S. Polasky, A. Purvis, J. Razaque, B. Reyers, R. Roy Chowdhury, Y. J. Shin, I. J. Visseren-Hamakers, K. J. Willis, and C. N. Zayas (eds.). IPBES secretariat, Bonn, Germany. 56 pages. <https://doi.org/10.5281/zenodo.3553579>

<sup>277</sup> Bayer. Finding future models for agricultural systems Pollinators perform a crucial service that supports most of the world's plant diversity – and a significant portion of global agriculture. The Importance of Insect Pollinators for Agriculture.

biomass of wild mammals has fallen by 82%, natural ecosystems have lost about half their area. These losses are all largely as a result of human actions.

The Global Environment Outlook (GEO) 6 refers to the crisis in these terms: “A major species extinction event, compromising planetary integrity and Earth’s capacity to meet human needs, is unfolding. The critical pressures on biodiversity are habitat change, loss and degradation; unsustainable agricultural practices; the spread of invasive species; pollution, including microplastics; and overexploitation, including illegal logging and trade in wildlife. Illegal trade in wildlife, fisheries and forest products is worth between US\$90 billion and US\$270 billion per annum.”

GEO 6 contains a whole chapter on biodiversity (Chapter 6). The Executive Summary of this chapter begins as follows: “Biodiversity is in crisis. There is well-established evidence indicating an irrevocable and continuing decline of genetic and species diversity, and degradation of ecosystems at local and global scales. Scientists are increasingly concerned that, if anthropogenic pressures on Biodiversity continue unabated, we risk precipitating a sixth mass extinction event in Earth history, with profound impacts on human health and equity.” It states that there are critical pressures on biodiversity, with it being eroded by land-use change, direct exploitation, climate change, pollution and invasive alien species. While habitat loss/transformation is likely the most significant present pressure, climate change may be the most significant future pressure.<sup>278</sup>

GEO 5 mentions the decline of genetic diversity, threatening food security and the resilience of ecosystems, including agricultural systems and food security. This is largely a product of animal breeding for higher productivity traits, but it does indeed affect the wider biodiversity and ecosystems, as the GEO recognises. This has been an issue of concern to the FAO for many years, and should equally be an issue for UNEP.<sup>279</sup>

An August 2022 paper on “Collapse of terrestrial mammal food webs since the Late Pleistocene”<sup>280</sup> examined changes to terrestrial mammal food webs globally over the past ~130,000 years using extinct and extant mammal traits, geographic ranges, observed predator-prey interactions, and deep learning models. The researchers found that food webs underwent steep regional declines in complexity through loss of food web links after the arrival and expansion of human populations. They estimated that defaunation has caused a 53% decline in food web links globally. Although extinctions explain much of this effect, range losses for extant species degraded food webs to a similar extent, highlighting the potential for food web restoration via extant species recovery. Food webs influence

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[https://www.bayer.com/sites/default/files/BEEINFOmed\\_7\\_The-Importance-of-Insect-Pollinatorsjlouz8q1.pdf](https://www.bayer.com/sites/default/files/BEEINFOmed_7_The-Importance-of-Insect-Pollinatorsjlouz8q1.pdf)

<sup>278</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6> & UNEP. Global Environment Outlook 6 Summary for Policymakers. 6 August 2019. [https://www.unep.org/resources/assessment/global-environment-outlook-6-summary-policymakers?\\_ga=2.58831021.1679832863.1648133604-1602352062.1634737523](https://www.unep.org/resources/assessment/global-environment-outlook-6-summary-policymakers?_ga=2.58831021.1679832863.1648133604-1602352062.1634737523)

<sup>279</sup> UNEP. Global Environment Outlook (GEO) 5. Full Report. 2012. <https://www.unep.org/resources/global-environment-outlook-5>

<sup>280</sup> Fricke, Evan C. et al. Collapse of terrestrial mammal food webs since the Late Pleistocene. Science. 25 August 2022. <https://www.science.org/doi/10.1126/science.abn4012>

ecosystem diversity and functioning, and such losses could have profound impact on the long-term persistence and function of ecosystems.

Biodiversity loss is being experienced across all Earth's major biomes. GEO 6 reports that populations of species are declining and species extinction rates are increasing. 42 per cent of terrestrial invertebrates, 34 per cent of freshwater invertebrates and 25 per cent of marine invertebrates are considered at risk of extinction. In the oceans, overexploitation of fish stocks is leading to fisheries collapse. Between 1970 and 2014, global vertebrate species population abundances declined by on average 60 per cent. Steep declines in pollinator abundance have also been documented. Ten out of every fourteen terrestrial habitats have seen a decrease in vegetation productivity and just under half of all terrestrial ecoregions are classified as having an unfavourable status.<sup>281</sup>

If you look at the statistics above through an animal welfare lens, recognising that these represent individual sentient animals, you begin to recognise the scale and impact of this biodiversity crisis on animals. These are not just "species"; they are not just "resources". They are conscious beings, capable of suffering, forming part of a family structure, and part of an animal group structure – with its own society and culture. Each species threat represents the suffering of thousands of animals, and even millions or billions in some cases, through the causes of their demise and the effects of reducing conspecific and interconnected populations (and these effects constitute further threats). Habitats are their homes, and provide the resources needed for their welfare and survival. Furthermore, their demise will inevitably have "knock-on" effects on other animals, species and habitats.

#### **4.4.2. Root Causes and Drivers**

GEO 6 stated that three of the (seven) direct drivers of pressures to the marine environment are agriculture, capture fisheries and aquaculture. It also made a number of observations relevant to biodiversity, including (summarised):

- Overexploitation of wild fish stocks and intensive aquaculture have detrimental effects on marine and terrestrial ecosystems.
- Aquaculture as one of the primary pressures on ocean biodiversity.
- Capture fisheries – industrial uses include feed for aquaculture.
- The rise of aquaculture can reduce pressures of exploitation for some wild species, but can also lead to invasive species, inter-species breeding, eutrophication and disease spread.
- Measures to minimise the effects of fishing on the ecosystem have had mixed success. Where resource assessments and monitoring, control, and surveillance and enforcement measures are not available, overfishing and illegal, unreported or unregulated fishing continues and may be expanding.<sup>282</sup>

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<sup>281</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6> & UNEP. Global Environment Outlook 6 Summary for Policymakers. 6 August 2019. [https://www.unep.org/resources/assessment/global-environment-outlook-6-summary-policymakers?\\_ga=2.58831021.1679832863.1648133604-1602352062.1634737523](https://www.unep.org/resources/assessment/global-environment-outlook-6-summary-policymakers?_ga=2.58831021.1679832863.1648133604-1602352062.1634737523)

<sup>282</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6>

Research carried out in 2020 examined the impact of human carnivory as a major driver of vertebrate extinction. The study reviewed the anthropogenic threats to 1000 species randomly selected among more than 46,000 vertebrate entries in the IUCN Red List database. The researchers identified the following mechanisms by which human carnivory (i.e., our habit of feeding on other animals and related products) negatively affects the world's vertebrates: two mechanisms related to predation (predation and bycatch), two to competition (prey depletion and persecution), one to biohazards (any negative impacts caused by livestock or alien species whose introduction is linked to human carnivory), four to environmental changes (destructive harvesting practices, livestock, agriculture, and climate change), and a miscellaneous category for processes more indirectly connected with our high trophic position. The researchers conservative estimate, which does not include livestock impacts via agriculture and climate change, revealed that about one-quarter of the world's vertebrates are threatened by at least one mechanism related to human carnivory, and that this proportion is higher than that attributable to other leading causes of biodiversity decline including agriculture, forestry, infrastructure, pollution, invasive species, energy production and mining, fire regime and water systems modifications, and climate change. The conclusion of the report was that human carnivory is the major driver of the current biodiversity crisis.<sup>283</sup>

Even back in 2006, the FAO's Livestock's Long Shadow report stated:

"Livestock now account for about 20 percent of the total terrestrial animal biomass, and the 30 percent of the earth's land surface that they now pre-empt (*appropriated*) was once habitat for wildlife. Indeed, the livestock sector may well be the leading player in the reduction of biodiversity, since it is the major driver of deforestation, as well as one of the leading drivers of land degradation, pollution, climate change, overfishing, sedimentation of coastal areas and facilitation of invasions by alien species."<sup>284</sup>

"Some 306 of the 825 terrestrial ecoregions identified by the Worldwide Fund for Nature (WWF) – ranged across all biomes and all biogeographical realms, reported livestock as one of the current threats. Conservation International has identified 35 global hotspots for biodiversity, characterised by exceptional levels of plant endemism and serious levels of habitat loss. Of these, 23 are reported to be affected by livestock production. An analysis of the authoritative World Conservation Union (IUCN) Red List of Threatened Species shows that most of the world's threatened species are suffering habitat loss where livestock are a factor. Many of livestock's threats to biodiversity arise from their impact on the main resource sectors (climate, air and water pollution, land degradation and deforestation)."<sup>285</sup>

The FAO's Livestock's Long Shadow report also dealt with the important contribution of the livestock industry to the overexploitation of wild-caught fish for the production of fishmeal for livestock feed. The world's ocean fish face serious threats to their biodiversity. The principal source of pressure is overexploitation by fisheries, which have affected the size

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<sup>283</sup> Coimbra, Zulmira H.; Gomes-Jr, Luiz; Fernandez, Fernando A.S. Human carnivory as a major driver of vertebrate extinction. Perspectives in Ecology and Conservation, Volume 18, Issue 4, 2020. <https://doi.org/10.1016/j.pecon.2020.10.002>.  
(<https://www.sciencedirect.com/science/article/pii/S2530064420300614> )

<sup>284</sup> FAO. Livestock's Long Shadow: Environmental Issues and Options 2006. <https://www.fao.org/3/a0701e/a0701e.pdf>

<sup>285</sup> FAO. Livestock's Long Shadow: Environmental Issues and Options 2006. <https://www.fao.org/3/a0701e/a0701e.pdf>

and viability of fish populations.<sup>286</sup> Fishmeal and fish oil are also used in aquaculture systems, adding to the pressures on wild fish stocks.<sup>287</sup>

Oceans cover over 70% of the Earth's surface, and the oceans hold about 96.5 percent of all Earth's water. The primary pressures on open ocean biodiversity are overexploitation, pollution from land-based activities and climate change; coastal ecosystems have additional pressures associated with habitat destruction, aquaculture and invasive species. These pressures affect the state of marine biodiversity.<sup>288</sup>

The ocean also produces more than 50 per cent of the planet's oxygen, is the main source of sustenance for more than a billion people, and provides work through its industries for some 40 million employees. Yet, more than one third of the world's fish stocks are harvested at biologically unsustainable levels.<sup>289</sup>

Commercial aquaculture has significant detrimental impacts on oceans and marine environments. The most common methods of aquaculture include open net pens anchored to the bottom in coastal waters, offshore cages in deeper waters, recirculating aquaculture systems (RAS) built on land, raceways also known as "flow-through" systems either inside or outside, and polyculture that may co-cultivate finfish, shellfish, and marine plants.<sup>290</sup> Fish waste and left-over food spill out from nets and tanks into the ocean, causing nutrient pollution, eutrophication and hypoxia which can stress or kill aquatic creatures. Antibiotics or pesticides used on farmed fish can affect other marine life and human health. These nutrients and chemicals impact the biodiversity on the ocean floor when they sink, can lead to increased occurrences of algal blooms, and have made potentially toxic algae even more poisonous.<sup>291</sup> When fish are crowded together in nets or pens, they are susceptible to stress, fostering disease and parasites that are then spread to wild species. Sometimes farmed fish also escape into the ocean, breeding with wild species and affecting the population's overall genetic diversity.<sup>292</sup>

The commercial fishing industry is doing widespread damage to the ocean through taking too many fish for populations to rebuild, using harmful techniques such as bottom trawling - a widespread fishing practice that involves dragging heavy nets, large metal doors and

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<sup>286</sup> FAO. Livestock's Long Shadow: Environmental Issues and Options. Chapter 5. Livestock's impact on biodiversity. 2006. <https://www.fao.org/3/a0701e/a0701e.pdf>

<sup>287</sup> WWF. Fishmeal and fish oil. <https://www.worldwildlife.org/industries/fishmeal-and-fish-oil#:~:text=Fishmeal%20and%20oil%20are%20easily,a%20growing%20market%20for%20fisheries>.

<sup>288</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6>

<sup>289</sup> UN. 'Revitalize our seas' UN chief urges on World Oceans Day. 8 June 2022. <https://news.un.org/en/story/2022/06/1119802>

<sup>290</sup> Today's Farmed Fish. Common Methods. <https://www.todaysfarmedfish.org/common-farming-methods>

<sup>291</sup> Scottish Government. Review and Synthesis of the Environmental Impacts of Aquaculture 2002). [https://www.researchgate.net/profile/Kenneth-Black/publication/230792025\\_Review\\_and\\_Synthesis\\_of\\_the\\_Environmental\\_Impacts\\_of\\_Aquaculture/links/00b7d5195e29fd9535000000/Review-and-Synthesis-of-the-Environmental-Impacts-of-Aquaculture.pdf](https://www.researchgate.net/profile/Kenneth-Black/publication/230792025_Review_and_Synthesis_of_the_Environmental_Impacts_of_Aquaculture/links/00b7d5195e29fd9535000000/Review-and-Synthesis-of-the-Environmental-Impacts-of-Aquaculture.pdf)

<sup>292</sup> Cho, Renee. Colombia Climate School. Making Fish Farming More Sustainable. 13 April 2016. <https://news.climate.columbia.edu/2016/04/13/making-fish-farming-more-sustainable/>



chains over the seafloor to catch fish – destroying habitats and killing non-target species.<sup>293</sup> Bottom trawling fishing also "destroys the natural seafloor habitat by essentially rototilling the seabed. All of the bottom-dwelling plants and animals are affected, if not outright destroyed by tearing up root systems or animal burrows".<sup>294</sup>

As well as killing non-target animals, commercial fishing stirs and releases sediment into the water, disrupting food chains.<sup>295</sup> The fishing industry also uses methods such as introducing explosives and poisons into the water, causing enormous loss of animal life and environmental destruction.<sup>296</sup> Furthermore, of nearly 400 fish stocks around the world that have been monitored since the 1970s by the UN Food and Agriculture Organization (FAO), approximately one third are currently not fished within sustainable limits.<sup>297</sup>

Ghost fishing gear is another massive impact of the fishing industry. Between 500,000 to 1 million tons of fishing gear are discarded or lost in the ocean every year. Discarded nets, lines, and ropes now make up about 46% of the Great Pacific Garbage Patch. Ghost fishing gear is the deadliest form of marine plastic as it unselectively catches wildlife, entangling marine mammals, seabirds, sea turtles, and sharks, subjecting them to a slow and painful death through exhaustion and suffocation. Ghost fishing gear also damages critical marine habitats such as coral reefs.<sup>298</sup>

Similar to other land-based production, the expansion of land-based aquaculture has resulted in substantial environmental externalities that affect water, soil, biodiversity and climate, and which compromise the ability of the environment to produce food.<sup>299</sup>

Estimates by fishcount.org.uk<sup>300</sup> have been that between 1-3 trillion wild fish are commercially caught each year and that between 51 and 167 billion farmed fishes were slaughtered in 2017. And, further that the numbers of decapod crustaceans killed in recorded aquaculture production in 2017 were<sup>301</sup>:

43-75 billion crayfish, crabs and lobsters.

210-530 billion shrimps and prawns.

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<sup>293</sup> USGS. Science for a Changing World. Recent scientific work outlines the severe consequences the practice of bottom trawling has on loose sediment on the ocean floor. 14 March 2016.

<https://www.usgs.gov/news/national-news-release/what-drag-global-impact-bottom-trawling>

<sup>294</sup> USGS: Science for a Changing World. 14 March 2016. <https://www.usgs.gov/news/national-news-release/what-drag-global-impact-bottom-trawling>

<sup>295</sup> Mancuso, Monique. Effects of Fish Farming on Marine Environment. Journal of Fisheries Sciences. July 6, 2015.

<sup>296</sup> Pariona, Amber. What is the Environmental Impact of the Fishing Industry? World Atlas. 27 April, 2017.

<sup>297</sup> Faunalytics. Global Fishing & Food Security. 22 April 2022. <https://faunalytics.org/global-fishing-food-security/> and <https://doi.org/10.1038/s41586-020-2616-y>

<sup>298</sup> WWF. Ghost fishing gear. <https://www.worldwildlife.org/stories/ghost-fishing-gear>

<sup>299</sup> Faunalytics. Global Fishing & Food Security. 22 April 2022. <https://faunalytics.org/global-fishing-food-security/> and <https://doi.org/10.1038/s41586-020-2616-y>

<sup>300</sup> Fish count estimates. <http://fishcount.org.uk/fish-count-estimates-2>

<sup>301</sup> Fishcount.org.uk. Numbers of farmed decapod crustaceans. <http://fishcount.org.uk/fish-count-estimates-2/numbers-of-farmed-decapod-crustaceans>

The Marine Life Institute has published “Key Recommendations for Marine Capture Fisheries”<sup>302</sup> which propose the adoption of an animal welfare-based approach (WBA) to capture fisheries management. This approach is centred around the following principles:

1. Refining the methods used to capture and retrieve aquatic animals;
2. Improving the ways in which captured animals are handled on-board;
3. Implementing effective stunning and slaughter of captured animals; and,
4. Eliminating the indirect adverse welfare impacts on non-target species.

There is further information in the recommendations. The authors state that: “There is ample scientific consensus that aquatic animals have the capacity to suffer in the same way as terrestrial animals. Given that this recognition is enshrined in law throughout the world, we have both a legal and moral obligation to apply the same standards of welfare to wild-caught aquatic animals.”

A UK Marine Mammal Welfare Workshop<sup>303</sup> recommended that the welfare of individual marine mammals and the resulting consequences for their conservation should be fully taken into consideration when making and implementing policy decisions regarding activities that affect marine mammals. Impacts on the welfare of individuals may be an indicator of potential threats towards social units, or whole populations. Research indicates that an understanding of animal social learning and culture has significant potential to help maximise the impact and efficiency of conservation efforts, and work has already been done to identify relevant methodologies and provide a framework for viewing behavioural data through a cultural lens which might provide new insights for conservation management.<sup>304</sup> It is essential that welfare impacts are monitored to objectively measure welfare status over time. In line with Environmental Impact Assessments, Animal Welfare Impact Assessments should be required for activities that may impact on marine mammals (and other animals).

Eutrophication, caused by the input of nutrients in water bodies and characterised by excessive plant and algal growth, is another massive threat to ocean biodiversity, causing the “dead zones” mentioned in the above flagship reports. The most common causes include leaching from fertilised agricultural areas, sewage from urban areas and industrial wastewater. The input of nutrients most commonly associated with eutrophication – phosphorus and nitrogen (e.g. agricultural runoff) – into lakes, reservoirs, rivers and coastal marine ecosystems, including coral reefs, have been widely recognised as a major threat to both water ecosystems and human health.<sup>305</sup> Factory farming of livestock and aquaculture are inherently bad for animal welfare, and they contribute to marine pollution and eutrophication, which in turn impacts the habitats and lives of marine animals.

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<sup>302</sup> Emam, Wasseem and Lu, Christine. Marine Life Institute. Key Recommendations for Marine Capture Fisheries. [https://drive.google.com/file/d/15P6Mq7eflvZoxh6bQ\\_jNUo4-UExsqdLy/view](https://drive.google.com/file/d/15P6Mq7eflvZoxh6bQ_jNUo4-UExsqdLy/view)

<sup>303</sup> Wild Animal Welfare and the Whale and Dolphin Conservation. UK Marine Mammal Welfare Workshop. 3 December 2019. [https://static1.squarespace.com/static/5edf4fd72d25275e3acc8c4a/t/5f4f9b5bf41ed579a073db77/1599052651035/WAWC\\_WDC\\_UK\\_marine\\_mammal\\_welfare\\_report\\_.pdf](https://static1.squarespace.com/static/5edf4fd72d25275e3acc8c4a/t/5f4f9b5bf41ed579a073db77/1599052651035/WAWC_WDC_UK_marine_mammal_welfare_report_.pdf)

<sup>304</sup> Brakes, Philippa et al. A deepening understanding of animal culture suggests lessons for conservation work on animal culture. Royal Society Publishing. 24 March 2021. <https://royalsocietypublishing.org/doi/pdf/10.1098/rspb.2020.2718>

<sup>305</sup> UNEP, CBD, WHO. Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review. 2015. <https://www.cbd.int/health/SOK-biodiversity-en.pdf>

The IPBES report identified the five direct drivers of biodiversity loss as changing use of sea and land, direct exploitation of organisms, climate change, pollution and invasive non-native species.<sup>306</sup> The UNEP/CBD/WHO report on “Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review (2015)”<sup>307</sup> provides further analysis on the drivers of biodiversity loss. With regards to direct drivers, it cites land-use change, habitat loss, overexploitation, pollution, invasive species and climate change; and for indirect drivers, demographic change and large-scale social and economic processes – citing macro-economic policies and structures and public policies that provide perverse incentives or fail to incorporate the value of biodiversity as compounding the dual threat to biodiversity and public health. These drivers were also identified in the third edition of Global Biodiversity Outlook (GBO 3) and reiterated in its fourth edition. Anthropogenic pressures that contribute to biodiversity loss, ill-health and disease emergence included demographic change and resulting changes in production and consumption patterns.<sup>308</sup>

GEO 6 states that the primary pressures on open ocean biodiversity are overexploitation, pollution from land-based activities and climate change; coastal ecosystems have additional pressures associated with habitat destruction, aquaculture and invasive species.<sup>309</sup>

All of the direct drivers identified in the various flagship reports are intrinsically linked to animal welfare and animal use, in various forms. If we examine the links, it can be seen that biodiversity loss cannot be effectively addressed without taking into account animal use and animal welfare. Some examples of linkages with drivers are as follows:

### ➤ **Land-use change, sea use change**

Land and sea use change are the major drivers of biodiversity loss.<sup>310</sup>

The IPBES report shows a planet in which the human footprint is so large it leaves little space for anything else. Three-quarters of all land has been turned into farm fields, covered by concrete, swallowed up by dam reservoirs or otherwise significantly altered. Two-thirds of the marine environment has also been changed by fish farms, shipping routes, subsea mines and other projects. Three-quarters of rivers and lakes are impacted by crop or livestock cultivation.<sup>311</sup>

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<sup>306</sup> IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany. 1148 pages. <https://doi.org/10.5281/zenodo.3831673>

<sup>307</sup> UNEP, CBD, WHO. Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review. 2015. <https://www.cbd.int/health/SOK-biodiversity-en.pdf>

<sup>308</sup> UNEP, CBD, WHO. Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review. 2015. <https://www.cbd.int/health/SOK-biodiversity-en.pdf>

<sup>309</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6>

<sup>310</sup> IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany. 1148 pages. <https://doi.org/10.5281/zenodo.3831673>

<sup>311</sup> IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio,

In April 2022, the UN Convention to Combat Desertification (UNCCD) published its Global Land Outlook 2nd Edition and the Global Land Outlook 2 Summary for Decision Makers. These stated that up to 40% of the planet's land is degraded, directly affecting half of humanity, threatening roughly half of global GDP (US\$44 trillion). Ibrahim Thiaw, Executive Secretary of the UNCCD stated: "Modern agriculture has altered the face of the planet more than any other human activity. We need to urgently rethink our global food systems, which are responsible for 80% of deforestation, 70% of freshwater use, and the single greatest cause of terrestrial biodiversity loss".<sup>312</sup>

Key points in the Global Land Outlook 2nd Edition include:

- Repurposing in the next decade just \$US 1.6 trillion of the annual \$700 billion in perverse subsidies (*note: these are the figures given in GLO2, but it appears that the terminology mixes US and (old-style) UK terminologies and values?*) given to the fossil fuel and agricultural industries would enable governments to meet current pledges to restore by 2030 some one billion degraded hectares – an area the size of the USA or China – including 250 million hectares of farmland.
- Many traditional and modern regenerative food production practices can enable agriculture to pivot from being the primary cause of degradation to the principal catalyst for land and soil restoration.
- Intensive monocultures and the destruction of forests and other ecosystems for food and commodity production generate the bulk of carbon emissions associated with land use change.
- If current land degradation trends continue, food supply disruptions, forced migration, rapid biodiversity loss and species extinctions will increase, accompanied by a higher risk of zoonotic diseases like COVID-19, declining human health, and land resource conflicts.

The report also mentions the benefits of rewilding, and includes agroecology and regenerative practices, integrated soil and water management, grazing/rangeland management, and agroforestry/silvopastoral systems.<sup>313</sup>

The report's key message number 5 is about Transforming Food Systems. It states that modern agriculture has altered the face of the planet more than any other human activity – from the production of food, animal feed, and other commodities to the markets and supply chains that connect producers to consumers. ***Making our food systems sustainable and resilient would be a significant contribution to the success of the global land, biodiversity, and climate agendas. Globally, food systems are responsible for 80% of deforestation, 70% of freshwater use, and are the single greatest cause of terrestrial biodiversity loss.*** At the same time, soil health and biodiversity below ground – the source of almost all our food

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J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany. 1148 pages. <https://doi.org/10.5281/zenodo.3831673>

<sup>312</sup> UN Convention to Combat Desertification (UNCCD). Chronic land degradation: UN offers stark warnings and practical remedies in Global Land Outlook 2. 26 April 2022. <https://www.unccd.int/news-stories/press-releases/chronic-land-degradation-un-offers-stark-warnings-and-practical>

<sup>313</sup> UN Convention to Combat Desertification (UNCCD). Chronic land degradation: UN offers stark warnings and practical remedies in Global Land Outlook 2. 26 April 2022. <https://www.unccd.int/news-stories/press-releases/chronic-land-degradation-un-offers-stark-warnings-and-practical>

calories – has been largely neglected by the industrial agricultural revolution of the last century. Intensive monocultures and the destruction of forests and other ecosystems for food and commodity production generate the bulk of carbon emissions associated with land use change. Food systems must continue to provide us with sustenance, but can be redesigned and redeployed to ensure positive outcomes for nature and the climate as well. By eliminating or repurposing harmful subsidies and providing the right incentives, we can shift from resource-depleting models of production to those that link resource efficiency and productivity gains to healthy and resilient food systems etc.

***In the words of the UN Secretary-General António Guterres: “Food systems are one of the main reasons we are failing to stay within our planet’s ecological boundaries”.<sup>314</sup>***

This has been long-known. For example, the FAO’s 2006 report “**Livestock’s Long Shadow: Environmental Issues and Options**”<sup>315</sup> included a section on land use and land degradation which stated:

“The livestock sector is by far the single largest anthropogenic user of land. The total area occupied by grazing is equivalent to 26 percent of the ice-free terrestrial surface of the planet. In addition, the total area dedicated to feed-crop production amounts to 33 percent of total arable land. In all, livestock production accounts for 70 percent of all agricultural land.”<sup>316</sup>

“About 20 percent of the world’s pastures and rangelands, with 73 percent of rangelands in dry areas, have been degraded to some extent, mostly through overgrazing, compaction and erosion created by livestock action.”<sup>317</sup>

And on overgrazing the report said:

“Overgrazing can be reduced by grazing fees and by removing obstacles to mobility on common property pastures. Land degradation can be limited and reversed through soil conservation methods, silvopastoralism, better management of grazing systems, limits to uncontrolled burning by pastoralists and controlled exclusion from sensitive areas.”<sup>318</sup>

Recently there have been a batch of apocalyptic biodiversity studies which have forced scientists and researchers to make clarion calls for humanity to do far more to address the industries driving the interlinked climate and biodiversity crises, including logging and agriculture.<sup>319</sup> In the most comprehensive review yet of the risks facing reptiles, scientists found that more than a fifth of all these species are threatened with extinction. This new study published in April 2022 in Nature assessed more than 10,000 reptiles around the world - from turtles, snakes and lizards to crocodiles - and warned that we must conserve

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<sup>314</sup> UN Convention to Combat Desertification (UNCCD). Chronic land degradation: UN offers stark warnings and practical remedies in Global Land Outlook 2. 26 April 2022. <https://www.unccd.int/news-stories/press-releases/chronic-land-degradation-un-offers-stark-warnings-and-practical>

<sup>315</sup> FAO. Livestock’s Long Shadow: Environmental Issues and Options 2006. <https://www.fao.org/3/a0701e/a0701e.pdf>

<sup>316</sup> FAO. Livestock’s Long Shadow: Environmental Issues and Options 2006. <https://www.fao.org/3/a0701e/a0701e.pdf>

<sup>317</sup> FAO. Livestock’s Long Shadow: Environmental Issues and Options 2006. <https://www.fao.org/3/a0701e/a0701e.pdf>

<sup>318</sup> FAO. Livestock’s Long Shadow: Environmental Issues and Options 2006. <https://www.fao.org/3/a0701e/a0701e.pdf>

<sup>319</sup> Inside Climate News. ‘Apocalypse Papers’: Scientists Call for Paradigm Shift as Biodiversity Loss Worsens. 29 April 2022. <https://insideclimatenews.org/todaysclimate/apocalypse-papers-scientists-call-for-paradigm-shift-as-biodiversity-loss-worsens/>



them to prevent dramatic changes to Earth's critical ecosystems. The data showed that reptiles are increasingly threatened by widespread habitat loss driven by logging and agricultural expansion. Increased reptile extinctions could throw food chains around the world off balance because these species play an indispensable role in ecosystems as both prey and predators for many other species.<sup>320</sup>

Every year the world loses around 5 million hectares of forest. 95% of this occurs in the tropics. At least three-quarters of this is driven by agriculture – clearing forests to raise livestock and grow crops (often for animal feed) (and for paper production).<sup>321</sup>

The most recent global assessment report on biodiversity and ecosystem services<sup>322</sup> stated that agricultural expansion, particularly to sustain industrial livestock systems,<sup>323</sup> is the most widespread driver of land-use change". A 2020 report by the FAO and UNEP states: "Agricultural expansion continues to be the main driver of deforestation and forest fragmentation and the associated loss of forest biodiversity".<sup>324</sup>

Grazing livestock and the production of feed crops are together the main agricultural drivers of deforestation, biodiversity loss and land degradation.<sup>325</sup> GEO 6 stated that food production is the largest anthropogenic use of land, accounting for 50 per cent of habitable land. Livestock production uses 77 per cent of agricultural land for feed production, pasture and grazing land. The livestock sector provides only 17 per cent of dietary energy and 33 per cent of dietary protein demands. Therefore, using about 80 per cent of agricultural land for livestock is inefficient.<sup>326</sup>

Industrial animal agriculture increases monoculture farming for crop feeds, enlarges fields and loses natural biodiversity and habitat areas. This biodiversity is essential for agricultural production systems, underpinning ecosystem services such as pollination, pest control, nutrient cycling, erosion control and water supply. For example, non-crop areas such as meadows, hedgerows and forest patches provide a habitat for a wide range of natural enemies of crop and animal pests and diseases (birds, aphids, etc.) which help to reduce

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<sup>320</sup> Cox, N., Young, B.E., Bowles, P. et al. A global reptile assessment highlights shared conservation needs of tetrapods. *Nature* (2022). <https://doi.org/10.1038/s41586-022-04664-7>

<sup>321</sup> Hannah Richie. Our World in Data. Cutting down forests: what are the drivers of deforestation? 23 February 2021. <https://ourworldindata.org/what-are-drivers-deforestation>

<sup>322</sup> IPBES (2019). The global assessment report on Biodiversity and Ecosystem Services - [https://ipbes.net/sites/default/files/2020-02/ipbes\\_global\\_assessment\\_report\\_summary\\_for\\_policymakers\\_en.pdf](https://ipbes.net/sites/default/files/2020-02/ipbes_global_assessment_report_summary_for_policymakers_en.pdf)

<sup>323</sup> Industrial livestock systems, which involve animal abuse as an integral element of the business model, are also a major driver of anti-microbial resistance (AMR), potentially an even more devastating human health threat than COVID-19. A 2016 review into the origins, impact and possible solutions for AMR has estimated that, if no action is taken, by 2050 drug-resistant infections will place at risk some 10 million human lives a year and a cumulative US\$100 trillion in economic output - O'Neill review on antimicrobial resistance (2016) - <https://amr-review.org/>

<sup>324</sup> FAO and UNEP. 2020. The State of the World's Forests 2020. Forests, biodiversity and people. Rome. DOI: <https://doi.org/10.4060/ca8642en>

<sup>325</sup> Garnett T. 2014. What is a sustainable healthy diet? A discussion paper. Oxford, United Kingdom: Food Climate Research Network (FCRN). <https://cgspace.cgiar.org/bitstream/handle/10568/35584/FCRN-sustainable-healthy-diet.pdf>

<sup>326</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6>



pest population numbers without the use of pesticides. The use of chemical inputs, particularly pesticides, has had severe negative consequences for wildlife, human health and for agricultural biodiversity.<sup>327</sup>

Habitat loss is the thinning, fragmenting, or outright destruction of an ecosystem's plant, soil, hydrologic, and nutrient resources. This is occurring on land and in rivers and lakes. Worldwide, agriculture uses an average of 70 per cent of all fresh water withdrawals, rising to 90 per cent in many poorer countries.<sup>328</sup> Animal products generally have a larger water footprint than crop products. The average water footprint per calorie for beef is twenty times larger than for cereals and starchy roots. The water footprint of different food sources – animal and crop products can be assessed on the Water Footprint website. Generally, it can be seen that from a freshwater resource perspective, it is more efficient to obtain calories, protein and fat through crop products than animal products. The projected increase in the production and consumption of animal products is likely to put further pressure on the globe's freshwater resources.<sup>329</sup>

Our World in Data documents a study of the impacts if the world adopted a plant-based diet. This includes interesting charts such as land use of different foods per 1000 kilocalories, and global land use across different diets. Half of the world's habitable land is used for agriculture, with most of this used to raise livestock for dairy and meat. Livestock are fed from two sources – lands on which the animals graze and land on which feeding crops, such as soy and cereals, are grown. How much would our agricultural land use decline if the world adopted a plant-based diet? The research suggests that if everyone shifted to a plant-based diet we would reduce global land use for agriculture by 75%. This large reduction of agricultural land use would be possible thanks to a reduction in land used for grazing and a smaller need for land to grow crops.<sup>330</sup>

More than 500,000 species have insufficient habitats for long-term survival. Many are on course to disappear within decades.<sup>331</sup> This is evidently an animal welfare problem, as well as a species problem. Degradation of habitats causes lack of food and water sources, lack of shelter, and often animal deaths.

### ➤ ***Over-exploitation of wildlife***

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<sup>327</sup> UNEP, CBD, WHO. Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review. 2015. <https://www.cbd.int/health/SOK-biodiversity-en.pdf>

<sup>328</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6>

<sup>329</sup> Water Footprint Network. Water footprint of crop and animal products: a comparison. <https://waterfootprint.org/en/water-footprint/product-water-footprint/water-footprint-crop-and-animal-products/>

<sup>330</sup> Richie, Hannah. If the world adopted a plant-based diet we would reduce global agricultural land use from 4 to 1 billion hectares. Our World in Data. 4 March 2021. <https://ourworldindata.org/land-use-diets>

<sup>331</sup> IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany. 1148 pages. <https://doi.org/10.5281/zenodo.3831673>

Exploitation of wildlife has been identified as the second most significant direct driver of biodiversity loss.<sup>332</sup>

Over-exploitation of wildlife includes both legal and illegal uses of wildlife, and threatens biodiversity and its ability to support communities and a functioning planet. Anthropogenic pressures on wildlife are enormous and relentless, particularly through the commercial trade. From 1997 to 2016 the value of the legal trade in wildlife has been valued at between US\$2.9 and 4.4 trillion. The majority of wildlife trade research is focussed on species listed in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The concurrent, considerably larger, legal wildlife trade in both CITES and non-CITES-listed species, however, remains unexamined – despite the fact that this contributes to over-exploitation. It is therefore important to have clear systems in place for tracing traded wildlife. Monitoring legal wildlife trade in all species is as important as it is for trade in protected species, since flows of the legal trade correlate with, and provide cover for, illegally traded wildlife.<sup>333</sup>

Wild animals are captured, transported and killed for a myriad of human purposes – including many inessential uses, such as for luxury products, products for which alternatives exist, and for entertainment. They are used for: food and clothing; decorative products; medicinal products (not all of which are effective); witchcraft; the pet trade; zoos, aquaria and circuses; experimentation (science, research and testing); and hunting trophies. They are hunted, trapped, captured, transported and killed - in both legal and illegal wildlife trades. Wildlife is also killed (“culled”) for “management” purposes, such as to deal with disease control, population pressures and human-wildlife conflicts – for example, when habitats and wildlife corridors are not sufficient. Many of these practices have repercussions which go wider than the target animals, through harming or killing non-target animals (“by-catch”) to disrupting animal family groups, social structures and cultures. These practices and methods can cause immense harm and suffering to animals, as well as - frequently - painful and protracted deaths. So, this is clearly both a conservation and an animal welfare problem.

Although historically the welfare impacts of the wildlife trade were largely ignored, there have now been some studies on this. One example is this paper on “Animal Welfare in the Global Wildlife Trade”<sup>334</sup>, which provides an overview and analysis of such impacts. The paper suggests that greater attention should be paid to the welfare of animals traded alive in larger numbers (e.g., birds, reptiles, amphibians) and to those—including mammals—potentially subject to greater impacts through live use (e.g., as pets). As well as calling for more evidence-based research, the authors call for animal welfare to be integrated with wider issues.

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<sup>332</sup> IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany. 1148 pages. <https://doi.org/10.5281/zenodo.3831673>

<sup>333</sup> Andersson, Astrid Alexandra et al. CITES and beyond: Illuminating 20 years of global, legal wildlife trade. *Global Ecology and Conservation*, Volume 26, 2021. <https://doi.org/10.1016/j.gecco.2021.e01455>. & <https://www.sciencedirect.com/science/article/pii/S2351989421000056>

<sup>334</sup> Baker, Sandra et al. Rough Trade: Animal Welfare in the Global Wildlife Trade. December 2013. <https://academic.oup.com/bioscience/article/63/12/928/2364858?login=false>

Permitting trophy hunting in migration corridors can have devastating consequences for transient elephants and biodiversity alike. In some cases, putting aside land for trophy hunting can lead to both land-use and over-exploitation issues. For example, when a wildlife corridor in Botswana (Ngamiland), which was used for seasonal migrations fertilising grasslands and dispersing seeds, was opened for trophy hunting. This is an area which is sparsely populated with elephants, and there have been no human-elephant conflicts. “Super-tuskers” were targeted, because these carry a premium. Targeting these elephants is extremely detrimental to the population because they provide critically important ecological and social knowledge and aid the survival of the entire group. Older bull elephants’ control musth in younger, inexperienced bulls who otherwise manifest delinquent behaviour.<sup>335</sup>

There are other examples of trophy hunting affecting the genetic integrity of populations through selective removal of key individuals – for example, in a study of African leopards, which directly linked unsustainable anthropogenic mortality to inbreeding through disrupted dispersal in a large, solitary felid and exposed the genetic consequences underlying this behavioural change. In this study, the researchers emphasised the importance of managing and mitigating the effects of unsustainable exploitation on local populations and increasing habitat fragmentation between contiguous protected areas by promoting in situ recovery and providing corridors of suitable habitat that maintain genetic connectivity.<sup>336</sup>

Trapping of wild animals is carried out by fur trappers, “pest” and predator controllers, scientific researchers, and wildlife managers. It causes immense pain and suffering. Not only animal protectionists object to its inherent inhumaneness, but wildlife professionals have also expressed concern about undue pain and suffering in mammal trapping.<sup>337 338</sup>

Some interesting research has been carried out on the relative animal welfare impacts of different pest control methodologies, including studies by Sandra Baker at Oxford University, such as this paper on “Assessing Animal Welfare Impacts in the Management of European Rabbits (*Oryctolagus cuniculus*), European Moles (*Talpa europaea*) and Carrion Crows (*Corvus corone*).<sup>339</sup>

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<sup>335</sup> Pinnock, Don. International elephant corridor put at risk by killing of Botswana’s largest tuskers. Daily Maverick. 12 May 2022. <https://www.dailymaverick.co.za/article/2022-05-12-international-elephant-corridor-put-at-risk-by-killing-of-botswanas-largest-tuskers/>

<sup>336</sup> Naude, V.N. et al. Unsustainable anthropogenic mortality disrupts natal dispersal and promotes inbreeding in leopards. *Ecology and Evolution*, 10(8), pp. 3605-3619. April 2020. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7160178/>

<sup>337</sup> Clifton, Merritt. “Trapping defender” Proulx explains why all fur trapping is cruel. *Animals* 24-7. 11 May 2022. <https://www.animals24-7.org/2022/05/11/trapping-defender-proulx-explains-why-all-fur-trapping-is-cruel/>

<sup>338</sup> Proulx, Gilbert. Mammal Trapping, Wildlife Management, Animal Welfare & International Standards. Alpha Wildlife Research & Management Ltd. <https://cwbm.ca/product/mammal-trapping-e-book/>

<sup>339</sup> Baker, Sandra et al. Assessing Animal Welfare Impacts in the Management of European Rabbits (*Oryctolagus cuniculus*), European Moles (*Talpa europaea*) and Carrion Crows (*Corvus corone*). February 2016. DOI: [10.1371/journal.pone.0146298](https://doi.org/10.1371/journal.pone.0146298) & [https://www.researchgate.net/publication/289335487\\_Assessing\\_Animal\\_Welfare\\_Impacts\\_in\\_the\\_Management\\_of\\_European\\_Rabbits\\_Oryctolagus\\_cuniculus\\_European\\_Moles\\_Talpa\\_europaea\\_and\\_Carrion\\_Crows\\_Corvus\\_corone](https://www.researchgate.net/publication/289335487_Assessing_Animal_Welfare_Impacts_in_the_Management_of_European_Rabbits_Oryctolagus_cuniculus_European_Moles_Talpa_europaea_and_Carrion_Crows_Corvus_corone)

It is also worth remembering that not all population effects are due only to animals being killed by human activity. This can also be due to reduced fitness such as injuries, stress, toxicities and reduced fertility. These can in turn be due to environmental factors, such as habitat loss, reduced resources (e.g., food, water, shelter), climate change and pollution.

Historically, wildlife welfare has received far less attention than welfare for farm or companion animals, because of the widespread, avoidable and unnecessary direct harms to animals in human “care”. Most legislation was centred on preventing cruelty, what humans should do to protect the animals in their care from unnecessary suffering, and to provide them with suitable care, housing, feed etc. However, in recent years interest in wildlife welfare has grown, as more people have realised that humans have a substantial influence on the lives and welfare of wild animals. Humans, as individuals and as a species, intentionally or unintentionally influence the welfare of wildlife in many different ways – such as those noted above. Also, the growing global human population is impacting wildlife habitats, and causing disturbance or destruction of nature, be it for infrastructure projects such as roads, city expansion or beach resorts, or to gain access to natural resources such as oil, timber or minerals. The expanding human population requires more food, and this brings its own significant impacts.<sup>340</sup>

Sometimes wildlife is “managed” - hunted and killed – because of human-animal or environment-animal conflicts, or indeed when wild animals are starving due to insufficient food sources. These problems can occur when the animals’ territories are too small to cater for their needs – for example, when land-use change occurs removing natural habitats and wildlife corridors permitting their free movement in search of resources. In such cases, restoration of habitats and wildlife corridors is the preferred option, particularly from an animal welfare perspective. But where this is not possible, then wildlife contraception can be a humane management option. There have been many studies and trials of wildlife contraception and welfare, and some of the history and examples are provided in the Wild Animal Initiative briefing “Deep Dive: Wildlife contraception and welfare”.<sup>341</sup>

A recent article on “Wildlife Welfare”<sup>342</sup> explores some of the areas where researchers are studying the welfare of wildlife, and includes some suggestions for giving greater consideration to wildlife welfare for the benefit of both individual animals and conservation objectives. One useful suggestion is to use the 3Rs approach (formulated by Russel and Burch), which has been internationally accepted as an ethical framework to improve the welfare of animals used in research. It stands for “Replacement, Reduction and Refinement”, and seeks to reduce the numbers of animals used, refine the methods used (to improve welfare) and ultimately to replace animal use with alternatives. In fact, this ethical approach should be extended to all uses of animals, not just research and wildlife use. In the case of wildlife, it is urgently needed to address the existential biodiversity loss crisis. After

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<sup>340</sup> Berg, Charlotte et al. Wildlife Welfare. Front. Vet. Sci., 30 September 2020. <https://doi.org/10.3389/fvets.2020.576095>

<sup>341</sup> Liedholm, Simon Eckerström. Deep Dive: Wildlife contraception and welfare. Wild Animal Initiative. 8 April 2022. <https://www.wildanimalinitiative.org/blog/contraception-deep-dive>

<sup>342</sup> Berg, Charlotte et al. Wildlife Welfare. Front. Vet. Sci., 30 September 2020. <https://doi.org/10.3389/fvets.2020.576095>

all, how can wildlife continue to be used for inessential products, vanity products and human entertainment, when this is putting species and ecosystems at terminal risk, and causing immense animal suffering?

The UK's Wild Animal Welfare Committee has some interesting papers on wild animal welfare, including areas such as hunting, trapping and management.<sup>343</sup> An external paper of particular interest is "International consensus principles for ethical wildlife control"<sup>344</sup>. This explores international perspectives on and experiences with human–wildlife conflicts to develop principles for ethical wildlife control, which minimises animal welfare harms.

According to the article "The principles can be captured in a list of 7 questions that can be asked in sequence when decisions about human–wildlife conflicts are made, and they can be used to ensure that the principles are followed: Can the problem be mitigated by changing human behaviour? Are the harms serious enough to warrant wildlife control? Is the desired outcome clear and achievable, and will it be monitored? Does the proposed method carry the least animal welfare cost and to the fewest animals? Have community values been considered alongside scientific, technical, and practical information? Is the control action part of a systematic, long-term management programme? Are the decisions warranted by the specifics of the situation rather than negative labels applied to the animals?"

Carefully asking such questions is particularly important when addressing conflicts with commensal rodents, since ill-considered control plans so frequently result in severe adverse consequences to both target and non-target animals. For example, vast numbers of wildlife are accumulating rodent poisons in their blood, their livers, their fat. Most thoroughly studied in that respect have been the rodenticides that prevent coagulation, that promote internal bleeding.

A 2015 article in the Tufts Veterinary Magazine<sup>345</sup> stated, "So-called 'second-generation' anticoagulant rodenticides, or SGARs, became popular because even a single feeding easily kills mice or rats. However, because it takes several days for the poisoned rodents to bleed out, they can continue to feed on the poison. When they do die, their carcasses can contain residues that are lethal for hawks, owls and other animals that often make a meal of rodents, living and dead." "SGARs also can accumulate in liver tissue, so an animal that repeatedly feeds on prey containing nonlethal amounts can store up a deadly dose over time."

In a paper entitled "The welfare of wildlife: an interdisciplinary analysis of harm in the legal and illegal wildlife trades and possible ways forward"<sup>346</sup>, researchers make the case as to

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<sup>343</sup> Wild Animal Welfare Committee. Resources. <https://www.wawcommittee.org/resources>

<sup>344</sup> Wild Animal Welfare Committee. International consensus principles for ethical wildlife control. [https://static1.squarespace.com/static/5edf4fd72d25275e3acc8c4a/t/5f4f9c2cf41ed579a073faac/1599052848970/Dubois\\_et\\_al-2017-Conservation\\_Biology-1.pdf](https://static1.squarespace.com/static/5edf4fd72d25275e3acc8c4a/t/5f4f9c2cf41ed579a073faac/1599052848970/Dubois_et_al-2017-Conservation_Biology-1.pdf)

<sup>345</sup> Cummings Veterinary Medicine. Safe Rodent Control. Winter 2015. <http://sites.tufts.edu/vetmag/winter-2015/safe-rodent-control/>

<sup>346</sup> Wyatt, T., Maher, J., Allen, D. et al. The welfare of wildlife: an interdisciplinary analysis of harm in the legal and illegal wildlife trades and possible ways forward. *Crime Law Soc Change* 77, 69–89 (2022). <https://doi.org/10.1007/s10611-021-09984-9>

why welfare is an important component of any discussion or policy about wildlife trade, not only for the interests of the wildlife and the environment, but also for the sake of humans. They detail the harm in the trade as well as the current welfare provisions, particularly in relation to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which guide global transport and trade. Then they suggest a number of ways that the current approach to wildlife welfare could be improved.

The illegal wildlife trade also impacts both animal welfare and conservation, accelerating the decline in wildlife populations. The value of illegal trade has been estimated at [between \\$7 and \\$23 billion per year](#).<sup>347</sup> making wildlife crime one of the most lucrative illegal businesses, often run by sophisticated, international, and well-organized criminal networks seeking to exploit the high rewards and low risks of the trade. At the local level, poaching is also the result of poverty, corruption, inadequate enforcement, and political instability.

Illegal wildlife trafficking is the fourth most lucrative global crime after drugs, humans and arms.<sup>348</sup> An historic Resolution on tackling wildlife crime was adopted in May 2022 by consensus at a key United Nations meeting in Vienna, Austria. The Resolution, entitled “Strengthening the international legal framework for international cooperation to prevent and combat illicit trafficking in wildlife”, which was submitted by the governments of Angola, Kenya and Peru, calls on the United Nations Office on Drugs and Crime (UNODC) and its Member States to examine the challenges and gaps in the current international legal framework for preventing and combating wildlife trafficking. It also asks them to consider the pros and cons of developing an additional protocol on wildlife crime under the UN Convention Against Transnational Organised Crime, in order to strengthen international cooperation in tackling the problem.<sup>349</sup>

World Animal Protection has a lecture on “Wild Animal Welfare: Management of Wildlife”<sup>350</sup> which covers the main animal welfare concerns relating to wildlife, and suggestions for humane ways in which these might be resolved. This lecture was developed in conjunction with the University of Bristol and other scientific advisors, and it includes references to relevant research.

As can be seen below, wild animals are captured, transported, traded and used in many different ways, and this has enormous impacts on their welfare, as well as conservation. Here are some examples of potential harms caused:

- Capture
  - Harm during capture (e.g., trapping methods, use of toxins for marine fish)
  - Killing of families (e.g., primate parents to take juveniles, nursing mothers captured leaving babies/infants)
  - Effects on population levels

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<sup>347</sup> GEF. Illegal Wildlife Trade. <https://www.thegef.org/what-we-do/topics/illegal-wildlife-trade>

<sup>348</sup> WWF. Illegal Wildlife Trade. <https://www.thegef.org/what-we-do/topics/illegal-wildlife-trade>

<sup>349</sup> Born Free. United Nations Agrees Historic Resolution on Wildlife Trafficking. 20 May 2022. <https://www.bornfree.org.uk/news/un-wildlife-trafficking-resolution>

<sup>350</sup> World Animal Protection. Wild Animal Welfare: Management of Wildlife. [https://www.worldanimalprotection.org/sites/default/files/media/M21\\_P\\_Wild\\_AW\\_Management\\_of\\_Wildlife.pdf](https://www.worldanimalprotection.org/sites/default/files/media/M21_P_Wild_AW_Management_of_Wildlife.pdf)



- Damage to habitats
- Transport
  - Stress, densities
  - Starvation/dehydration
  - Infections
  - Injury by other animals/humans
  - Mortality
- Retail
  - Suffering at retail
  - Poor (e.g., impulse) purchase choices by consumers
- Destination
  - Lack of knowledge of carers
  - Lack of facilities of carers (e.g., different climate/temperatures, poor housing/accommodation/space etc.)
  - Lack of opportunities for social interaction with conspecifics
  - Hand-rearing
  - Imprinting on humans or other species
  - Relinquishment or release
- Subsequent breeding in captivity
  - Hybridisation
  - Many animals labelled as captive-bred are probably wild-caught (and in other cases the breeding stock are)
  - Inappropriate or inadequate breeding and rearing facilities
- Impact on populations in destination countries
  - International spread of disease
  - International spread of zoonotic disease
  - Alien species

Stereotypical behaviours are indicators of poor mental health and welfare. Species possessing high cognitive abilities, are particularly vulnerable to aberrant behaviours. In birds, this can take the form of feather plucking, which may develop into more severe self-mutilation and open wounds.

Death rates are typically much higher among wild animals captured and transported to sale than among those bred in captivity. Taking account of these forms part of a 'whole life' approach to welfare. Some animals marketed as captive bred are in fact captured from the wild. This is especially true of amphibians and reptiles, but also birds such as parrots in demand as exotic pets<sup>351</sup> and long tailed macaques used for biomedical research<sup>352</sup>. Because conditions are difficult to verify or assure and are frequently poor (especially across international supply chains), it is ultimately difficult to justify the wild capture of any species for private ownership.

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<sup>351</sup> Chan, David Tsz Chung et al. Global trade in parrots – Influential factors of trade and implications for conservation. *Global Ecology and Conservation*, Volume 30, 2021.

<https://www.sciencedirect.com/science/article/pii/S2351989421003346>

<sup>352</sup> The Long-Tailed Macaque Project. Trade. <https://theltmproject.org/blog/trade/>

Mortality rates provide a rough indicator of the most severe welfare failures. High mortality of traded animals raises welfare concerns, and also has implications for conservation if collection from the wild is required to meet demand. Data for individual species is poor, with estimates varying widely. Research published in 2015 suggests an 8.5% mortality rate for all lizards during the first year in private ownership, including a 28.2% rate for chameleons, 3.7% for chelonians (including tortoises, turtles and terrapins) and 2.3% for all snakes. All these rates are unacceptably high.<sup>353</sup>

Another area of over-exploitation is wild-caught fishing, which is the most serious threat to our oceans. Overfishing is catching too many fish at once, so the breeding population becomes too depleted to recover. Overfishing often goes hand in hand with wasteful types of commercial fishing that haul in massive amounts of unwanted fish or other “non-target” species, which are then discarded.<sup>354</sup> There is more about this in Section 3.4.2. (Root Causes and Drivers). The number of overfished fisheries has been slowly creeping up since the 1980s. According to the FAO, 35.4% of fisheries were overfished in 2019, up from 34.2% in 2017.<sup>355</sup>

Some of the major uses of wildlife which can lead to over-exploitation and thus contribute to biodiversity loss include: hunting; the pet trade; zoos and aquaria, circuses and tourism “animal experiences”; experimentation (science, research and testing); and even some misguided conservation projects. These can also have impacts on animal welfare. There is more about these issues below.

### ➤ ***Invasive Alien Species***

The GEO 6 report describes invasive alien species as plants, animals, pathogens and other organisms that are non-native to an ecosystem, and which may cause economic or environmental harm or adversely affect human health. In particular, they can impact adversely upon biodiversity, including decline or elimination of native species - through competition, predation, transmission of pathogens or the disruption of local ecosystems and ecosystem functions.<sup>356</sup> The GEO 6 Summary for Policymakers states that native and non-native invasive species threaten ecosystems, habitats and other species. The economic costs, both direct and indirect, amount to many billions of dollars annually.<sup>357</sup>

The CBD points out that invasive alien species, introduced and/or spread outside their natural habitats, have affected native biodiversity in almost every ecosystem type on earth and are one of the greatest threats to biodiversity. Some are introduced on purpose, others

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<sup>353</sup> Robinson, Janine E. et al. Captive Reptile Mortality Rates in the Home and Implications for the Wildlife Trade. 10 November 2015. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4640569/>

<sup>354</sup> Environmental Defence Fund. Overfishing: The most serious threat to our oceans. <https://www.edf.org/oceans/overfishing-most-serious-threat-our-oceans>

<sup>355</sup> FAO. Towards Blue Transformation A Vision for Transforming Aquatic Food Systems. The status of fishery resources. <https://www.fao.org/state-of-fisheries-aquaculture>

<sup>356</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6>

<sup>357</sup> Global Environment Outlook 6 Summary for Policymakers. 6 August 2019. [https://www.unep.org/resources/assessment/global-environment-outlook-6-summary-policymakers?\\_ga=2.58831021.1679832863.1648133604-1602352062.1634737523](https://www.unep.org/resources/assessment/global-environment-outlook-6-summary-policymakers?_ga=2.58831021.1679832863.1648133604-1602352062.1634737523)

unwittingly, and some released from captive situations (such as zoos, fur farms etc.). Since the 17th century, invasive alien species have contributed to nearly 40% of all animal extinctions for which the cause is known.<sup>358</sup> Aquatic invasive species are among the most pervasive, often being transported across the globe before introduction.<sup>359</sup>

The impact of invasive alien species on native animals are, in essence, animal welfare impacts. Invasive species can harm native wild animals through competition, predation, transmission of pathogens or the disruption of local habitats. These harms may occur even if species are not at risk.

However, some alien species become naturalised without negative impacts. For example, South African researchers reported that in South Africa there were 21 species of alien amphibians in the country out of a total of 104 species assessed globally with EICAT (IUCN standard), and from these only the Asian Common Toad was considered to have a major impact globally. But even in this case, there was no evidence for it having any impact in South Africa. Others even contribute positively to the environment and local communities.<sup>360</sup> <sup>361</sup>

Clearly, the best approach is to prevent the introduction of non-native species in the first place – particularly as once animals have been introduced, it can be difficult to assess the situation and deal with this ethically, humanely and appropriately. Particularly as nature begins to adapt and rebalance, when human interactions can be counterproductive.

However, if eradication of the invasive alien species is the agreed approach, then this must be done in the most humane way possible. It must also be done in an effective way, otherwise it is certainly not worth doing (witness the years of inhumane and ineffective “catch and kill” approaches to stray dog and cat control – as below). The IUCN has been leading a project for the European Commission on the humane management of invasive alien species. This work includes collating good practices that are both effective and humane, taking full account of animal welfare considerations.<sup>362</sup> There is also a paper entitled “International Consensus Principles for Ethical Wildlife Control” which records the principles which were developed during a 2-day workshop of experts through a facilitated engagement process and discussion.<sup>363</sup>

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<sup>358</sup> CBD. What are Invasive Alien Species? 2009. <https://www.cbd.int/ids/2009/about/what/>

<sup>359</sup> UNEP, CBD, WHO. Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review. 2015. <https://www.cbd.int/health/SOK-biodiversity-en.pdf>

<sup>360</sup> Zengeya, Tsungai A. et al. Springer. An Evaluation of the Impacts of Alien Species on Biodiversity in South Africa Using Different Assessment Methods. 11 March 2020. [https://link.springer.com/chapter/10.1007/978-3-030-32394-3\\_17](https://link.springer.com/chapter/10.1007/978-3-030-32394-3_17)

<sup>361</sup> Vimercati, Giovanni et al. The importance of assessing positive and beneficial impacts of alien species. <https://neobiota.pensoft.net/article/52793/>

<sup>362</sup> IUCN launches a call for good practices on the humane management of invasive alien species. 10 February 2021. <https://www.iucn.org/news/europe/202102/iucn-launches-a-call-good-practices-humane-management-invasive-alien-species>

<sup>363</sup> Dubois, Sarah et al. International Consensus Principles for Ethical Wildlife Control. Wellbeing International Studies Repository. Conservation Biology, 31(4), 753-760. 2017. <https://www.wellbeingintlstudiesrepository.org/cgi/viewcontent.cgi?article=1000&context=ethcbio>

Domestic animals could be considered as “invasive alien species”, especially if they become feral. Domestic dogs and cats, in particular, are increasingly being recognised as a potential threat for native wildlife, including endangered species. As well as killing, they may bring other threats including disturbance/fear, competition, hybridisation and disease risk.<sup>364</sup> <sup>365</sup> For many years the problem of stray control was mainly tackled by local authorities using “catch and kill” methods. Not only were these methods inhumane, but they didn’t even work over the long term. This is because they do not take account of all the important factors relevant to the carrying capacity of the environment including food, shelter, water and human attitudes and behaviour.<sup>366</sup> Without addressing these factors, if stray dogs/cats are removed, others will simply move into the area to fill the vacuum; and this increases the risk of disease transmission. There is also a risk to humans from dogs forming packs and acting aggressively. It is important that owners of companion animals exercise responsibility for their care, and the protection of wildlife (for example, providing bells for cats so they do not predate on birds, and stopping dogs from roaming outside their compound without being controlled by their owners).

There are now well-known and accepted humane control measures for stray animals, with dog population control being covered by the World Organisation for Animal Health (WOAH) animal welfare standards (Chapter 7.7.).<sup>367</sup> <sup>368</sup> The most authoritative resources and expertise on this subject are from the International Companion Animal Management Coalition (ICAM), which supports the development and use of humane and effective companion animal population management worldwide.<sup>369</sup> ICAM’s resources include guidance on the components of effective population control programmes (with neutering as an important component, given the very frequent ineffectiveness of culling), planning, monitoring and evaluation (for effective impact) and case studies.<sup>370</sup> Their well-developed principles and methods, backed by sound science, should also be considered in the wider context of alien species.

This is an overview of direct drivers, and the nexus with animal welfare. It is noted that climate change and pollution are also drivers of biodiversity loss, but these are included in separate sections of this Scoping Study.

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<sup>364</sup> Home, C et al. Canine Conundrum: domestic dogs as an invasive species and their impacts on wildlife in India. 20 December 2017.

<https://zslpublications.onlinelibrary.wiley.com/doi/10.1111/acv.12389>

<sup>365</sup> Stetson University. Domestic cats an invasive species? The last biodiversity lecture of spring 2020 examines the issue. <https://www2.stetson.edu/law/news/index.php/2020/04/08/domestic-cats-an-invasive-species-the-last-biodiversity-lecture-of-2020-examines-the-issue/>

<sup>366</sup> WOAH. Terrestrial Animal Health Code. Chapter 7.7. Stray Dog Control.

[https://www.oie.int/fileadmin/Home/eng/Health\\_standards/tahc/2018/en\\_chapitre\\_aw\\_stray\\_dog.htm](https://www.oie.int/fileadmin/Home/eng/Health_standards/tahc/2018/en_chapitre_aw_stray_dog.htm)

<sup>367</sup> WOAH. Terrestrial Animal Health Code. Chapter 7.7. Stray Dog Control.

[https://www.oie.int/fileadmin/Home/eng/Health\\_standards/tahc/2018/en\\_chapitre\\_aw\\_stray\\_dog.htm](https://www.oie.int/fileadmin/Home/eng/Health_standards/tahc/2018/en_chapitre_aw_stray_dog.htm)

<sup>368</sup> ICAM. Global veterinary body gives support for humane DPM. <https://www.icam-coalition.org/global-veterinary-body-gives-support-for-humane-dpm/>

<sup>369</sup> The International Companion Animal Management Coalition. <https://www.icam-coalition.org/>

<sup>370</sup> The International Companion Animal Management Coalition. Topics. <https://www.icam-coalition.org/topics/>

There are also indirect drivers underlying these direct drivers. These need to be tackled using large-scale political, social and economic processes. There is more on this in the section of this Scoping Study on “Just Transitions”.

Two issues of major importance to biodiversity merit further mention here: food systems and the wildlife trade.

#### **4.4.3. Food Systems**

The urgent need to transform food systems has already been recognised in flagship reports – through all stages from food production through processing and supply chains, including demand and eliminating food waste. The global food system is the leading cause of deforestation, land use change and biodiversity loss; accounts for 70% of all human water use and is a major source of water pollution..<sup>371</sup>

As regards deforestation, the FAO’s Livestock’s Long Shadow report stated: “Expansion of livestock production is a key factor in deforestation, especially in Latin America where the greatest amount of deforestation is occurring – 70 percent of previous forested land in the Amazon is occupied by pastures, and feed crops cover a large part of the remainder..<sup>372</sup>

A 2021 Chatham House report, supported by the UN Environment Programme (UNEP) and Compassion in World Farming described the key actions needed for food system transformation in support of biodiversity..<sup>373</sup> In their press release on the report, UNEP confirmed that our global food system is the primary driver of biodiversity loss, with agriculture alone being the identified threat to 24,000 of the 28,000 (86%) species at high risk of extinction..<sup>374</sup>

In the last decades our food systems have been following the “cheaper food paradigm”, with a goal of producing more food at lower costs through increasing inputs such as fertilisers, pesticides, energy, land and water. This paradigm leads to a vicious circle: the lower cost of food production creates a bigger demand for food that must also be produced at a lower cost through more intensification and further land clearance. As can be seen above, the impacts of producing more food at a lower cost are not limited to biodiversity loss either. The global food system is a major driver of climate change, accounting for around 30% of total human-produced emissions. According to the Chatham House report, a reform of food systems is a matter of urgency and should focus on three interdependent actions:

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<sup>371</sup>Garnett T. 2014. What is a sustainable healthy diet? A discussion paper. Oxford, United Kingdom: Food Climate Research Network (FCRN).

<https://cgspace.cgiar.org/bitstream/handle/10568/35584/FCRN-sustainable-healthy-diet.pdf>

<sup>372</sup> FAO. Livestock’s Long Shadow: Environmental Issues and Options 2006.

<https://www.fao.org/3/a0701e/a0701e.pdf>

<sup>373</sup> UNEP/CIWF. Food system impacts on biodiversity loss. 03 February 2021.

<https://www.unep.org/resources/publication/food-system-impacts-biodiversity-loss>

<sup>374</sup> UNEP. Our global food system is the primary driver of biodiversity loss. February 2021.

<https://www.unep.org/news-and-stories/press-release/our-global-food-system-primary-driver-biodiversity-loss>

- Firstly, global dietary patterns need to move towards more plant-heavy diets, mainly due to the disproportionate impact of animal agriculture on biodiversity, land use and the environment. Such a shift, coupled with the reduction of global food waste, would reduce demand and the pressure on the environment, benefit the health of populations around the world, and help reduce the risk of pandemics.
- Secondly, more land needs to be protected and set aside for nature. The greatest gains for biodiversity will occur when we preserve or restore whole ecosystems. Therefore, we need to avoid converting land for agriculture. Human dietary shifts are essential in order to preserve existing native ecosystems and restore those that have been removed or degraded.
- Thirdly, we need to farm in a more nature-friendly, biodiversity-supporting way, limiting the use of inputs and replacing monoculture with polyculture farming practices.

Dietary change is necessary to enable land to be returned to nature, and to allow widespread adoption of nature-friendly farming. The greater the dietary change, the more scope there is for the second and third actions.<sup>375</sup>

Whilst dietary change to predominantly plant-based foods is desirable from most perspectives – favouring the environment, human and animal health and well-being, it is not easy to persuade hardened meat eaters to change the habits of a lifetime. So, technology may well have the answer to spiralling animal cruelty, global warming, impending mass extinction, enormous levels of pollution and pandemic risks: cultured meat. Cultured meat is produced from cells drawn from donor animals without harm and then raised on a plant-based diet in a bioreactor, with no animal components needed. Replicating meat protein, but without the slaughter. Cultured meat has a much lower environmental footprint, reducing the impact on climate, land use and air pollution by 90%: It holds the very real potential of being the renewable energy equivalent for food.<sup>376</sup>

Moving away from industrial agriculture and monocultures to agroecological production methods is also important. A 2016 study entitled “A Global Paradigm to Challenge Mainstream Industrial Agriculture” examines this issue, using a 2008 call to re-evaluate our current Food Systems made by the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) as a backdrop to a literature review. The paper outlines key points in the controversy between the need for high-input and “techno-based” versus agroecological farming models. The paper analyses why, despite repeated calls for alternative methods of production over the years, with modern farming undermining the wellbeing of communities, including the destruction of “huge regions of natural habitat” and “an untold loss of ecosystem services” as well as health challenges, the paradigm of industrial or conventional agriculture still dominates and permeates mainstream academic and policy discussions about the future of agriculture. One key point

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<sup>375</sup> UNEP. Our global food system is the primary driver of biodiversity loss. February 2021. <https://www.unep.org/news-and-stories/press-release/our-global-food-system-primary-driver-biodiversity-loss>

<sup>376</sup> Lymbery, Philip. Evolution or Revolution: Can Cultured Meat be a Game Changer for Food? 27 April 2022. <https://philiplymbery.com/evolution-or-revolution-can-cultured-meat-be-a-game-changer-for-food/#.YmmJ2LsXKkZ.linkedin>



is that industry and industry-funded academics support techno-based solutions, and they are able to churn out papers in support of their commercial agenda. A critical assessment is made of proposed strategies to protect soil resources, improve nutrient and energy cycles, protect agrobiodiversity, and promote social well-being in rural communities. With an increase in the number of affluent consumers (i.e., the middle class) in the developing world, and with the continued problem of extreme and chronic poverty with other larger sectors of society, organic farming and agroecology models are put forward as a sound social, scientific, and rural development strategy.<sup>377</sup>

As we have seen above in Paragraph 3.4.2. on “Root Causes and Drivers”, although aquaculture is frequently touted as a panacea for future food security, intensive aquaculture production brings many detrimental impacts on both marine and terrestrial ecosystems. Wild fish stocks have been perilously over-exploited too. However, the same type of plant-based and cellular alternatives are being developed for seafood.

Cultured or cellular seafood has similar benefits to cultured meat, and avoids the detrimental environmental and animal welfare impacts of industrial aquaculture.<sup>378</sup> An April 2022 paper on “Alternative Seafood and Its Contribution to Food Systems”<sup>379</sup> examines the potential of alternatives to seafood to contribute to food systems. Alternative seafood comprises all plant-based, fermentation-derived and cell-based seafood alternatives that mimic the taste, texture, appearance and/or nutritional properties of conventional seafood. The paper explains these in more detail, and analyses their uptake and impacts. The conclusion is that initially, the impacts will be largely concentrated in high income countries. As the demand for seafood alternatives grows, this may lessen demand for traditional seafood products. However, there is also a likelihood that the removal of some of the commercial pressures on fisheries and aquaculture may lessen pressures on seafood resources for local food security, as well as bringing positive environmental impacts.

A new book by Philip Lymbery (Global CEO of Compassion in World Farming) called “Sixty Harvests Left: How to Reach a Nature-Friendly Future”<sup>380</sup> examines how the food industry is threatening the planet. It contains in-depth investigations of how industrial animal agriculture is sweeping the countryside and jeopardising the air we breathe, the water we drink, the food we eat and the nature that we treasure. But the investigations also uncovered pioneers who are battling to bring landscapes back to life, who are rethinking farming methods, rediscovering traditional techniques and developing technologies to feed an ever-expanding global population.

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<sup>377</sup> Valenzuela, Hector. Agroecology: A Global Paradigm to Challenge Mainstream Industrial Agriculture. March 2016. <https://www.mdpi.com/2311-7524/2/1/2>

<sup>378</sup> Rubio, Nathalie et al. Cell-Based Fish: A Novel Approach to Seafood Production and an Opportunity for Cellular Agriculture. *Frontiers in Sustainable Food Systems*. June 2019. <https://doi.org/10.3389/fsufs.2019.00043> & <https://www.frontiersin.org/articles/10.3389/fsufs.2019.00043/full>

<sup>379</sup> Marwaha, Nisha et al. Fad, Food, or Feed: Alternative Seafood and Its Contribution to Food Systems. *Perspective article. Front. Sustain. Food Syst.*, 4 April 2022. <https://doi.org/10.3389/fsufs.2022.750253> & <https://www.frontiersin.org/articles/10.3389/fsufs.2022.750253/full>

<sup>380</sup> Lymbery, Philip. *Sixty Harvests Left: How to Reach a Nature-Friendly Future*. 18 August 2022. <https://www.bloomsbury.com/uk/sixty-harvests-left-9781526619327/>

Other important considerations with regard to food systems are the commercial use of wildlife, and the use of wildlife for luxury or exotic foods. Both are directly connected with the transmission and spread of zoonoses, and with biodiversity loss – as is examined in the relevant sections of the Scoping Study. In the case of luxury or exotic foods, this is even more egregious because the use is inessential.

Exotic fare is a growing trend in fashionable restaurants. Lions, monkeys, turtles, sharks, frogs and snakes are only a few of the species that may appear on global menus. In some cases, restaurants are offering species on the brink of extinction because of overhunting or overfishing. Even if they are not rare, their capture may have damaged habitat. And in many cases, individual animals have suffered in capture, transport and captivity prior to being killed for food.<sup>381</sup> This involves marine as well as terrestrial species. For example, shark fin soup, consumed by Asian communities throughout the world, is one of the principal drivers of the demand of shark fins. This near USD 1 billion global industry has contributed to a shark population declines of up to 70%. In an effort to arrest these declines, the trade in several species of sharks is regulated under the auspices of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). However, a 2022 study found that despite this legal framework, the dried fins of trade-regulated sharks are frequently sold in markets and consumed in shark fin soup. This is a non-essential, luxury food, with bowls of soup priced at \$9 to \$54 USD, based on fin size and species.<sup>382</sup>

The research paper, entitled “Rethinking game consumption in tourism: a case of the 2019 novel coronavirus pneumonia outbreak in China”<sup>383</sup> explains the origins of wild animal consumption as a delicacy, and why this continues despite wild animals no longer being a food necessity. The authors revisit the topic from three main aspects – the ethics of wildlife consumption, managing the sale of wild animals in tourism, and food neophiliac tourists' attitudes and related safety regulations. The study recommends food neophiliac tourists to develop greater awareness of the ethics around animal consumption when engaging in food-oriented travel.

Scientists have been issuing dire warnings about the illegal or unsustainable wildlife trade since the 1992 manifesto World Scientists' Warning to Humanity, issued by the Union of Concerned Scientists (re-issued 25 years later by the Alliance of World Scientists). A 2021 paper revisited and built on this theme, citing food as one of the drivers. The scientists stressed the urgent need for cooperation between actors and disciplines to regulate wildlife trade and curb its negative consequences, for both ecosystems and humanity. This should arguably also read for the sake of the animals and their welfare. The authors pointed out that:

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<sup>381</sup> Humane Society International. Don't Buy Wild: Products, Food and Exotic Pets. [https://www.hsi.org/news-media/dbw\\_products\\_food\\_exoticpets/](https://www.hsi.org/news-media/dbw_products_food_exoticpets/)

<sup>382</sup> Pei Choy, Christine and Wainwright, Benjamin J. What Is in Your Shark Fin Soup? Probably an Endangered Shark Species and a Bit of Mercury. 14 February 2022. <https://www.mdpi.com/2076-2615/12/7/802>

<sup>383</sup> Ying, Tianyu et al. Rethinking game consumption in tourism: a case of the 2019 novel coronavirus pneumonia outbreak in China. 29 February 2020. DOI: [10.1080/02508281.2020.1743048](https://doi.org/10.1080/02508281.2020.1743048) & <https://www.tandfonline.com/doi/full/10.1080/02508281.2020.1743048?scroll=top&needAccess=true>

- Illegal or unsustainable wildlife trade threatens numerous species.
- Both targeted and non-targeted species are affected by wildlife trade.
- Disease transmission to humans is currently a major concern.<sup>384</sup>

The amount of illegal, smuggled bush meat entering commerce has increased markedly in recent years coincident with the increased demand for farmed game meats. The burgeoning smuggled bush meat trade may reflect the increase in intercontinental immigration of diverse cultures wishing to have continued access to traditional foods from their home countries and/or the local consumer's growing interest in experiencing novel exotic foods. Historically, the consumption of bush meat was primarily confined to the poorer, rural communities in Africa, Asia, the Middle East, and South America that hunted local wildlife for personal consumption as an inexpensive source of protein in their diets. Now, however, consumption is substantially increasing in Europe and the U.S. Much of this meat, which is being sold in street markets and ethnic restaurants, is illegally smuggled into countries – so avoiding health and safety checks.<sup>385</sup>

Some countries are now permitting the farming of wildlife, in order to meet demand and try to deal with the impacts of unsustainable consumption. This can have immense ethical and animal welfare implications. A 2021 study on the “Effects of legalization and wildlife farming on conservation”<sup>386</sup> found that wildlife farming increased the perceived social approval and acceptability of wildlife products, and thus fuelled demand. This was particularly true for mammals. For example, bear farming increased the acceptability and perceived social approval of bear bile; and it also decreased perceived legal sanctions for bear consumption. Tiger farming diminished perceived legal sanctions for tiger consumption and farming tigers for medicinal use increased the acceptability of tiger consumption. Overall, the results of this study indicated that bans on wildlife consumption and decreased wildlife farming of mammals can have conservation benefits.

#### **4.4.4. The Wildlife Trade**

The second issue of major importance to biodiversity, which urgently needs transformational change is the relentless and unsustainable use of wildlife, which is also inhumane, unsafe and unhealthy. Existing conventions and environmental programmes have been unsuccessful at addressing this crisis.

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<sup>384</sup> Cardoso, Pedro et al. Scientists' warning to humanity on illegal or unsustainable wildlife trade. Science Direct. November 2021. <https://doi.org/10.1016/j.biocon.2021.109341> & <https://www.sciencedirect.com/science/article/pii/S0006320721003931>

<sup>385</sup> Food Safety Magazine. Game Meat: A Complex Food Safety and Animal Health Issue. 1 December 2004. <https://www.food-safety.com/articles/4688-game-meat-a-complex-food-safety-and-animal-health-issue>

<sup>386</sup> Rizzolo, Jessica Bell. Effects of legalization and wildlife farming on conservation. January 2021. <https://doi.org/10.1016/j.gecco.2020.e01390> & <https://www.sciencedirect.com/science/article/pii/S2351989420309318>

There is a relatively new movement in favour of “compassionate conservation”, which gives weight to the interests and welfare of animals in conservation issues.<sup>387</sup> There has also been a proposal for the formal development of a new discipline, Conservation Welfare, integrating the expertise of scientists from both conservation and animal welfare disciplines.<sup>388</sup> These developments are important given that increasingly, human activities, including those aimed at conserving species and ecosystems (conservation activities) influence not only the survival and fitness but also the welfare of wild animals.

The Convention on Migratory Species of Wild Animals (CMS) has been spearheading efforts to use scientific knowledge on animal culture to better protect endangered wildlife. Scientific research has made significant progress in animal culture. It is clear that human activities that disrupt the social fabric of culturally developed species can have severe impacts. Protecting cultural knowledge among peers and across generations may be vital for the survival and successful reproduction of certain species. Supporting individuals that act as ‘repositories’ of social knowledge such as elephant matriarchs, or groups of knowledgeable elders, may be just as important as conserving critical habitat.<sup>389</sup>

The Convention on Biological Diversity<sup>390</sup>, in its framing in terms of “sustainable use” has failed to prevent and reverse biodiversity loss. Sustainable use seems to have diverged from a core focus on sustainability, to instead become a synonym for the “right to use”. Benefit sharing has also become a right, regardless of ecological sustainability, impacts and external costs. The precautionary principle has clearly not been applied. While the concept of sustainability is composed of three pillars (economic, social and environmental), socio-economic considerations have historically tended to take priority over environmental concerns. The current existential planetary crisis means this is no longer tenable. Priority must first and foremost be given to the reduction of exploitation and elimination of threats to biodiversity, and to the active conservation and restoration of biodiversity in order to halt its loss and ensure its long-term recovery.

The need for stricter controls on the use of wildlife is evident, and these must include both ethical and practical considerations, including animal and human health and welfare. It is unacceptable from both conservation and animal welfare perspectives to permit wild animals to be used for any inessential purpose. It is unacceptable not to differentiate between essential (for nutrition that cannot be obtained from other sources) and inessential (including luxury products, status symbols, entertainment etc.) uses of wild animals and in order to end the increasing over-exploitation of wild species, the latter must not be supported. In practice, the concept of sustainable use has led to a “free for all” in the

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<sup>387</sup> The Conversation. Introduced species are animals too: why the debate over compassionate conservation is worth having. 22 February 2022. <https://theconversation.com/introduced-species-are-animals-too-why-the-debate-over-compassionate-conservation-is-worth-having-163987>

<sup>388</sup> Mellor, David J et al. Feelings and Fitness” Not “Feelings or Fitness”—The Raison d’être of Conservation Welfare, Which Aligns Conservation and Animal Welfare Objectives. *Front. Vet. Sci.*, 27 November 2018 | <https://doi.org/10.3389/fvets.2018.00296>

<sup>389</sup> Convention on the Conservation of Migratory Species of Wild Animals. Animal Culture Linked to Conservation for the First Time. 19 February 2020. <https://www.cms.int/en/news/animal-culture-linked-conservation-first-time>

<sup>390</sup> Convention on Biological Diversity. Introduction. <https://www.cbd.int/intro/>

commercialisation of trade in wild animals. Biodiversity loss has only accelerated while this approach has been promoted.

The 2020 paper entitled “Trading Tactics: Time to Rethink the Global Trade in Wildlife” considers (1) why the risks presented by the wildlife trade (to animal welfare, biodiversity, public health, and financial security) are manifold, and cannot be treated with complacency; (2) why the goal of a legal, sustainable, safe, humane, and equitable commercial wildlife trade (being distinct from non-commercial trade such as animal rescue, conservation, and subsistence purposes) is misleading and unachievable; and (3) why moving towards an end to the commercial trade in wildlife should be the ultimate and more ambitious goal. The paper concludes that: “while pursuing the United Nation’s Sustainable Development Goals (with their focus on poverty alleviation, food security, public health, and conservation) is enduringly vital, a flourishing wildlife trade is not. Given that the over-exploitation of wildlife, including for the pet trade, has been identified as one of the dominant drivers of biodiversity loss, emergence of zoonotic infectious disease, animal suffering, and financial instability, perpetuating the concept of utilising a regulated wildlife trade as the default approach to protect people and planet is in urgent need of re-evaluation.”<sup>391</sup>

Animals are a vital part of ecosystem restoration projects too. A recent scientific paper published in the journal *Ecography* identified the impact of animals on global ecosystem processes. Researchers used data from the International Union for the Conservation of Nature (IUCN) to identify twenty species that, if reintroduced or allowed to recolonise through improved connectivity, could “increase the area of the world containing intact large mammal assemblages by 54%”.

Animals are key and irreplaceable components of biodiversity, which is the basis of a habitable planet for humans. Without animals, the energy from today’s plants (algae, trees, flowers etc) will eventually reach the atmosphere and ocean, much of it as carbon. In the words of the opening of the abstract: “Assemblages of large mammal species play a disproportionate role in the structure and composition of natural habitats. Loss of these assemblages destabilises natural systems, while their recovery can restore ecological integrity”.<sup>392</sup>

Clearly animal welfare and animal behaviour considerations should form an integral part of any animal reintroductions as part of rewilding activities. The UK Wild Animal Welfare Committee underlines this need in its paper “Animal reintroductions: who is safeguarding animal welfare?”: “Reintroduced species usually represent those that were historically present and are derived from external populations that may be genetically different to the lost species. This paper asks whether animal welfare receives adequate consideration as part of the debate about animal reintroductions and who, if anyone, acts as the guardian of

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<sup>391</sup> D’Cruze, Neil et al. Trading Tactics: Time to Rethink the Global Trade in Wildlife. 21 December 2020. DOI: [10.3390/ani10122456](https://doi.org/10.3390/ani10122456)

<sup>392</sup> Vynne, Carly et al. An ecoregion-based approach to restoring the world's intact large mammal assemblages. *Ecography*. 27 January 2022. <https://doi.org/10.1111/ecog.06098>

animal welfare during these activities? There are welfare risks to both the reintroduced species and resident wild animal species, both of which need to be considered”<sup>393</sup>

Another consideration is the role of wildlife rehabilitation centres. Many of these are run by animal protection NGOs, and they work to rehabilitate and release injured or threatened wildlife back into the wild. Wildlife rehabilitation is an undervalued and potentially useful tool for stabilising some declining populations, and could be targeted to support in-situ interventions. Under a Conservation Medicine framework, future collaborations between veterinarians, rehabilitators and ecologists should explore how rehabilitation can be combined most effectively with other conservation interventions to support the recovery of endangered populations.<sup>394</sup>

This ECO article on “Animal Health and Welfare Key to an Effective Post-2022 Global Biodiversity Framework”<sup>395</sup> and the Position Paper on “Key recommendations for an ambitious, effective and transformative Post-2020 Global Biodiversity Framework”<sup>396</sup> from the World Federation for Animals, Born Free and several other NGOs to the Geneva CBD meetings on the Post-2020 Global Biodiversity Framework (14-29 March 2022) examine how the inclusion of animal health and welfare could support and strengthen the new Post-2022 Global Biodiversity Framework. In particular, the Sustainable Use narrative needs to be more tightly defined, using strict ecological criteria, and incorporating human and animal health risks and animal welfare concerns. The aim should be to enable species and ecosystems to thrive. Successful species and habitat conservation, and biological stability/sustainability should be prerequisites to any equitable sharing of benefits. A highly precautionary approach needs to be adopted, given that exploitation of wildlife has been identified as the second most significant direct driver of biodiversity loss. Ecological sustainability is a fundamental prerequisite to the social and economic aspects of sustainability.

Researchers reflecting on the CBD conference COP 15, pointed out that conservation science still rests on how animals can benefit humans, with key players such as the body of conservation scientists that produces reports on biodiversity for the UN, continuing to prioritise human wellbeing above all else. This prioritisation stems from an anthropocentric culture that typically considers humans to be separate from and of greater value than other species; and it often results in the treatment of other species and nature as objects and resources for human ends. This assumption still underlies the way many people approach conservation. As the researchers say: “In environmental science and resource management,

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<sup>393</sup> Wild Animal Welfare Committee. Animal reintroductions: who is safeguarding animal welfare? <https://static1.squarespace.com/static/5edf4fd72d25275e3acc8c4a/t/5f4f99b13c28b129b0df37f3/1599052212900/Topic+Statement+Reintroductions+Final+Feb+2020.pdf>

<sup>394</sup> Patterson, James E. et al. Population-level effects of wildlife rehabilitation and release vary with life-history strategy. *Journal for Nature Conservation*. June 2021. <https://www.sciencedirect.com/science/article/pii/S1617138121000303>

<sup>395</sup> ECO 2022. Animal Health and Welfare Key to an Effective Post-2022 Global Biodiversity Framework. 24 March 2022. SBSTTA 24 / SBI 3 / OEWS 3 <https://eco2022cbdalliance.blogspot.com/2022/03/animal-health-welfare-key-to-effective.html>

<sup>396</sup> WFA, Born Free et al. Key recommendations for an ambitious, effective and transformative Post-2020 Global Biodiversity Framework. Position Paper. February 2022. <https://wfa.org/wp-content/uploads/2022/02/WFA-POSITION-PAPER-FEB-2022-Post-2020-GBF.pdf>



the concepts of “natural resources” and “ecosystem services” reflect the prevailing anthropocentric approach for assessing natural value, especially through cost-benefit economic analyses.” However, to effectively address our extinction crisis, the researchers argue that we need more than merely technical advances or policies that remain mired in anthropocentric assumptions. Rather, fundamental changes are needed in how we view and value nature and other species. This would require a shift towards ecocentrism, a moral point of view in which every species and ecosystem type is seen as having intrinsic value.<sup>397</sup>

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The Global Biodiversity Outlook is the flagship publication of the Convention on Biological Diversity (CBD).<sup>399</sup> GBO-5<sup>400</sup> highlighted that Humanity stands at a crossroads with regard to the legacy it leaves to future generations. Biodiversity is declining at an unprecedented rate, and the pressures driving this decline are intensifying. None of the Aichi Biodiversity Targets have been fully met, in turn threatening the achievement of the Sustainable Development Goals and undermining efforts to address climate change.<sup>401</sup> Governments are even continuing to provide subsidies that are harmful to biodiversity. The jury is still out as to whether a new Post-2020 Global Biodiversity Framework will help to address this massive biodiversity loss, given the political will that will be required to underpin its success or failure.

#### 4.4.5. Major Uses of Wildlife

Some of the major uses of wildlife and potential causality are examined briefly below.

##### ➤ *Hunting*

Hunting has been found to cause immense suffering and cruelty. The most egregious forms of hunting, such as trophy hunting and cruel trapping (including leghold traps) are the target of widespread objections, and an increasing number of bans.<sup>402</sup>

There are enormous animal welfare problems involved with the trapping of wild animals, both target and non-target species (including companion animals), and many bans being

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<sup>397</sup> Alberro, Heather; Taylor, Bron and Kopnina, Helen. Conservation science still rests on how animals can benefit humans. The Conversation. 8 June 2022.  
<https://theconversation.com/conservation-science-still-rests-on-how-animals-can-benefit-humans-184671>

<sup>398</sup> Piccolo, John J et al. “Nature's contributions to people” and peoples' moral obligations to nature. Biological Conservation. Volume 270. June 2022.  
<https://www.sciencedirect.com/science/article/pii/S0006320722001252?via=ihub>

<sup>399</sup> The Convention on Biological Diversity. The Global Biodiversity Outlook.  
[https://www.cbd.int/gbo/#:~:text=Global%20Biodiversity%20Outlook%20\(GBO\)%20provides,genetic%20resources%20are%20shared%20equitably.](https://www.cbd.int/gbo/#:~:text=Global%20Biodiversity%20Outlook%20(GBO)%20provides,genetic%20resources%20are%20shared%20equitably.)

<sup>400</sup> The Convention on Biological Diversity. Global Biodiversity Outlook 5.  
<https://www.cbd.int/gbo/gbo5/publication/gbo-5-en.pdf>

<sup>401</sup> Earth.Org. World Fails to Meet Single Biodiversity Target to Stop Destruction of Nature – UN.  
<https://earth.org/un-report-aichi-targets/>

<sup>402</sup> European Commission. Implementation of Humane Trapping Standard in the EU.  
[https://ec.europa.eu/environment/biodiversity/animal\\_welfare/hts/index\\_en.htm](https://ec.europa.eu/environment/biodiversity/animal_welfare/hts/index_en.htm)

imposed on different trapping methods..<sup>403</sup> As regards trophy hunting, a growing number of conservation and animal protection organisations from all around the world (137 by July 2022) are combining their forces to speak out against trophy hunting and urge policy-makers to ban imports..<sup>404</sup> In March 2022, the Belgian Parliament resolved to ban the import of hunting trophies from internationally protected species, joining a growing list of other countries..<sup>405</sup> Airlines are taking a stand too - when Aerolíneas Argentinas banned hunting trophies from its flights back in 2021, it joined 45 airlines who had already taken this route..<sup>406</sup> The colonial roots of trophy hunting, and its elitist nature are frequently questioned..<sup>407</sup> There is also increasing evidence against historical claims that hunting is necessary for conservation, or even that it serves a significant (net) conservation role at all.

Some reports of interest include:

- Trophy Hunting: Busting the myths and exposing the cruelty..<sup>408</sup>
- Does Trophy Hunting Help Conservation?..<sup>409</sup>  
*Dr Mark Jones, Born Free's Head of Policy, says: "Claims by trophy hunters that they are primarily concerned about wildlife conservation or animal management are highly misleading. Trophy hunters don't target problem or surplus animals; instead, they covet those animals with the most impressive traits – the largest tusks, or the darkest manes. By doing so they remove key individuals, severely disrupting animal families and populations. They also cause immense animal suffering. Trophy hunting is not a conservation or animal management tool, nor does it contribute significant funds to conservation programmes or local communities; it is a cruel relic from colonial times that should be consigned to history where it belongs."*
- Why Hunting Isn't Conservation, and Why It Matters..<sup>410</sup>
- An extensive study by the Africa-wide research organisation Good Governance Africa (GGA), which questions the sustainability of trophy hunting, and states that it does not support conservation of community upliftment..<sup>411</sup>

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<sup>403</sup> Fur Free Alliance. Trapping. <https://www.furfreealliance.com/trapping/>

<sup>404</sup> Born Free. Global NGOs Call for a Ban on Hunting Trophy Imports. 7 July 2022.

[https://www.bornfree.org.uk/news/trophy-hunting-position-paper?utm\\_source=linkedin&utm\\_medium=social&utm\\_campaign=trophy-hunting&utm\\_content=position-paper](https://www.bornfree.org.uk/news/trophy-hunting-position-paper?utm_source=linkedin&utm_medium=social&utm_campaign=trophy-hunting&utm_content=position-paper)

<sup>405</sup> Humane Society International. Belgium Parliament is resolved to ban the import of hunting trophies from internationally protected species. 25 March 2022. <https://www.hsi.org/news-media/belgium-parliament-ban-the-import-of-hunting-trophies/>

<sup>406</sup> Garbunop, Daniel Martínez. Aerolíneas Argentinas to Ban Animal Hunting Trophies from Flights. 2 September 2021. <https://simpleflying.com/aerolineas-argentinas-hunting-trophies/>

<sup>407</sup> Tenniswood, Kerri (summary). The Colonial Roots of Trophy Hunting. Original study by Mkono, M. 2019, Published 7 July 2022. <https://faunalytics.org/the-colonial-roots-of-trophy-hunting/>

<sup>408</sup> Born Free. Trophy Hunting: Busting the myths and exposing the cruelty. July 2019. <https://wildthingsinitiative.com/hunting-is-not-conservation/>

<sup>409</sup> Born Free. Does Trophy Hunting Help Conservation? <https://www.bornfree.org.uk/articles/bth-conservation>

<sup>410</sup> Bixby, Kevin. Why Hunting Isn't Conservation, and Why It Matters. <https://rewilding.org/hunting-isnt-conservation/>

<sup>411</sup> Pinnock, Don. Daily Maverick. Value of trophy hunting to conservation massively overstated: report. 22 March 2022. <https://www.dailymaverick.co.za/article/2022-03-22-value-of-trophy-hunting-to-conservation-massively-overstated-report/>

- This interesting article records the first-hand experience of Dereck Joubert, who took over a former hunting concession, and built up its wildlife populations and involved the local community.<sup>412</sup>
- Killing for trophies: an analysis of global trophy hunting trade. A report by IFAW, based on thorough analysis, which includes conservation and animal welfare aspects.<sup>413</sup>
- Hunting. An article which includes information on the cruelty of hunting, and why this is not considered conservation.<sup>414</sup>  
*While hunters and so-called wildlife professionals pretend to have control over ecosystems and the animals they kill, natural predators such as wolves, mountain lions and bears are the real ecosystem managers, if allowed to survive naturally. For instance, the reintroduction of wolves to Yellowstone National Park caused ripple effects throughout the ecosystem, with an increase in biodiversity, including a higher occurrence of beavers, several bird and plant species, and natural habitat and stream recovery.*
- This article entitled “Reframing trophy hunting’s socio-economic benefits in Namibia” rebuts some of the arguments often used to position Namibia as a case study for trophy hunting as a conservation strategy benefitting local communities. It uses research and personal experience to build a case. For example, an official study found that in 2016, only 8% of revenue from trophy hunting went to communal conservancies, with 92% attributed to freehold land. Just over 70% of all freehold land remains white-owned, and the trophy hunting industry thrives on commercial farmland, which has not been subject to de-colonial measures. Also, the trophy hunting industry is almost predominantly white-run.<sup>415</sup>
- Similarly, a forensic study into Botswana’s Community Based Natural Resource Management (CBNRM) conservation system has found it to be failing the people and wildlife it was designed to support.<sup>416</sup>
- This article entitled “Ban wildlife trophy imports!” includes a plea to UK and USA from former Botswana president Ian Seretse Khama. The article details studies that have shown that trophy hunting fails to provide tangible financial benefits to local communities, does not assist with an increase in wildlife populations, and does not mitigate human-wildlife conflict.<sup>417</sup>

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<sup>412</sup> Joubert, Dereck. Dereck Joubert sets the record straight about trophy hunting impact on lions and refutes claims of so-called benefits. Daily Maverick. 6 February 2019. <https://africageographic.com/stories/dereck-joubert-sets-record-straight-about-trophy-hunting-impact-lions-refutes-claims-so-called-benefits/>

<sup>413</sup> IFAW. killing for trophies: an analysis of global trophy hunting trade. <https://www.ifaw.org/resources/killing-for-trophies>

<sup>414</sup> In Defence of Animals. Hunting. <https://www.idausa.org/campaign/wild-animals-and-habitats/hunting/>

<sup>415</sup> Becker, Frowin. Reframing trophy hunting’s socio-economic benefits in Namibia. 28 April 2022. Mongabay. <https://news.mongabay.com/2022/04/reframing-trophy-huntings-socio-economic-benefits-in-namibia-commentary/>

<sup>416</sup> Pinnock, Don. Botswana’s wildlife management fails communities — report. 7 July 2022. Daily Maverick. <https://www.dailymaverick.co.za/article/2022-07-07-botswanas-wildlife-management-fails-communities-report/>

<sup>417</sup> Clifton, Merritt. “Ban wildlife trophy imports!” pleads former Botswana president to U.K. & U.S. 1 July 2022. Animals 24-7. <https://www.animals24-7.org/2022/07/01/ban-wildlife-trophy-imports-pleads-former-botswana-president-to-u-k-u-s/>

- There is also significant concern over the way in which hunting quotas are allocated, and the effectiveness of controls. For example, see this case in South Africa: High Court grants urgent interim relief pending judgment against 2022 trophy hunting quotas.<sup>418</sup>
- The book “Animal welfare in a changing world” includes a Chapter (6) on Trophy hunting and animal welfare. This discusses both regulatory and welfare aspects of hunting wild animals for sport.<sup>419</sup>

Newsletter 4 of the “End Pandemics” Alliance includes two campaigns against trophy hunting which demonstrate the impacts of this “sport”. The first is the forced eviction of Maasai residents from a 1500 km<sup>2</sup> area of Tanzania, affecting an estimated 70,000 community members, to make way for an exclusive trophy hunting concession, operated by an influential hunting firm. The second is to stop the proposed trophy hunting of jaguars and other species in Brazil. Pressure from the hunting and firearms lobbies has seen this proposition resurface, as the government continues its assault on nature. The illegal trade in jaguar teeth and claws has boomed in recent years, as buyers look for alternatives to hard-to-get tiger products. Establishing a legal trade in jaguars would likely provide a cover for the illegal trade, as has been seen with lions and tigers, which could have a highly destabilising effect on already-threatened jaguar populations.<sup>420</sup>

Different countries regulate and control hunting in different ways. However, both animal welfare problems and conservation questions still abound. In trophy hunting, foreign hunters pay enormous amounts to bag a trophy, which means that the professional hunters who accompany them are loath to carry out “mercy killings” when their clients do not make an instant kill. There are many documented cases of painful and protracted deaths for this reason.

Another immense animal welfare problem is “canned hunting”, whereby wild animals – most commonly lions - are bred intensively and then placed into small enclosures for hunting – to maximise the clients’ chance of securing a trophy. Canned hunting is also commonly referred to as shopping and shooting, put and take, or captive hunting. It is effectively factory farming of wildlife, which should have no role in any conservation programmes.<sup>421</sup>

There are parallels between the canned hunting of lions and the breeding and hunting of game birds, which takes place in various countries across the world (e.g., pheasants in the UK and pigeons in the US). The adverse ecological impacts and implications for conservation

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<sup>418</sup> High Court grants urgent interim relief pending judgment against 2022 trophy hunting quotas. 25 March 2022. <https://www.hsi.org/news-media/high-court-grants-interim-relief-pending-judgment-trophy-hunting-quotas/>

<sup>419</sup> Jones, M and Draper, C. Chapter 6 of Animal welfare in a changing world. Trophy hunting and animal welfare. <https://www.cabi.org/vetmedresource/ebook/20183269886>

<sup>420</sup> End Pandemics. Newsletter 4. <https://mailchi.mp/2fbc69a90ca6/endpandemics-newsletter-4?e=af943990ed>

<sup>421</sup> Barkham, Patrick. Canned hunting: the lions bred for slaughter. The Guardian. 3 June 2013. <https://www.theguardian.com/environment/2013/jun/03/canned-hunting-lions-bred-slaughter>

are covered in this recent report.<sup>422</sup> The animal welfare ethics of sport hunting are also prominent (and in some views decisive) – with game birds being bred like battery chickens: and changing attitudes to its moral status may be the dominant force shaping the future of sport hunting world-wide.<sup>423</sup>

Wildlife has also been hunted and traded for centuries locally and internationally for consumption, ornamentation, clothing, and medicine. Despite substantial investment in wildlife conservation, illegal trading also persists and maintains substantial pressure on natural populations. Excessive wildlife hunting has important consequences on population dynamics and may lead to extinction and disruption of ecosystem functioning.<sup>424</sup>

The unsustainable wildlife trade is sustained by actors in myriad roles - including consumers, producers and policymakers - who directly or indirectly impact ecosystems and wild species. The illegal trade in wildlife (for example, rhino horn, pangolin scales, tiger bones and elephant ivory) involves suppliers who hunt the animals, intermediaries (and perhaps corrupt enforcement agents) who facilitate trade and transport the products to market, and domestic and international consumers. Reversing current trends will require not only stricter regulation and enforcement, but also profound and persistent changes to human behaviour across actors and scales. This underlines the importance of the science of human behavioural change.<sup>425</sup>

A multinational team of researchers recently investigated the biodiversity exploitation for online entertainment. The emergence of online trading facilitates the physical movement of wildlife across countries and continents, providing challenges to both conservation and animal welfare. There is also a novel form of wildlife exploitation which involves no physical movement of organisms, presenting new challenges. This consists of hunting and fishing “experiments” for monetised online entertainment. The researchers who analysed videos of these “experiments” considered that it raises serious ethical questions about animal welfare and the normalisation of violence to animals on the Internet. The emergence of this phenomenon highlights the need for online restriction of this type of content to limit the spread of animal cruelty and the damage to global biodiversity. It also sheds light on some conservation gaps in the virtual sphere of the Internet which offers biodiversity-related business models that has the potential to spread globally.<sup>426</sup>

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<sup>422</sup> Shooting pheasants for sport: What does the death of Cecil tell us?

Feber, Ruth E; Johnson, Paul J; Macdonald, David W. *People and Nature*; London Vol. 2, Iss. 1, (Mar 2020): 82-95. DOI:10.1002/pan3.10068

<sup>423</sup> Shooting pheasants for sport: What does the death of Cecil tell us?

Feber, Ruth E; Johnson, Paul J; Macdonald, David W. *People and Nature*; London Vol. 2, Iss. 1, (Mar 2020): 82-95. DOI:10.1002/pan3.10068

<sup>424</sup> Khelifa, Rassim et al. *Frontiers in Conservation Science*. Biodiversity Exploitation for Online Entertainment. 24 January 2022. <https://www.frontiersin.org/articles/10.3389/fcosc.2021.788269/full>

<sup>425</sup> Nielsen, Kristian Steensen et al. *Nature*. Human Behaviour. Biodiversity conservation as a promising frontier for behavioural science. 3 May 2021. <https://www.nature.com/articles/s41562-021-01109-5>

<sup>426</sup> Khelifa, Rassim et al. *Frontiers in Conservation Science*. Biodiversity Exploitation for Online Entertainment. 24 January 2022. <https://www.frontiersin.org/articles/10.3389/fcosc.2021.788269/full>

There is more information on overexploitation and destructive harvesting of wildlife in Chapter 4 of the report on “Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review”.<sup>427</sup> This points out that wildlife exploitation can not only reduce the abundance of the populations of species concerned, but also in some cases, threaten the survival of the species itself. Demand for wild-sourced food is increasing in some areas. The wildlife trade, for purposes such as supplying the pet trade, medicinal use, horticulture and luxury goods, is increasing globally, exacerbating pressures on wild populations. Practices for harvest, including unregulated administration of chemicals for the capture of animals (e.g., the release of cyanide or trawling practices for fishing) may also have impacts on non-target species, and/or unsustainable harvests may alter ecological dynamics, such as diminished potential for seed dispersion and implications for food chains (affecting also the humans who depend on them). As native biodiversity declines, local protein sources from subsistence hunting or gathering may be diminished. Additionally, bushmeat hunting and consumption, sometimes in areas that have not been previously targeted for food sourcing (for example, in newly established mining camps in formerly pristine habitat) may pose direct novel infectious disease transmission.

An editorial examining the question of wildlife welfare in “Frontiers in Veterinary Science” makes the same point that unregulated hunting, poaching and unsustainable fishing by humans can, over time, reduce the number of wild animal individuals to a level where they can no longer proliferate and will become extinct. Such activities can also directly lead to animals being hit or caught, struck and lost, injured but not killed—causing considerable suffering if the animal cannot immediately be located and humanely killed. Furthermore, hunting and fishing activities may impact animals other than the intended prey, through disturbance, by-catch or entanglement. This entanglement and incidental capture can affect cetaceans with severe animal welfare consequences.<sup>428</sup>

Furthermore, it is not just wildlife that is at risk. Rampant trade in donkey skins for traditional medicines is causing a massive decline in populations and even local “extinctions”. This has severe animal welfare implications due to inappropriate sourcing, handling, transportation and slaughter. It also compromises the livelihoods and transport of dependent communities especially in Latin America, Africa and Asia.<sup>429</sup>

### ➤ **Wildlife for Pets**

The use of wildlife for the pet trade is another area which has conservation and animal welfare implications, and the trade is growing. Animal welfare is invariably compromised for a wild animal in captivity, and there is also suffering in capture, confinement and transport. Exotic animals should not be kept as pets, whether wild-caught or purpose-bred, and there is no reason to do so. Many owners simply keep them as a status symbol, perceiving them to boost their image or standing.

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<sup>427</sup> UNEP, CBD, WHO. Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review. 2015. <https://www.cbd.int/health/SOK-biodiversity-en.pdf>

<sup>428</sup> Berg, Charlotte et al. Frontiers in Veterinary Science. Editorial: Wildlife Welfare. 30 September 2020. <https://www.frontiersin.org/articles/10.3389/fvets.2020.576095/full>

<sup>429</sup> World Veterinary Association. The Donkey Skin Trade and Welfare of Donkeys. [https://worldvet.org/uploads/news/docs/wva\\_fs\\_on\\_donkey\\_skin\\_trade.pdf](https://worldvet.org/uploads/news/docs/wva_fs_on_donkey_skin_trade.pdf)



The lack of legal repercussions for the inhumane treatment of exotic pets has helped create an industry in which “animal suffering, abuse, and the human greed behind it constitutes” the norm”, says Clifford Warwick, an independent reptile biologist and animal welfare specialist.<sup>430</sup>

An article in *Nature Communications* entitled “Thousands of reptile species threatened by under-regulated global trade” found that unregulated, or under-regulated wildlife trade can lead to unsustainable exploitation of wild populations. International efforts to regulate wildlife mostly miss ‘lower-value’ species, such as those imported as pets, resulting in limited knowledge of trade in groups like reptiles. This report examined web-based private commercial trade of reptiles to highlight the scope of the global reptile trade, finding that over 35% of reptile species are traded online. Three quarters of this trade is in species that are not covered by international trade regulation. Approximately 90% of traded reptile species and half of traded individuals are captured from the wild.<sup>431</sup>

Birds are at risk as well as mammals and reptiles. Before 1992, when the U.S. banned the import of many wild-caught birds, conservationists estimated that for the 700,000 wild birds brought into the country each year, 3.5 million more died.<sup>432</sup>

On a national and global scale, though, the problem is difficult to tackle, because it’s difficult to define. No one knows what percentage of animals die before they’re exported from their country of origin, multiple critics of the industry say, and it’s also unknown how many die prematurely in private homes, either for lack of appropriate care or their unsuitability for life in captivity.<sup>433</sup>

Traditionally, scientists, conservationists, and policymakers have kept relatively quiet on the issue of animal welfare in the wildlife trade, focussing on the protection of species and ecosystems over the well-being of individual animals. But now, an increasing number of researchers have begun calling for animal welfare to be made a conservation priority.<sup>434</sup> There are practical reasons for conservationists and policymakers to care about animal welfare: The more animals that die in trade because of ill treatment, the more that are captured from the wild to keep supplies coming. Regardless of how well or badly animals are doing in the wild, humans have an ethical responsibility not to cause harm.<sup>435</sup>

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<sup>430</sup> Nuwer, Rachel. National Geographic. Many exotic pets suffer or die in transit, and beyond—and the U.S. government is failing to act. 2 March 2021.

<https://www.nationalgeographic.com/animals/article/exotic-pets-suffer-wildlife-trade>

<sup>431</sup> Marshall, B.M., Strine, C. & Hughes, A.C. Thousands of reptile species threatened by under-regulated global trade. *Nat Commun* 11, 4738 (2020). <https://doi.org/10.1038/s41467-020-18523-4>

<sup>432</sup> Nuwer, Rachel. National Geographic. Many exotic pets suffer or die in transit, and beyond—and the U.S. government is failing to act. 2 March 2021.

<https://www.nationalgeographic.com/animals/article/exotic-pets-suffer-wildlife-trade>

<sup>433</sup> Nuwer, Rachel. National Geographic. Many exotic pets suffer or die in transit, and beyond—and the U.S. government is failing to act. 2 March 2021.

<https://www.nationalgeographic.com/animals/article/exotic-pets-suffer-wildlife-trade>

<sup>434</sup> Sekar, Nitin and Shiller, Derek. Engage with animal welfare in conservation. *Science*. 7 August 2020. <https://www.science.org/doi/abs/10.1126/science.aba7271>

<sup>435</sup> Sekar, Nitin and Shiller, Derek. Engage with animal welfare in conservation. *Science*. 7 August 2020. <https://www.science.org/doi/abs/10.1126/science.aba7271>

CITES, the international wildlife trade treaty, mandates that shipment of certain live animals must minimise injury or cruel treatment—but its regulations apply only to transport, not to how animals are captured, stockpiled, or eventually housed, says Sue Lieberman, Vice President of International Policy at the Wildlife Conservation Society. One suggestion for reforming the wildlife trade for private keeping is that trade should be permitted only for species on a “positive list” - animals for which ample scientific evidence exists that they can be traded safely, sustainably, and without harm or distress. The Netherlands and Belgium have already implemented positive lists for exotic pet mammals, but there are calls for the EU to apply the same approach for all exotic pets.

Even when wild animals being traded illegally are confiscated, they can face further severe animal welfare problems. This is mainly because there is insufficient housing and expertise available to ensure that their welfare is taken care of, and rehabilitation back into the wild in natural habitat is rarely achieved.<sup>436</sup>

Born Free also has some reports of relevance, for example:

An Investigation into the Online Sale of Exotic Animals as Pets.<sup>437</sup>

Pet Shop Primates.<sup>438</sup>

The Exotic Pet Demic. UKs Ticking Time Bomb Exposed.<sup>439</sup>

### ➤ ***Zoos and Aquaria, Circuses and Tourism “Animal Experiences”***

The use of wildlife in zoos and aquaria, circuses and tourism “animal experiences” can impact conservation, education, and cause serious animal welfare problems.

Public collections of captive wild animals are largely justified by the industry for their claimed beneficial impacts on animals. Firstly, such collections are often claimed to play a conservation role. The World Zoo Conservation Strategy stresses that successful conservation means all species, including humanity, thriving in healthy and sustainable ecosystems; that is, securing populations of species in natural habitats for the long term.<sup>440</sup> Contributions to this aim could be through visitor-funded breeding and reintroduction programmes, support for *in situ* conservation, or providing high standard care and accommodation for victims of the illegal wildlife trade. Secondly, such collections are often claimed to play an educational and motivational role which promotes concern for conservation and animal protection. Contributing to this could be the emotional experience of an encounter with wild animals which encourages people to live sustainably, respectfully

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<sup>436</sup> Wild Cru. Research. Animal Welfare in the Wildlife Trade. <https://www.wildcru.org/research/animal-welfare-in-the-wildlife-trade/>

<sup>437</sup> Born Free. An Investigation into the Online Sale of Exotic Animals as Pets. 2015.

<https://www.bornfree.org.uk/publications/investigation-online-exotic-pets>

<sup>438</sup> Born Free. Pet Shop Primates. 2014. <https://www.bornfree.org.uk/publications/pet-shop-primates>

<sup>439</sup> Born Free and RSPCA. The Exotic Pet Demic. UKs Ticking Time Bomb Exposed. September 2021. <https://www.bornfree.org.uk/publications/exotic-pet-demic>

<sup>440</sup> Barongi, R., Fisker, F. A., Parker, M. & Gusset, M. (eds) (2015). Committing to Conservation: The World Zoo and Aquarium Conservation Strategy. World Association of Zoos and Aquariums. Gland: WAZA Executive Office, 69 pp.

and altruistically; plus going beyond the sharing of knowledge about the natural world, to involving people in conservation, and helping them to form connections that will benefit animals, their habitats and themselves.<sup>441</sup>

However, there are questions about the validity of claims that keeping wild animals in zoos and aquaria provides significant education or conservation benefits, compared to alternatives, and whether these can justify the animal suffering involved. In the case of circuses and tourism “animal experiences”, these are primarily businesses using animals for human pleasure for profit, without any of the beneficial impacts claimed by zoos and aquaria. The same goes for bad collections of wild animals which do nothing in the line of conservation or education. In all such cases, the animal suffering involved is not balanced by any positive conservation or animal benefits.

### **Zoos and Aquaria:**

As regards education, zoos vary significantly in their educational offerings. There is also a risk of a negative educational impact of the sight of captive animals outside their natural environments and/or with poor welfare (and displaying unnatural behaviour, including stereotypical behaviours) and the message conveyed that it is acceptable to confine wild animals in poor conditions for human convenience.<sup>442</sup> At the same time, alternative forms of education have improved enormously, including wildlife documentaries, internet, books, travel opportunities and virtual reality.

As regards conservation, there have been some reintroductions from zoological collections. However, most animals held captive in zoos are not endangered or threatened in the wild, and also most have no chance of being reintroduced to the wild.<sup>443</sup> Captive-bred animals are likely to lack survival skills necessary to be released into the wild, and often have developed such severe stereotypes or psychological harms - brought on by captivity - that they would not survive. There is no evidence of any gorilla, polar bear, rhino, elephant, tiger, panda, or chimpanzee born at a zoo will ever be released to the wild. The limited number of reintroductions from zoo-bred populations might have been achieved through other protective measures or breeding programmes.

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<sup>441</sup> EAZA. Education. <https://www.eaza.net/conservation/education/>

<sup>442</sup> The Zoo Inquiry. WSPA and Born Free. 5 September 1994.  
[https://www.bornfree.org.uk/storage/media/content/images/Publication%20covers/The\\_Zoo\\_Inquiry.compressed.pdf](https://www.bornfree.org.uk/storage/media/content/images/Publication%20covers/The_Zoo_Inquiry.compressed.pdf)

<sup>443</sup> Born Free. Conservation or Collection. Examining the conservation status of animals housed and bred in licensed charitable UK zoos. May 2021.  
<https://www.bornfree.org.uk/publications/conservation-or-collection-report>

At the same time, some wild animals are poached from the wild for captive collections.<sup>444</sup> As recently as 2019, zoos in China and the United States both petitioned for dozens of wild-caught African elephants to be caught.<sup>445</sup>

A series of reports by the World Society for the Protection of Animals (now World Animal Protection) and Born Free have suggested that zoos have limited conservation role. A well-researched 1994 report entitled “The Zoo Inquiry”<sup>446</sup> detailed an investigation by experienced zoo professionals and veterinarians into claims made by the industry to justify the existence of zoos in terms of their contribution to conservation and education. It concluded that the captive breeding of wild animals for true conservation objectives could, at best, play only a marginal role in species conservation, and that most zoos did little to educate people about conservation. A 2011 investigation into 200 EU zoos in 20 countries identified limited change.<sup>447</sup> A 2021 report entitled “Conservation or Collection” examined the conservation status of licensed charitable UK zoos, and identified that the majority of species housed by the UK Consortium of Charitable Zoos were not considered to be threatened species, and that zoos had made little effort to address this imbalance since the requirements were introduced 15 years ago.<sup>448</sup>

Conservationist Damian Aspinall, who is responsible for two wildlife parks and has been in the industry for 40 plus years, considered these issues in a 2019 article for The Independent newspaper, and concluded that zoos do not play a significant role in the conservation of wildlife, their educational claims are exaggerated and are outdated.<sup>449</sup> Others including Sir David Attenborough have suggested zoos do have a potential role to play - providing they are scientific, selective about what they keep (he mentions “animals that have been reduced to less than 100 and the reason they've done that is that something has happened in their environment which has made it impossible for them to survive”), and that animals are kept to the highest possible standards.<sup>450</sup>

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<sup>444</sup> Barongi, R., Fisker, F. A., Parker, M. & Gusset, M. (eds) (2015). *Committing to Conservation: The World Zoo and Aquarium Conservation Strategy*. World Association of Zoos and Aquariums. Gland: WAZA Executive Office, 69 pp.

<sup>445</sup> Williamson, Ben. World Animal Protection. Keeping Wild Animals in Captivity Is Not Conservation. Here's Why. 15 October 2020. <https://www.worldanimalprotection.us/blogs/keeping-wild-animals-captivity-not-conservation-heres-why>

<sup>446</sup> The Zoo Inquiry. WSPA and Born Free. 5 September 1994. [https://www.bornfree.org.uk/storage/media/content/images/Publication%20covers/The\\_Zoo\\_Inquiry.compressed.pdf](https://www.bornfree.org.uk/storage/media/content/images/Publication%20covers/The_Zoo_Inquiry.compressed.pdf)

<sup>447</sup> Born Free Foundation. The EU Zoo Inquiry 2011. An evaluation of the implementation and enforcement of EC Directive 1999/22, relating to the keeping of animals in zoos. Report Findings and Recommendations. 2012. <https://www.bornfree.org.uk/storage/media/content/files/Publications/FINDINGS%20%26%20RECOMMENDATIONS.pdf>

<sup>448</sup> Born Free. Conservation or Collection. Examining the conservation status of animals housed and bred in licensed charitable UK zoos. May 2021. <https://www.bornfree.org.uk/publications/conservation-or-collection-report>

<sup>449</sup> Aspinall, Damian. Zoos are outdated and cruel – it's time to make them a thing of the past. The Independent. 14 August 2019. <https://www.independent.co.uk/climate-change/news/zoos-cruel-wildlife-conservation-species-a9056701.html>

<sup>450</sup> Anstey, Tom. Sir David Attenborough advocates for zoos and aquariums in battle for species survival. Planet Attractions. 21 December 2020. <https://www.planetattractions.com/news/Sir-David-Attenborough-advocates-for-zoos-and-aquariums-in-battle-for-species-survival/108>

At the same time, animals in zoos may have their welfare severely compromised. Zoos are unable to completely recreate the complex environment that many animals have evolved to encounter in the wild and animals suffer in captivity as a result. Wildlife is not domesticated, and wild-caught animals are not used to human contact or confinement. Many animals in zoos cannot live naturally or fulfil their “telos” by performing their individual and species-specific behaviours, which are important to them.

The paper written back in 2015 – entitled “Captivity for Conservation? Zoos at a Crossroads” analysed whether “captivity for conservation” can be an ethically acceptable goal of the “modern zoo”. The paper explores both animal welfare and conservation perspectives, and suggests a uniting position that zoos will be morally justifiable only if the costs in terms of animal welfare and freedom are clearly outweighed by genuine demonstrable benefits to species preservation. It also argues that the Noah’s Ark paradigm does not meet this standard.<sup>451</sup>

The Born Free investigations have also identified significant welfare compromises. Many zoo enclosures were found to be inadequate for the needs of the animals. Many captive wild animals were diagnosed as having developed medical and/or behavioural problems, such as lameness and behavioural problems in elephants, stereotypic behaviour and high infant mortality in polar bears, and abnormal behaviour in great apes. Wild animals have evolved mentally and physically to live very different lives to that in captivity, adapted to specific natural environments, and to exhibit locomotory, appetitive, social and other behaviours appropriate for those environments. Being brought into, or born in, captivity does not remove their inherent instincts and needs.<sup>452</sup>

It is difficult to estimate the total number of wild animals housed in zoos across the world since the definition of zoo varies between different countries, and there are different regulations and requirements. There are tens of thousands of zoos worldwide, holding millions of wild animals in captivity.

Addressing these challenges has various options. The conservationist Damian Aspinall suggested that zoos are outdated and should end.<sup>453</sup> Others have suggested specific changes that would reduce animal welfare and environmental harms, for example the World Zoo Conservation Strategy takes the position that the commercial trade in animals taken from the wild should cease as soon as possible as a source for acquisition of zoo animals.<sup>454</sup>

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<sup>451</sup> Keulartz, J. Captivity for Conservation? Zoos at a Crossroads. *J Agric Environ Ethics* **28**, 335–351 (2015). <https://doi.org/10.1007/s10806-015-9537-z>

<sup>452</sup> Born Free. Zoos and Aquaria – What are the issues? <https://www.bornfree.org.uk/zoo-issues>

<sup>453</sup> Aspinall, Damian. Zoos are outdated and cruel – it’s time to make them a thing of the past. The Independent. 14 August 2019. <https://www.independent.co.uk/climate-change/news/zoos-cruel-wildlife-conservation-species-a9056701.html>

<sup>454</sup> Barongi, R., Fisker, F. A., Parker, M. & Gusset, M. (eds) (2015). *Committing to Conservation: The World Zoo and Aquarium Conservation Strategy*. World Association of Zoos and Aquariums. Gland: WAZA Executive Office, 69 pp.

Some legislation, such as the European Union, Council Directive 1999/22/EC, have attempted to strengthen and enforce the conservation and biodiversity role of zoos, requiring zoos to provide better justification regarding the choices of animals and individuals that they choose to keep for conservation, education and display reasons, taking into account and protecting animal welfare.<sup>455</sup>

Similar concerns relate to the marine aquarium industry, which takes up to 41.5 million animals from the wild each year, mortality can range from less than 5 percent to more than 90 percent depending on the species, according to a 2012 report by Defenders of Wildlife. Reef fish are sometimes stunned with cyanide or forced to the surface with explosive blasts to make them easier to collect.<sup>456</sup>

### **Circuses and Tourist Experiences:**

Circuses are purely for entertainment, and have no conservation function whatsoever. The set-up of a circus is such that animals are moved around the country, sometimes even between countries, which involves being housed in secure, easily transportable accommodations. Circuses cannot provide a suitable environment for an animal, in terms of appropriate lighting, heating, space, exercise, environmental enrichment, being housed in an appropriate social or family group, and natural diurnal routines. There are also many cruel and questionable forms of training.<sup>457</sup>

Wild circus animals are usually captive bred, but this doesn't mean that they're domesticated, a process that has taken millennia for the evolution of truly domestic species, and the wild animals used to perform in circuses have the same needs as they would in the wild. These needs simply can't be met in a travelling circus environment.<sup>458</sup>

The European Commission has recently stated that “Most Member States take the view that the use of wild animals in circuses has no educational or cultural value and may in fact have a negative impact on the public’s perceptions of and respect for wild animals. 23 States (and many local jurisdictions) have already adopted a total or partial ban on their use<sup>459</sup> including Bolivia, Colombia, Costa Rica, El Salvador, Guatemala, Iran, Israel, Lebanon, Mexico,

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<sup>455</sup> UFAW. Zoo Animal Welfare. <https://www.ufaw.org.uk/why-ufaws-work-is-important/zoo-animal-welfare>

<sup>456</sup> Nuwer, Rachel. National Geographic. Many exotic pets suffer or die in transit, and beyond—and the U.S. government is failing to act. 2 March 2021. <https://www.nationalgeographic.com/animals/article/exotic-pets-suffer-wildlife-trade>

<sup>457</sup> Wild Welfare. Why Circuses are Never Good for Animal Welfare. <https://wildwelfare.org/why-circuses-are-never-good-for-animal-welfare/>

<sup>458</sup> RSPCA. Wild animals in circuses. <https://www.rspca.org.uk/adviceandwelfare/wildlife/captivity/circuses> Includes a link to the RSPCA report on “A Review of the Welfare of Wild Animals in Circuses”.

<sup>459</sup> European Parliament. Parliamentary Questions. 11 October 2021. [https://www.europarl.europa.eu/doceo/document/O-9-2021-000064\\_EN.html](https://www.europarl.europa.eu/doceo/document/O-9-2021-000064_EN.html)



Paraguay, Peru, Singapore and the UK.<sup>460</sup> Animal Defenders International publish a worldwide circus bans list (updated 2022), which shows considerably more bans.<sup>461</sup>

Tourism activities vary. Some are simply using animals for entertainment. Others are carried out by wildlife enthusiasts, with the aim to support wildlife in the wild. However, all may have unintended negative side effects on wild animal welfare. Wildlife encounters, such as whale-watching, seal-spotting, bird-watching, or tiger-tracking, may involve elements of disturbance or improper feeding of the target animals.<sup>462</sup> Encounters with captive wildlife, such as walking with elephants or wild cats, can be linked to animal welfare problems.<sup>463</sup> The paper on “Animal Welfare and Animal Ethics Challenges of Animal-Based Tourism” examines these issues in more detail, based on the proceedings of a two-day expert symposium.<sup>464</sup>

### ➤ **Wild Animals for Experimentation (science, research and testing)**

Animals are also taken from the wild or bred in captivity for experimentation (science, research or testing). This has repercussions for both biodiversity and animal welfare (and human health). Some countries have legislation which prevents the use of wild-caught animals, but this is by no means the norm. For example, the European Union legislation on the protection of animals for scientific purposes includes provisions against the use of endangered species and animals taken from the wild, but does give some exceptions. For primates, there is a provision to the effect that only offspring of primates bred in captivity can be used. Great apes shall not be used. This legislation is firmly based on the principle of the Three Rs, to replace, reduce and refine the use of animals used for scientific purposes, and it includes animal welfare provisions. One example is that the capture of animals in the wild shall be carried out only by competent persons using methods which do not cause the animals avoidable pain, suffering, distress or lasting harm.<sup>465</sup> However, some other countries do not have such protective legislation, and some just include a ban on the use of wild-caught primates – but not a ban on the use of progeny from wild-caught primates, which means that they are still taken from the wild for breeding purposes.

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<sup>460</sup> RSPCA. Wild animals in circuses.

<https://www.rspca.org.uk/adviceandwelfare/wildlife/captivity/circuses> Includes a link to the RSPCA report on “A Review of the Welfare of Wild Animals in Circuses”.

<sup>461</sup> Animal Defenders International. Worldwide circus bans. [https://www.ad-international.org/animals\\_in\\_entertainment/go.php?id=281](https://www.ad-international.org/animals_in_entertainment/go.php?id=281)

<sup>462</sup> Berg, Charlotte et al. Frontiers in Veterinary Science. Editorial: Wildlife Welfare. 30 September 2020. <https://www.frontiersin.org/articles/10.3389/fvets.2020.576095/full>

<sup>463</sup> Projects Abroad. Cuddling Cubs – Discover the Darker Side of Big Cat “Conservation” <https://www.projects-abroad.org/blog/the-darker-side-of-big-cat-conservation/>

<sup>464</sup> von Essen, Erica, Johan Lindsjö, Johan and Berg, Charlotte. Instagranimal: Animal Welfare and Animal Ethics Challenges of Animal-Based Tourism. Animals (Basel) 2020 Oct; 10(10): 1830. Published online 2020 Oct 8. doi: 10.3390/ani10101830. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7600185/>

<sup>465</sup> Consolidated text of Directive 2010/63/EU of the European Parliament and of the Council of 22 September 2010 on the protection of animals used for scientific purposes. <https://eur-lex.europa.eu/eli/dir/2010/63/2019-06-26>

Capturing wild primates and maintaining them in captivity is known to be stressful to the animals and can often result in high morbidity and mortality. Use of wild-caught primates, either to replenish breeding stock or as experimental animals, has therefore been identified as a serious animal welfare concern.<sup>466</sup>

The USA still allows the import of primates sourced directly or indirectly from the wild for use in research or laboratory breeding colonies. The US is one of the world's largest importers of primates for research. According to recent data obtained from the US Fish and Wildlife Service, 45,822 monkeys were imported from China, 22,707 from Cambodia, 9,303, from Mauritius, 1,320 from Vietnam, and 1,050 from the Philippines between January 2018 and June 2020, for use in experiments or for use in laboratory breeding colonies.<sup>467</sup> There is currently no US law that prohibits the import of primates sourced directly or indirectly from the wild for use in research or laboratory breeding colonies. Field investigations in South East Asia and Mauritius have exposed the brutality and misery inflicted on monkeys in the chain of supply from trapping in the wild to the laboratory cage or breeding farm.<sup>468</sup>

There has also been evidence that researchers in more highly regulated countries have been using facilities overseas to carry out experiments on wild caught animals. For example, a Cruelty Free International investigation into animal experiments on wild baboons at the Institute of Primate Research in Nairobi showed research by European/US and US researchers.<sup>469</sup>

An increasing number of researchers are pointing out that irrespective of the intention and purpose of the procedure – be this for scientific research – including behavioural research - or management - the welfare of wild animals subjected to capture, anaesthesia, handling, sampling, marking and sometimes selective removal (i.e., culling) may be compromised. In properly regulated environments, research projects have to implement the 3Rs and must undergo ethical reviews and official animal welfare controls, whereas other uses may not. It is often difficult to define the dividing line between the categories, e.g., when marking for identification purposes. This grey area creates uncertainty and problems beyond animal

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<sup>466</sup> Refinements in husbandry, care and common procedures for non-human primates: ninth report of the BVA/WF/FRAME/RSPCA/UFAW Joint Working Group on Refinement Article in Laboratory Animals· April 2009.  
[https://www.researchgate.net/publication/51435999\\_Refinements\\_in\\_husbandry\\_care\\_and\\_common\\_procedures\\_for\\_non-human\\_primates\\_ninth\\_report\\_of\\_the\\_BVA/WF/FRAME/RSPCA/UFAW\\_Joint\\_Working\\_Group\\_on\\_Refinement/figures?lo=1](https://www.researchgate.net/publication/51435999_Refinements_in_husbandry_care_and_common_procedures_for_non-human_primates_ninth_report_of_the_BVA/WF/FRAME/RSPCA/UFAW_Joint_Working_Group_on_Refinement/figures?lo=1)

<sup>467</sup> Herschler, Nathan. Stolen from the Wild. Rise for Animals. October 29, 2020  
<https://riseforanimals.org/news/stolen-from-the-wild/> & Cruelty Free International. US Research Fueling Cruel and dangerous International Primate Trade. 1 September 2020  
<https://crueltyfreeinternational.org/latest-news-and-updates/us-research-fueling-cruel-and-dangerous-international-primate-trade>

<sup>468</sup> Herschler, Nathan. Stolen from the Wild. Rise for Animals. October 29, 2020  
<https://riseforanimals.org/news/stolen-from-the-wild/> & Cruelty Free International. US Research Fueling Cruel and dangerous International Primate Trade. 1 September 2020  
<https://crueltyfreeinternational.org/latest-news-and-updates/us-research-fueling-cruel-and-dangerous-international-primate-trade>

<sup>469</sup> Cruelty Free International. Experiments on Wild Baboons in Kenya.  
<https://crueltyfreeinternational.org/experiments-wild-baboons-kenya>

welfare, e.g., in Sweden, information that has been collected during management without ethical approval should not be published. The legislation therefore needs to be harmonised to ensure consistent ethical and welfare assessments for wild animals at the hands of humans, and for the benefit of science and management.<sup>470</sup>

Furthermore, there is a growing body of scientific literature critically assessing the validity of animal experimentation generally (and animal modelling specifically) that raises important concerns about its reliability and predictive value for human outcomes and for understanding human physiology. The unreliability of animal experimentation across a wide range of areas undermines scientific arguments in favour of the practice. Additionally, animal experimentation often significantly harms humans through misleading safety studies, potential abandonment of effective therapeutics, and direction of resources away from more effective testing methods. Evidence suggests that the collective harms and costs to humans from animal experimentation outweigh potential benefits and that resources would be better invested in developing human-based testing methods.<sup>471</sup>

### ➤ **Conservation Projects**

In the area of wildlife conservation projects, a large range of activities from habitat restoration and head-starting programmes (breeding artificially and then releasing into the wild) to translocation, captive breeding and the keeping of so-called “parallel populations” can be identified. When the focus is on species conservation, the welfare of the individual animals has historically often been given a lower priority. This has, however, changed during recent years, and scientists and others have raised questions about ethical aspects of such interventions and the potential to improve the welfare of animals involved in such projects.<sup>472</sup> Animal welfare concerns can relate to various aspects of capture methods, the design of enclosures for breeding animals or head-starting animals, preparation of captive-bred animals for a life in the wild, preparation of release-sites to improve the survival chances of newly-released animals, and proper post-release monitoring. There is need for an evidence-based approach to evaluate practices in conservation research and breeding programmes from an animal welfare perspective, while still meeting conservation goals.<sup>473</sup> Common sense would suggest that, by and large, breeding and preparation for release will require meeting animals’ needs in naturalistic ways, i.e., that largely meet their welfare needs. So, we might expect the concerns for conservation and welfare to coincide in most cases.

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<sup>470</sup> Lindsjö, Johan et al. *Frontiers in Veterinary Science*. The Dividing Line Between Wildlife Research and Management - Implications for Animal Welfare.

<https://www.frontiersin.org/articles/10.3389/fvets.2019.00013/full>

<sup>471</sup> Akhtar A. The flaws and human harms of animal experimentation. *Camb Q Healthc Ethics*. 2015;24(4):407-419. doi:10.1017/S0963180115000079 &

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4594046/citedby/>

<sup>472</sup> Berg, Charlotte et al. *Frontiers in Veterinary Science*. Editorial: Wildlife Welfare. 30 September 2020. <https://www.frontiersin.org/articles/10.3389/fvets.2020.576095/full>

<sup>473</sup> Berg, Charlotte et al. Wildlife Welfare. *Front. Vet. Sci.*, 30 September 2020. <https://doi.org/10.3389/fvets.2020.576095>

Some captive breeding establishments have limited territories, leading to overpopulation, and then undertake research on various management control methods. Although many will simply use this as an excuse to make a profit out of “surplus” animals (dead or alive), some will try to use non-lethal control methods. For example, Makalali in South Africa is carrying out research on elephant and lion contraception.<sup>474</sup> Meanwhile Namibia – which is often cited for its “successful” conservation policies that involve growing populations of wildlife on private and communal land – was criticised for capturing 22 elephants and exporting them to zoos in the UAE in a deal which lacked transparency. Over-populations of elephants in limited habitats sometimes raid crops, and damage fencing, pipes and water infrastructure. These elephants came from a fragile, desert-adapted population herd, and conservationists said that splitting up the group this way would affect the welfare of both the captured elephants and those left behind.<sup>475</sup>

Scientists are capturing and tagging more wild animals than ever for conservation research, using technologies that allow them to follow everything from honeybees to great white sharks. But the stress of capture itself — from being immobilised in a trap, or chased over long distances — can also kill. This may be through capture myopathy, which occurs when overworked skeletal muscles — the ones that power the fight-or-flight response — start to break down and release a protein called myoglobin. In great amounts, myoglobin can enter the bloodstream and concentrate in the kidneys, where it causes tissue damage and sometimes kidney failure. Fish are particularly vulnerable to capture injuries - even those that are not bleeding or in obvious distress are affected in some way. A simple dip net removes the natural layer of slime that protects fish and can cause micro-injuries, including frayed fins. Capturing animals for conservation programmes can also have adverse – or fatal – impacts. Potential damage to animals must be taken into account before any study or wildlife management action that requires catching or handling.<sup>476</sup>

#### **4.4.6. The Seabed in Areas Beyond National Jurisdiction**

The United Nations Convention on the Law of the Sea declared the areas of the deep seabed that lie beyond national jurisdictions to be the “common heritage of mankind” while giving the International Seabed Authority (ISA), which is based in Kingston, Jamaica, the mandate to manage the seabed's mineral resources.

There has been rapidly growing commercial interest in deep-sea mining and on March 28, 2019, ISA issued draft regulations on exploitation of the mineral resources in the international seabed area and stated: “The new draft exploitation regulations will build on the exploration regulations already in place by ensuring adherence to robust environmental standards, including baseline studies, environmental impact assessments, environmental

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<sup>474</sup> Makalali. Research. <https://www.makalaligamereserve.org/conservation/research>

<sup>475</sup> Journal of African Elephants. Export of elephants to UAE drags Namibia wildlife policy into the spotlight. 8 April 2022. <https://africanelephantjournal.com/export-of-elephants-to-uae-drags-namibia-wildlife-policy-into-the-spotlight/>

<sup>476</sup> Bittel, Jason. Capturing wild animals for study can stress them to death. Is it worth it? 13 March 2019. <https://www.washingtonpost.com/science/2019/03/13/capturing-wild-animals-study-can-stress-them-death-is-it-worth-it/>

monitoring and management". The draft regulations<sup>477</sup> were developed by ISA's Legal and Technical Commission, a 30-member expert advisory body and there have been continuing stakeholder consultations, and revisions to the draft, including via the 27th session of the Authority in Kingston Jamaica, 21 March-1 April 2022.

In its 2019 Report entitled "30x30: A Blueprint for Ocean Protection"<sup>478</sup>, Greenpeace identified as potential adverse impacts of deep-sea mining:

- Direct removal of seafloor habitat and organisms
- Alteration of substrate and its geochemistry
- Modification of sedimentation rates and food webs
- Creation of changes in substrate availability, heterogeneity and flow regimes
- Release of suspended sediment plumes
- Release of toxins and contamination from extraction and removal processes
- Noise pollution
- Light pollution
- Chemical leakage from mining machinery

and continued by asserting that a recent scientific analysis (Deep-Sea Mining with No Net Loss of Biodiversity – An Impossible Aim) demonstrated that biodiversity loss from DSM will be unavoidable.

In 2018, 50 NGOs had jointly signed an appeal to ISA<sup>479</sup> expressing deep concern about the potentially irreversible losses of biodiversity likely to result from deep-sea mining and calling on it:

To amend the mission contained in its Strategic Plan so that the obligation for any activities in the Area to ensure effective protection for the marine environment from harmful effects is the fundamental objective of the ISA.

To act on civil societies' requests for fundamental reforms of the ISA operations, including among others the establishment of an Environment Committee, the opening up of the Legal and Technical Committee for observers, and public access to data and information.

To establish a process to investigate comprehensively and in a participatory and science-based manner the fundamental questions about the need for deep seabed mining and its long-term consequences for the planet and humankind, ensuring that more sustainable alternatives are fully assessed and fed into the debate in an open and transparent manner. In the meantime, to end the granting of contracts for deep-sea mining exploration and to not issue contracts for exploitation.

## 4.5. Pollution and Waste

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<sup>477</sup> ISA. Draft regulations on exploitation of mineral resources in the Area. ISBA/27/C/IWG/ENV/CRP.1 8 February 2022. <https://isa.org.jm/files/files/documents/20220208-IWG-ENV-CRP1.pdf>

<sup>478</sup> Greenpeace. 30x30: A Blueprint for Ocean Protection. <https://storage.googleapis.com/planet4-international-stateless/2019/03/5db0f88b-greenpeace-30x30-blueprint-report.pdf>

<sup>479</sup> Joint NGO call on the International Seabed Authority: Protect the marine environment from harm! Submission on the ISA's Draft Strategic Plan. [https://www.savethehighseas.org/wp-content/uploads/2019/01/2018\\_04\\_27\\_NGO\\_submission\\_to\\_ISA\\_9\\_07.pdf](https://www.savethehighseas.org/wp-content/uploads/2019/01/2018_04_27_NGO_submission_to_ISA_9_07.pdf)

### 4.5.1. Pollution Overview

Pollution is the presence of or introduction into the environment of a substance which has harmful or poisonous effects. All forms of pollution including chemical, plastic, noise, light, and air negatively alter the environment. Major emitters include agriculture and aquaculture, as well as transport and industry.<sup>480</sup> Pollution threatens the health of ecosystems, animals, and people alike. The ways in which humans use animals are a leading cause of pollution and, conversely, animals and their welfare are massively impacted by pollution.

Scientists from the Stockholm Resilience Centre have now stated that chemical pollution is the fifth planetary boundary to have been crossed, with the others being global warming, the destruction of wild habitats, loss of biodiversity and excessive nitrogen and phosphorus pollution. "Planetary boundaries" are intended to represent the safe limit for humanity, and the scientists call for a cap on production and release of toxic chemicals since pollution now threatens the global ecosystems upon which life depends.<sup>481</sup> <sup>482</sup>

### 4.5.2. Animal Agriculture and Pollution

Agriculture is a leading cause of pollution in many countries,<sup>483</sup> particularly industrial animal agriculture.<sup>484</sup> In 2006, the United Nations Food and Agriculture Organisation (FAO) described livestock farming as "...one of the most significant contributors to today's most serious environmental problems."<sup>485</sup> Yet despite the magnitude of the problem, which is fuelled by high levels of consumption of meat and dairy products, particularly in the Global North, relatively few global and national policies effectively address the environmental effects of animal agriculture.<sup>486</sup>

According to the Worldwatch Institute<sup>487</sup>, in 2000, there were an estimated 15 billion livestock in the world (although this Worldwatch report attracted some criticism, this was

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<sup>480</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6>

<sup>481</sup> Carrington, Damian. Environment Editor. The Guardian. Chemical pollution has passed safe limit for humanity, say scientists. <https://www.theguardian.com/environment/2022/jan/18/chemical-pollution-has-passed-safe-limit-for-humanity-say-scientists>

<sup>482</sup> The Stockholm Resilience Centre. Stockholm University. Planetary Boundaries. <https://www.stockholmresilience.org/research/planetary-boundaries.html>

<sup>483</sup> WWF. Farming: Pollution. [http://wwf.panda.org/what\\_we\\_do/footprint/agriculture/impacts/pollution/](http://wwf.panda.org/what_we_do/footprint/agriculture/impacts/pollution/)

<sup>484</sup> Henning Steinfeld et al., FAO, Livestock's Long Shadow: Environmental Issues and Options (2006). <http://www.fao.org/docrep/010/a0701e/a0701e00.htm>

<sup>485</sup> Henning Steinfeld et al., FAO, Livestock's Long Shadow: Environmental Issues and Options (2006). <http://www.fao.org/docrep/010/a0701e/a0701e00.htm>

<sup>486</sup> Hyner, Christopher. Managing Editor—Georgetown Environmental Law Review. A Leading Cause of Everything: One Industry That Is Destroying Our Planet and Our Ability to Thrive on It. October 23, 2015. <https://gelr.org/2015/10/23/a-leading-cause-of-everything-one-industry-that-is-destroying-our-planet-and-our-ability-to-thrive-on-it-georgetown-environmental-law-review/>.

<sup>487</sup> Worldwatch. Livestock and Climate Change: What if the key actors in climate change are... cows, pigs, and chickens? Nov/Dec 2009. <https://awellfedworld.org/wp-content/uploads/Livestock-Climate-Change-Anhang-Goodland.pdf>



not concerning livestock numbers<sup>488</sup>). By 2016, that number had risen to about 24 billion, with the majority of eggs, chicken meat and pork produced in industrial systems.<sup>489</sup> According to the FAO, in 2020, the total number of livestock was then around 40.5 billion (excluding beehives and rodents).<sup>490</sup>

Given a projected increase in world population to 9.7 billion by 2050, unless decisive action is taken, the number of animals raised in these systems will continue to rise, being further pollution impacts.

FAO's Livestock Policy Brief on "Pollution from Industrialised livestock production" provides a useful overview on this issue. In their words: "Concentrated, large-scale livestock production often creates concentrated, large-scale environmental problems. Large industrial farms bring in massive quantities of nutrients in the form of concentrate feed. And they produce far more waste than can be recycled as fertiliser and absorbed on nearby land. When intensive livestock operations are crowded together, pollution can threaten the quality of the soil, water, air, biodiversity and ultimately public health."<sup>491</sup>

Animals and their uses have a significant impact on pollution, with industrial animal agriculture damaging our soil, water, air and the climate on an unprecedented scale. In many countries,<sup>492</sup> agriculture - particularly industrial animal agriculture (factory farming) – is a leading cause of pollution<sup>493</sup>. Taken together, industrial crop and animal agriculture and aquaculture are responsible for the vast majority of water pollution globally.

Traditional farming and agroecological methods can be relatively efficient at converting grass and other waste products into useful food<sup>494</sup>, and farm waste can be a soil enriching nutrient when applied in the correct amount and with the right method. But the "fast-growth, high-yield" intensive farming model is far from efficient when you take into account its high environmental cost. In the words of James Lomax, United Nations Environment Programme (UNEP) Programme Manager: "Efficient farming is not just a matter of production, it is also about environmental sustainability, public health and economic inclusivity"<sup>495</sup>. It also uses substantial amounts of grain and protein-rich soya as feed, and these are grown as monocultures, which deplete the soil and leaves it vulnerable to erosion.

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<sup>488</sup> Goodland, Robert. "Livestock and Climate Change": Critical Comments and Responses. March/April 2010. <https://awellfedworld.org/wp-content/uploads/WWMLivestock-ClimateResponses-20101.pdf>

<sup>489</sup> Fiona Harvey et al. Genetic Literacy Project. Science not Ideology. Megafarms: 'US model' large-scale livestock farms offer efficiency—and consequences. <https://geneticliteracyproject.org/2017/07/26/megafarms-us-model-large-scale-livestock-farming-model-offer-efficiency-consequences/>

<sup>490</sup> FAO. FAOSTAT. <https://www.fao.org/faostat/en/#data/QCL>

<sup>491</sup> FAO. Livestock Policy Brief. Pollution from Industrialised livestock production. <https://www.fao.org/3/a0261e/a0261e.pdf>

<sup>492</sup> WWF. Farming: Pollution. [http://www.panda.org/what\\_we\\_do/footprint/agriculture/impacts/pollution/](http://www.panda.org/what_we_do/footprint/agriculture/impacts/pollution/)

<sup>493</sup> Henning Steinfeld et al., FAO, Livestock's Long Shadow: Environmental Issues and Options (2006). <http://www.fao.org/docrep/010/a0701e/a0701e00.htm>

<sup>494</sup> Compassion in World Farming. Factory farming pollutes environments, contaminating the natural world with a range of potentially lethal toxins. <https://www.ciwf.org.uk/factory-farming/environmental-damage/#pollution>

<sup>495</sup> UNEP. 10 things you should know about industrial farming. <https://www.unep.org/news-and-stories/story/10-things-you-should-know-about-industrial-farming>

Chemical fertiliser runoff and intensive animal agriculture wastes add to global warming emissions and create oxygen-deprived "dead zones" at the mouths of major waterways.<sup>496</sup>

In intensive animal production, animals and their wastes are concentrated and usually exceed the capacity of the land to absorb the waste. Undesirable components of animal waste from farms and slaughterhouses include pathogens (such as *E-coli*), antibiotic-resistant bacteria, hormones, veterinary pharmaceuticals, excess nutrients, viruses, industrial chemicals, and heavy metals which can pollute land and water; and can release ammonia, hydrogen sulphide, volatile organic compounds, bioaerosols, and particulate matter into the air.<sup>497</sup> Consequently, the rapid growth of intensive animal production has produced an expanding array of deleterious environmental effects on water, air, and soil.<sup>498</sup>

A wide variety of chemical products are used in agriculture (agricultural chemicals), such as pesticides (including insecticides, herbicides and fungicides), as well as synthetic fertilisers, hormones and antibiotics. Animal waste contains residues from the massive doses of non-therapeutic antibiotics and artificial growth hormones that are routinely given to animals in some countries to prevent illness and accelerate weight gain. Ultimately, the dangerous compounds found in agrichemicals end up as pollutants when wind and rain disperse them into the environment.<sup>499</sup> Herbicides and insecticides harm wildlife and can pose human health risks as well.<sup>500</sup>

The creation of such enormous quantities of waste has a devastating effect on the air, water and soil surrounding intensive animal production facilities. Unlike human waste, livestock manure is not processed for sanitation. At these facilities, this waste is commonly mixed with water and held in pits (called "lagoons"), and then spread or sprayed on cropland. However, the system suffers from an excess of manure, and the lagoons are prone to leaks and spills causing catastrophic damage to rivers, lakes and streams.<sup>501</sup> Alternatively, if the manure is applied to fields, it can run off into surface waters. Nutrients and heavy metals present in animal feed are also excreted by livestock, and so end up being applied to cropland. These include zinc, copper, chromium, arsenic, cadmium and even lead.<sup>502</sup>

At the feed production stage, a range of biocides (e.g., fungicides, herbicides, pesticides) and other potentially ecotoxic agrichemicals (e.g., animal health remedies, fertilisers) are used. Hormonally active pesticides have adverse effects on a wide range of organisms.

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<sup>496</sup> National Geographic. Dead Zone. <https://www.nationalgeographic.org/encyclopedia/dead-zone/>

<sup>497</sup> Humane Society International (HSI). An HSI Report: The Public Health Implications of Intensive Farm Animal Production in South Asia. July 2013. [http://www.hsi.org/assets/pdfs/hsi-fa-white-papers/public\\_health\\_impacts\\_of.pdf](http://www.hsi.org/assets/pdfs/hsi-fa-white-papers/public_health_impacts_of.pdf)

<sup>498</sup> Pew Commission. Putting Meat on the Table. 2008. <https://www.ncifap.org/reports/>

<sup>499</sup> Food Empowerment Project. Pollution (Water, Air, Chemicals). Chemicals.

<http://www.foodispower.org/pollution-water-air-chemicals/>

<sup>500</sup> Union of Concerned Scientists: Science for a Healthy Planet and Safer World. Industrial Agriculture. <http://www.ucsusa.org/our-work/food-agriculture/our-failing-food-system/industrial-agriculture#.WaQ60CiGM2w>

<sup>501</sup> Environment America. Accidents Waiting to Happen: Agricultural Waste Lagoons Waste. <https://environmentamerica.org/wp-content/uploads/2022/08/AccidentsFactsheet-ManureLagoons-1.pdf>

<sup>502</sup> GRACE Communications. *Food Program: Environment*. <http://www.sustainabletable.org/265/environment>

Ecotoxic substances may also be used at the animal production stage in the form of veterinary products, antibiotics, anthelmintics and hormones; these can contaminate water and impact aquatic biodiversity.<sup>503</sup> For example, herbicides used to maintain drainage performance in pastoral landscapes can reduce fish and macro-invertebrate diversity.<sup>504</sup>

The agri-food processing industry is a significant source of organic pollution in most countries.<sup>505</sup> The large-scale transport of food is also damaging the environment in various ways, and “food miles” are now often considered (representing the distance food travels), but load size and the mode of transport (air, road, rail, and water) are more important determinants than the distance. Environmental impacts that are relevant to transport include acidification potential (causing acid rain) and emitting nitrous oxides and particulates causing air pollution - the most dangerous environmental threat linked to transportation. There are also environmental impacts at other stages of the food chain, including slaughter, packaging, storage (especially chilling/freezing) and at retailing. The global commodity market for food propels all of these impacts, as opposed to local food production for local – and seasonal - food security.<sup>506</sup>

The Organisation for Economic Cooperation and Development (OECD) has carried out studies on the monetary costs of agriculture on water quality. In their report<sup>507</sup>, they mention the need to account for external costs. They recognise that as an economic activity agriculture generates a number of marketed goods such as grain, milk and meat. However, the process of agricultural production also generates a number of external effects felt by the wider society. Some of these, such as attractive landscapes, are beneficial to society. Others, such as pollution, are costly to society. In either case, failing to account for such non-market goods and services means that the allocation of resources to and within agriculture is sub-optimal from society’s perspective.

#### **4.5.3. Aquaculture and Pollution**

Aquaculture production is rapidly expanding around the world, in some places and for certain species, at the expense of the natural environment.<sup>508</sup> Intensive fish production facilities also crowd fish (and their waste) together in nets, cages, or ponds and use large amounts of antibiotics, pesticides and other chemicals to keep disease at bay. The risk of

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<sup>503</sup> FAO. 2020. Biodiversity and the livestock sector – Guidelines for quantitative assessment – Version 1. Rome, Livestock Environmental Assessment and Performance Partnership (FAO LEAP). <https://www.fao.org/documents/card/en/c/ca9295en>

<sup>504</sup> FAO. 2020. Biodiversity and the livestock sector – Guidelines for quantitative assessment – Version 1. Rome, Livestock Environmental Assessment and Performance Partnership (FAO LEAP). <https://www.fao.org/documents/card/en/c/ca9295en>

<sup>505</sup> Ongley, Edwin D. Control of water pollution from agriculture - FAO irrigation and drainage paper 55 (1996). Chapter 1: Introduction to agricultural water pollution. <http://www.fao.org/docrep/w2598e/w2598e04.htm>

<sup>506</sup> Food and Transportation. 21 May 2019.

<https://www.theconsciouschallenge.org/ecologicalfootprintbibleoverview/food-transportation/>

<sup>507</sup> Moxey, Andrew. OECD. Agriculture and Water Quality: Monetary Costs and Benefits across OECD Countries (2012). <https://www.oecd.org/tad/sustainable-agriculture/49841343.pdf>

<sup>508</sup> World Bank. FISH TO 2030 Prospects for Fisheries and Aquaculture WORLD BANK REPORT NUMBER 83177-GLB. December 2013. <http://www.fao.org/docrep/019/i3640e/i3640e.pdf>

contamination is high, both to the surrounding water and within the enclosures themselves.<sup>509</sup> When these facilities are close to or located in the sea, uneaten fish feed, fish waste, chemicals and antibiotics flow through the cages directly into the ocean, polluting the water and harming the environment. There are also concerns that diseases and parasites—common occurrences in crowded pens—are spread to wild fish.<sup>510</sup>

Aquaculture is probably the fastest-growing animal production sector in the Asia Pacific region. Aquaculture is predicted to continue increasing production by intensifying existing aquaculture practices, increasing the number and type of farms, and exploring other environments. High levels of nutrients in effluent discharge to channels, rivers, or lakes may cause eutrophication and affect fisheries adversely. Important fish farming waste components are uneaten food, faecal droppings, dead fish, and residues of disease or parasite treatment chemicals.<sup>511</sup>

An August 2020 study<sup>512</sup> modelled the bioeconomic interrelations between a commercial fishery and an aquaculture industry. This showed that:

- Aquaculture influences fisheries through ecological and market mechanisms.
- Accumulated pollution from aquaculture may cause biological growth-retardation in a wild fish stock.
- When the growth-retardation parameter exceeds certain threshold levels the fishery effort and the biomass are wiped out.

#### 4.5.4. Marine Pollution

Eighty percent of marine pollution comes from land-based sources.<sup>513</sup> Industrial agriculture is a key source of damage to seas and oceans. Studies using satellite imagery have shown direct evidence that large-scale coastal farming is linked to extensive algal blooms in the ocean (as is inland farming, where runoff is transported through waterways to oceans), with scientists concluding that key regions of the ocean are much more vulnerable to agricultural runoff than was previously assumed. They stated "Inarguably, the effects of marine nitrogen

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<sup>509</sup> Food and Water Watch. Factory Fish Farming. January 2, 2013.

<https://www.foodandwaterwatch.org/insight/factory-fish-farming>

<sup>510</sup> Seafood Watch Website. Aquaculture. Problems with Condensed Space and Waste

<https://www.seafoodwatch.org/ocean-issues/aquaculture/pollution-and-disease>

<sup>511</sup> White, Patrick. 2017. Aquaculture Pollution: An Overview of Issues with a Focus on China, Vietnam, and the Philippines. World Bank, Washington, DC.

<https://openknowledge.worldbank.org/handle/10986/29249>

<sup>512</sup> Berglan, Harald et al. Aquaculture, pollution and fishery - dynamics of marine industrial interactions. Science Direct. Ecological Complexity. Vol 43. August 2020.

<https://doi.org/10.1016/j.ecocom.2020.100853>

<sup>513</sup> National Ocean Service. What is the biggest source of pollution in the ocean?

<https://oceanservice.noaa.gov/facts/pollution.html#:~:text=Most%20ocean%20pollution%20begins%20on%20land.&text=Much%20of%20this%20runoff%20flows,as%20a%20result%20of%20runoff>

pollution are becoming extremely widespread and severe as a consequence of the global expansion of industrialised agriculture and the intensification of certain practices.”<sup>514</sup> <sup>515</sup>

The GEO 6 report mentioned that agriculture and aquaculture are amongst the major emitters of marine pollution. These include major issues such as:

- Pollution from land-based activities (of which the livestock industry is a major factor).
- More than half of the total phosphorus loads in the five UN Environment regions originate from inorganic agricultural fertiliser run-off. Livestock waste used as fertiliser can also be problematic because its nitrogen-phosphorus ratio is higher than that needed by crops, thereby potentially saturating soils with phosphorus, which can then reach waterbodies via non-point source run-off.
- River nutrient contributions to coastal areas almost doubled during 1970- 2000. They mention the Gulf of Mexico ‘dead zone’, its causes and the fact that the algal growth consumes oxygen in the water, suffocating marine life. There are nearly four times as many dead zones (400) in the oceans now as there were in 1950.
- The routine use of antimicrobials in industrial livestock and aquaculture systems causes dangerous wastes and residues, which lead to deadly antimicrobial resistance.<sup>516</sup>

The introduction of excess nitrogen, phosphorous and other nutrients into waterways (including streams, rivers and oceans) causes eutrophication. Eutrophication encourages algal growth and results in algal blooms. Algal blooms can be dangerous to humans and marine life depending on the species. Species that produce toxins can sicken and kill shellfish, fish, turtles, birds, marine mammals and other animals in the region. They can also harm people who come into contact with the bloom or an affected drinking supply. As the algae dies, bacterial decomposition uses the water’s oxygen, leading to hypoxic and “dead zones.” Dead zones can move with the tides and fluctuate in size seasonally, but their presence is common in areas where excess nutrients from conventional agricultural operations enter waterways.<sup>517</sup>

The most infamous dead zone is in the Gulf of Mexico and, as of July 2017, this spanned over 8,200 square miles—roughly the size of New Jersey. The dead zone is fed by the Mississippi River, which transports pollution from agricultural operations in the Midwestern U.S. to the Gulf of Mexico. Much of the nitrogen and phosphorous causing this dead zone comes from soy and corn production—not for direct human consumption, but rather to feed livestock.<sup>518</sup>

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<sup>514</sup> Mark Shwartz. Stanford Report, March 10, 2005. Ocean ecosystems plagued by agricultural runoff. <http://news.stanford.edu/news/2005/march16/gulf-030905.html>.

<sup>515</sup> Scientific American. What Causes Ocean “Dead Zones”? <https://www.scientificamerican.com/article/ocean-dead-zones/>

<sup>516</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6>

<sup>517</sup> Scientific American. What Causes Ocean “Dead Zones”? <https://www.scientificamerican.com/article/ocean-dead-zones/>

<sup>518</sup> Milman Oliver, the Guardian. Meat industry blamed for largest-ever ‘dead zone’ in Gulf of Mexico (August 1, 2017). A new report shows toxins from suppliers to companies like Tyson Foods are pouring into waterways, causing marine life to leave or die.

The FAO's Livestock's Long Shadow report<sup>519</sup> reported similar concerns:

"The livestock sector is probably the largest sectoral source of water pollution, contributing to eutrophication, "dead zones" in coastal areas, degradation of coral reefs, human health problems, emergence of antibiotic resistance and many others. The major sources of pollution are from animal wastes, antibiotics and hormones, chemicals from tanneries, fertilisers and pesticides used for feed-crops, and sediments from eroded pastures. Global figures are not available but in the United States, with the world's fourth largest land area, livestock are responsible for an estimated 55 percent of erosion and sediment, 37 percent of pesticide use, 50 percent of antibiotic use, and a third of the loads of nitrogen and phosphorus into freshwater resources."

#### 4.5.5. Fresh Water

Agriculture, which accounts for 70 percent of water abstractions worldwide, plays a major role in water pollution. Farms discharge large quantities of agrochemicals, organic matter, drug residues, sediments and saline drainage into water bodies. The resultant water pollution poses demonstrated risks to aquatic ecosystems, human health and productive activities (UNEP, 2016).<sup>520</sup> According to the U.S. Environmental Protection Agency, the agricultural sector is "the leading contributor to identified water quality impairments in the nation's rivers and streams, lakes, ponds, and reservoirs." In particular, the agency has noted that water quality concerns are most pronounced in areas "where crops are intensively cultivated and where livestock operations are concentrated."<sup>521</sup>

Animal agriculture impacts fresh water through both pollution and water usage.<sup>522</sup> The projected increase in the production and consumption of animal products is likely to put further pressure on the globe's freshwater resources. The size and characteristics of the water footprint vary across animal types and production systems.<sup>523</sup> Water enters livestock systems in two forms: green water, which is soil moisture that plants can take up through their roots, and blue water, which is liquid water in rivers, lakes and aquifers. More than 90% of the consumptive water use in livestock production systems is for producing animal feed – whether grass or feed crops such as soy and maize. Most of this is green water. Blue water is primarily used for irrigation of feed and for drinking water, feed mixing and servicing livestock (washing animals and their environment). Intensive livestock systems

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<https://www.theguardian.com/environment/2017/aug/01/meat-industry-dead-zone-gulf-of-mexico-environment-pollution>

<sup>519</sup> FAO. Livestock's Long Shadow: Environmental Issues and Options 2006.

<https://www.fao.org/3/a0701e/a0701e.pdf>

<sup>520</sup> FAO. Water pollution from agriculture: a global review. 2017.

<https://www.fao.org/3/i7754e/i7754e.pdf>

<sup>521</sup> An HSUS Report: The Impact of Industrialized Animal Agriculture on the Environment

<http://www.humanesociety.org/assets/pdfs/farm/hsus-the-impact-of-industrialized-animal-agriculture-on-the-environment.pdf>

<sup>522</sup> Pimentel and Pimentel, Sustainability of meat-based and plant-based diets and the environment.

The American Journal of Clinical Nutrition. 2003. <http://ajcn.nutrition.org/content/78/3/660S.full>

<sup>523</sup> Water Footprint Network. Water footprint of crop and animal products: a comparison.

<https://waterfootprint.org/en/water-footprint/product-water-footprint/water-footprint-crop-and-animal-products/>



mean more demand for feed crops, which increases water usage (particularly green water).<sup>524</sup>

Comparing the water requirements per calorie of different foods, beef requires 20 times more water than cereals and starchy roots. If comparing the water footprint per gram of protein, milk, eggs and chicken meat require about 1.5 times more than pulses, while beef requires six times more.<sup>525</sup>

Meat processing plants and slaughterhouses are known for being large consumers of water<sup>526</sup> and large generators of wastewaters.<sup>527</sup>

Water quality issues generated by intensive agriculture include the release of various wastes, such as sediments, pesticides, animal manures, fertilisers and other sources of inorganic and organic matter. The most common cause of water pollution in the U.S. is excess levels of nitrogen and phosphorous, the main source of which is fertiliser runoff that occurs when rain carries fertiliser into waterways.<sup>528</sup> Pollutants are transported over land and through the soil by rainwater and melting snow. These pollutants ultimately find their way into groundwater, wetlands, rivers and lakes and, finally, to oceans in the form of sediment and chemical loads carried by rivers.<sup>529</sup> Many pollutants reach surface and groundwater resources through over-application of manure to available land resulting in nutrient run-off, overflow or leakage of manure storage tanks and lagoons, and aerosolised pollutants which condense into waterways.<sup>530</sup> Additionally, because agricultural water is recycled back to surface water and/or groundwater, the use of these polluted waters in agriculture contaminates crops and transmits disease to consumers and farm workers.<sup>531</sup>

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<sup>524</sup> Stockholm Environment Institute. Water use impacts of livestock production: the Brazilian Cerrado. P2CS seed project. March 2019. <https://www.sei.org/wp-content/uploads/2019/03/sei-2019-p2cs-water-use-beef.pdf>

<sup>525</sup> Water footprint of crop and animal products: a comparison. Water Footprint Network. <http://waterfootprint.org/en/water-footprint/product-water-footprint/water-footprint-crop-and-animal-products/>

<sup>526</sup> Valta K et al. Overview of water usage and wastewater management in the food and beverage industry, Desal. Water Treat., 53 (2014) 1–13

<sup>527</sup> Apatie, NC. Evaluation of a MBR for Treating Slaughterhouse Wastewater in Montevideo, Uruguay, Delft, 2016.

<sup>528</sup> Carpenter, Stephen. "Nonpoint Pollution of Surface Waters with Phosphorous and Nitrogen," Issues in Ecology. September 1998. [http://www.esa.org/science\\_resources/issues/FileEnglish/issue3.pdf](http://www.esa.org/science_resources/issues/FileEnglish/issue3.pdf)

<sup>529</sup> FAO. Control of Water Pollution from Agriculture. Introduction to Agricultural Water Pollution. <http://www.fao.org/docrep/w2598e/w2598e04.htm>

<sup>530</sup> Ongley, Edwin D. Control of water pollution from agriculture - FAO irrigation and drainage paper 55 (1996). Chapter 1: Introduction to agricultural water pollution. <http://www.fao.org/docrep/w2598e/w2598e04.htm>.

<sup>531</sup> Ongley, Edwin D. Control of water pollution from agriculture - FAO irrigation and drainage paper 55 (1996). Chapter 1: Introduction to agricultural water pollution. <http://www.fao.org/docrep/w2598e/w2598e04.htm>.

Aquaculture is also a major problem in freshwater, as well as estuarine and coastal environments, leading to eutrophication and ecosystem damage.<sup>532</sup> Aquaculture is increasing worldwide in order to satisfy the increasing demand for animal protein due to the limitations of capture fisheries production. However, aquaculture has been found to have significant impacts on the environment and natural resources.<sup>533</sup>, including being a key contributor – along with livestock and crop production - to the degradation of water quality. Fish excreta and uneaten feeds from fed aquaculture diminish water quality. Increased production has combined with greater use of antibiotics, fungicides and anti-fouling agents, which in turn contribute to polluting downstream eco-systems.<sup>534</sup>

#### 4.5.6. Land and Soil Pollution

On 12 September 2017, the UN Convention to Combat Desertification (UNCCD) launched a new flagship report, the Global Land Outlook<sup>535</sup>, which assessed the current and future state of the world's land resources.<sup>536</sup> The report stated that a third of the planet's land is severely degraded and fertile soil is being lost at the rate of 24 billion tons a year. It examined agriculture's contribution to this, and called for a shift away from destructively intensive agriculture.<sup>537</sup> Louise Baker, external relations head of the UN body, likened industrial agriculture to an "extractive industry," and stressed that it was not sustainable – adding that the fact that a third of land is now degraded should prompt more urgent action to address the problem. The study noted that pressures will continue to grow unless changes are made.<sup>538</sup>

In a series of forecasts on land use for 2050,<sup>539</sup> the authors noted that sub-Saharan Africa, south Asia, the Middle East and north Africa would face the greatest challenges unless the world sees lower levels of meat consumption, better land regulation and improved farming efficiency. The report's working paper on "Threats to Soils: Global Trends and

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<sup>532</sup> Ongley, Edwin D. Control of water pollution from agriculture - FAO irrigation and drainage paper 55 (1996). Chapter 1: Introduction to agricultural water pollution.

<http://www.fao.org/docrep/w2598e/w2598e04.htm>

<sup>533</sup> Boyd, Claude and McNevin, Aaron. Aquaculture, Resource Use, and the Environment. ISBN: 978-0-470-95919-0. Wiley-Blackwell. February 2015.

<sup>534</sup> FAO. Water pollution from agriculture: a global review. 2017.

<https://www.fao.org/3/i7754e/i7754e.pdf>

<sup>535</sup> UNCCD. Global Land Outlook. <https://www.unccd.int/resources/global-land-outlook/overview>

<sup>536</sup> IISD. SDG Knowledge Hub. Inaugural Global Land Outlook Launched at UNCCD COP.

[http://sdg.iisd.org/news/inaugural-global-land-outlook-launched-at-unccd-cop/?utm\\_medium=email&utm\\_campaign=2017-09-12%20-%20SDG%20Update%20AE&utm\\_content=2017-09-12%20-%20SDG%20Update%20AE+CID\\_21ea0c8fc55051df27d72a0c20638ad7&utm\\_source=cm&utm\\_term=Inaugural%20Global%20Land%20Outlook%20Launched%20at%20UNCCD%20COP](http://sdg.iisd.org/news/inaugural-global-land-outlook-launched-at-unccd-cop/?utm_medium=email&utm_campaign=2017-09-12%20-%20SDG%20Update%20AE&utm_content=2017-09-12%20-%20SDG%20Update%20AE+CID_21ea0c8fc55051df27d72a0c20638ad7&utm_source=cm&utm_term=Inaugural%20Global%20Land%20Outlook%20Launched%20at%20UNCCD%20COP)

<sup>537</sup> Jonathan Watts, The Guardian. Third of Earth's soil is acutely degraded due to agriculture.

Tuesday 12 September 2017. <https://www.theguardian.com/environment/2017/sep/12/third-of-earths-soil-acutely-degraded-due-to-agriculture-study?platform=hootsuite>

<sup>538</sup> UNCCD. Global Land Outlook 2 (2022). <https://www.unccd.int/resources/global-land-outlook/glo2>

<sup>539</sup> UNCCD. Global Land Outlook. Part 2: The Outlook. <https://www.unccd.int/resources/global-land-outlook/overview>

Perspectives”<sup>540</sup> stated that solutions need to be embedded in policies and programmes that support the development of more sustainable agricultural systems.

However, for thousands of years agricultural was a natural process that included traditional regenerative methods. Farmers were able to pass down their land for many generations and it remained fertile. It is modern agricultural practices, particularly monocultures and industrial animal agriculture that have caused land pollution and degradation of ecosystems.<sup>541</sup>

Industrial animal agriculture is a significant contributor to soil and land pollution. Most food produced for animals is grown using a combination of untreated animal waste and synthetic fertilisers, both of which may contain excessive amounts of nitrogen, phosphorus and heavy metals (such as zinc, copper, chromium, arsenic, cadmium, and lead).<sup>542</sup> Farmers may overuse these inputs to increase crop yields, and the remainder that cannot be absorbed by the soil degrades the soil’s water retention ability and fertility.<sup>543</sup> and may also contribute to pollution of surrounding waterways.

Monoculture agriculture has significant negative impacts, and is at the heart of land pollution. As animal production intensifies, it is uncoupled from crop production, with the result that standard nutrient cycles between plants, soil, and animals are severely altered.<sup>544</sup>, resulting in the use of large quantities of synthetic herbicides, insecticides, bactericides and fertilisers which contribute to pollution of soil and water.

A Dutch study on effects of livestock production on human health and the environment concluded that livestock production’s contribution to environmental impacts ranges from 2% for consumptive water use in the Netherlands to 95% for phosphorus transfer to soils, and extends beyond Dutch borders.<sup>545</sup>

Besides the negative impact the overuse of chemical fertilisers has on the soil, monocultures are detrimental to soil health in other ways. Ground cover crops are eliminated, meaning there is no natural protection for the soil from erosion by wind and rain. Without plants to provide leaf litter mulch, top-soils are not replenished. These factors combine to continually degrade the soil, and in some cases the soil becomes unusable for agriculture. In some

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<sup>540</sup> Global Land Outlook Working Paper

Threats to Soils: Global Trends and Perspectives

[https://knowledge.unccd.int/sites/default/files/2018-06/17.%20Threats%2Bto%2BSoils\\_Pierzynski\\_Brajendra.pdf](https://knowledge.unccd.int/sites/default/files/2018-06/17.%20Threats%2Bto%2BSoils_Pierzynski_Brajendra.pdf)

<sup>541</sup> Conserve Energy Future. <https://www.conserve-energy-future.com/causes-and-effects-of-agricultural-pollution.php>

<sup>542</sup> MN Department of Health. Heavy Metals in Fertilisers.

<https://www.health.state.mn.us/communities/environment/risk/studies/metals.html>

<sup>543</sup> Food Empowerment Project. Pollution (Water, Air, Chemicals). <http://www.foodispower.org/pollution-water-air-chemicals/>.

<sup>544</sup> <sup>544</sup> Humane Society International (HSI). An HSI Report: The Public Health Implications of Intensive Farm Animal Production in South Asia. July 2013. [http://www.hsi.org/assets/pdfs/hsi-fa-white-papers/public\\_health\\_impacts\\_of.pdf](http://www.hsi.org/assets/pdfs/hsi-fa-white-papers/public_health_impacts_of.pdf)

<sup>545</sup> Post, Pim M. et al. Effects of Dutch livestock production on human health and the environment. Science Direct. 1 October 2020. <https://www.sciencedirect.com/science/article/pii/S0048969720332228>

countries, this means that forests are then cleared to provide new agricultural land, starting the damaging cycle all over again.

Because of market forces, monocultures have allowed a small group of crops to take over the majority of the agricultural land across the globe. While this results in the production of large amounts of corn, soy and other livestock feed, this is an inefficient way to feed the world's population when taking into account environmental costs, and does not facilitate agroecological solutions. These impacts must be alleviated if the ecological systems of the earth are not to be irreversibly damaged.<sup>546</sup>

#### 4.5.7. Air Pollution

Agriculture is a major contributor to air pollution, the largest environmental risk factor for human mortality worldwide. In the United States, agricultural production results in an estimated 17,900 annual air quality–related deaths, 15,900 of which may be ascribed to food production, with 80% of those attributable to animal-based foods, both directly from animal production and indirectly from growing animal feed.<sup>547</sup>

Air quality degradation is a problem in and around intensive animal production facilities, due to localised releases of toxic gases, odorous substances, particulates, and bioaerosols containing a variety of microorganisms and human pathogens.<sup>548</sup> Manure emits ammonia, which combines with other air pollutants, like nitrogen oxides and sulphates, to create tiny (and deadly) solid particles. This air pollution can have moderate to severe health implications for surrounding communities and for farm workers, which disproportionately affects low-income areas where industrialised animal production facilities are typically located.<sup>549</sup>

Despite these already dire implications, agricultural emissions are only going to increase as rising incomes and urbanisation drive a global dietary transition towards increased consumption of meat and dairy products.<sup>550</sup> Dietary shifts toward more plant-based foods that maintain protein intake and other nutritional needs could reduce agricultural air quality–related mortality by 68-83%. In sum, improved livestock and fertilisation practices, and dietary shifts could greatly decrease the health impacts from agricultural impairment of air quality.<sup>551</sup>

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<sup>546</sup> GRACE Communications Foundation. *Industrial Crop Production*.  
<http://www.sustainabletable.org/804/industrial-crop-production>

<sup>547</sup> Domingo, Nina G. G. et al. PNAS. Air quality–related health damages of food. 10 May 2021.  
<https://doi.org/10.1073/pnas.2013637118>

<sup>548</sup> Pew Commission. Putting Meat on the Table. 2008. <https://www.ncifap.org/reports/>

<sup>549</sup> Humane Society International (HSI). An HSI Report: The Public Health Implications of Intensive Farm Animal Production in South Asia. July 2013. [http://www.hsi.org/assets/pdfs/hsi-fa-white-papers/public\\_health\\_impacts\\_of.pdf](http://www.hsi.org/assets/pdfs/hsi-fa-white-papers/public_health_impacts_of.pdf)

<sup>550</sup> David Tilman & Michael Clark, Global Diets Link Environmental Sustainability and Human Health, 515 *Nature* 518, 520 (2014).  
<http://www.nature.com/nature/journal/v515/n7528/abs/nature13959.html?foxtrotcallback=true>.

<sup>551</sup> Domingo, Nina G. G. et al. PNAS. Air quality–related health damages of food. 10 May 2021.  
<https://doi.org/10.1073/pnas.2013637118>

#### 4.5.8. Food Waste

According to the FAO a third of global food production is lost or wasted annually.<sup>552</sup> This adds substantial pollution to our environment, simply for food that is being thrown into landfills to pollute our environment even further.

Much food waste ends up in landfills, taking up large amounts of land and polluting soil, air and water. Food is the primary source of landfill gas and the largest component of materials sent to landfills. Fertilisers used to produce wasted food are released into the environment, poisoning drinking water and aquatic ecosystems and degrading land quality, without any benefits in terms of food security.<sup>553</sup> Also, in the case of animal-source foods, animal lives and welfare have been impacted for no useful purpose.

In 2021, the US Environmental Protection Agency prepared a report entitled “From Farm to Kitchen: Environmental Impacts of Food Waste”. The report authors argued that while meat, dairy, and eggs compose just a little over a quarter of US food waste by weight, there are disproportionate environmental benefits to reducing animal product waste. That is because animal products typically require much more land, water and energy – and emit more of the greenhouse gases carbon and methane – than plant-based foods.<sup>554</sup>

Fish waste is another massive problem. Figures from WWF show that in 2019, at least 230,000 tonnes of fish were dumped in EU waters. Most of the waste – 92% – is related to bottom-trawling, a fishing method that scrapes the seafloor, indiscriminately scooping up everything in its path. This figure is a small fraction of an even larger global issue. The Food and Agriculture Organization (FAO) estimates that 35% of all fish, crustaceans and molluscs harvested from oceans, lakes and fish farms are wasted or lost before they ever reach a plate. Bycatch (unintentionally caught, unwanted fish) is a growing problem, too: roughly 10% of wild-caught fish are discarded worldwide each year, representing 8.6m tonnes of animals. This waste is being driven by subsidies. Although subsidies were historically devised to support small-scale fishers, today 80% of \$35.4bn (£26.4bn) in annual fishing subsidies goes to a handful of industrial fleets, and these include gargantuan bottom trawlers that are uniquely equipped to travel out to the high seas and overfish, leading to discards on an industrial scale.<sup>555</sup>

#### 4.5.9. Pollution Impacts on Animals

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<sup>552</sup> FAO. Food Loss and Waste. <https://www.fao.org/food-loss-and-food-waste/flw-data/#:~:text=One%2Dthird%20of%20food%20produced,1.3%20billion%20tonnes%20per%20year>.

<sup>553</sup> World Animal Net. Food Waste. <https://worldanimal.net/images/stories/documents/UNEA/Food-Waste.pdf>

<sup>554</sup> Kenny, S., J. Stephenson, AND K. Jaglo. From Farm to Kitchen: Environmental Impacts of Food Waste (Part 1). U.S. EPA Office of Research and Development, Washington, DC, 2021. <https://www.epa.gov/land-research/farm-kitchen-environmental-impacts-us-food-waste>

<sup>555</sup> Bryce, Emma. Millions of tonnes of dead animals: the growing scandal of fish waste. The Guardian. 9 May 2022. <https://amp-theguardian-com.cdn.ampproject.org/c/s/amp.theguardian.com/environment/2022/may/09/millions-of-tonnes-of-dead-animals-the-growing-scandal-of-fish-waste>

The health of the environment is a critical foundation for the health and well-being of animals. Water, air and soil pollution can cause significant adverse health outcomes in humans, animals, and plants. Environmental contamination is an important factor in many non-infectious illnesses including cancer and respiratory illness. Several dangerous chemical substances and other pollutants may also contaminate food supply. For example, heavy metals such as lead or mercury and other toxic chemicals – like pesticides - in aquatic ecosystems can bioaccumulate in the food chain with potential adverse impacts on humans and animals. Similarly, air pollution from fossil fuels and other sources has demonstrably negative impacts on human and animal health, biodiversity including plants, animals and ecosystems and water quality as well as productive sectors such as agriculture and fisheries.<sup>556</sup>

Air pollutants in intensive livestock systems (Concentrated Animal Feeding Operations or CAFOs) affect animal health and welfare, as well as human health and ecosystem health and viability. The primary air pollutants of concern in CAFOs are particulate matter (PM), ammonia (NH<sub>3</sub>), hydrogen sulphide (H<sub>2</sub>S), volatile organic compounds (VOC), and odours. Dairy, beef, pig, and poultry CAFOs all emit these air pollutants. Ammonia primarily results from manure degradation and forms when urease, an enzyme present in animal faeces, catalyses the hydrolysis of urea from urine. In the USA, livestock is considered to be the single largest source of ammonia emissions, producing an estimated 71.3% of annual emissions. The high stocking density of CAFOs leads to greater amounts of air pollutants and a rise in associated concerns. Additionally, manure and feed storage and management have been a recurring contributor to air quality issues in CAFOs.<sup>557</sup>

Unsafe water, poor sanitation and poor hygiene are responsible for human and animal mortality and morbidity as a result of various diseases, particularly affecting vulnerable populations in low resource countries. Unintentional poisonings mainly arising from excessive exposure to, and inappropriate use of, toxic chemicals including pesticides present in occupational and/or domestic environments are heavily affecting human health particularly in low-income countries. Exposure to mycotoxins, aflatoxins, biotoxins and water-borne pathogens is another problem of concern affecting the health of animals, as well as humans and plants.<sup>558</sup>

Pollutant exposure risk is potentially increased for top-of-the-chain consumers such as humans and marine mammals through bioaccumulation along the food chain, as seen with mercury. Air pollution exposure presents risks of respiratory diseases. Other so-called “lifestyle diseases” (such as obesity and diabetes) may be influenced by access to physical

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<sup>556</sup> One Health Joint Plan of Action 4 (2022-2026): Working together for the health of humans, animals, plants and the environment. [https://cdn.who.int/media/docs/default-source/food-safety/public-consultation/online-consultation-one-health-joint-plan-of-action.pdf?sfvrsn=9b7f544d\\_7](https://cdn.who.int/media/docs/default-source/food-safety/public-consultation/online-consultation-one-health-joint-plan-of-action.pdf?sfvrsn=9b7f544d_7)

<sup>557</sup> Werth, Samantha et al. Air: Confined Animal Facilities and Air Quality Issues. DOI: [10.1016/B978-0-444-52512-3.00090-5](https://doi.org/10.1016/B978-0-444-52512-3.00090-5). In book: Encyclopaedia of Agriculture and Food Systems. Elsevier. December 2014. [https://www.researchgate.net/publication/289718900\\_Air\\_Confined\\_Animal\\_Facilities\\_and\\_Air\\_Quality\\_Issues](https://www.researchgate.net/publication/289718900_Air_Confined_Animal_Facilities_and_Air_Quality_Issues)

<sup>558</sup> One Health Joint Plan of Action 4 (2022-2026): Working together for the health of humans, animals, plants and the environment. [https://cdn.who.int/media/docs/default-source/food-safety/public-consultation/online-consultation-one-health-joint-plan-of-action.pdf?sfvrsn=9b7f544d\\_7](https://cdn.who.int/media/docs/default-source/food-safety/public-consultation/online-consultation-one-health-joint-plan-of-action.pdf?sfvrsn=9b7f544d_7)



fitness, which may be limited by outdoor and indoor air pollution levels. Chemicals, such as pharmaceuticals or plastics containing endocrine-disrupting substances, may be dispersed on entering water sources and other environmental settings, posing acute, chronic or recurring exposures in humans and animals. Widescale application of antimicrobials for human and animal medicine and food production, much of which is excreted into the environment, is resulting in rapid changes to microbial composition, as well as driving development of antimicrobial resistant infections. Contaminated water may enable persistence of human infectious agents and their diseases, such as cholera-causing *Vibrio* and parasitic worm-transmitted Schistosomiasis.<sup>559</sup>

Mercury is one of the most harmful pollutants faced by fish and wildlife. Scientists have found alarming levels of mercury accumulation in a wide range of wildlife species, causing dangerous reproductive and neurological problems. Fish have difficulty schooling and decreased spawning success. Birds lay fewer eggs and have trouble caring for their chicks. Mammals have impaired motor skills that affect their ability to hunt and find food. In addition, some evidence indicates elevated mercury levels can adversely affect species' immune systems. All these effects cause suffering and combine to create a severe threat to wildlife survival.

Mercury increases in concentration with each step up the food chain. As a result, large predator fish such as walleye and trout can have mercury levels over a million times that of the surrounding water. In turn, people and wildlife who consume fish or other species with high mercury levels are at risk of serious health problems.<sup>560</sup>

Both people and wildlife are increasingly exposed to hazardous air pollution during large-scale smoke events as climate change intensifies global wildfire activity. Although wildfire smoke is considered a growing risk to public health, few studies have investigated the impacts of wildfire smoke on wildlife, particularly among species that are vulnerable to smoke inhalation. A January 2022 study demonstrated that smoke inhalation can lead to carbon monoxide poisoning, respiratory distress, neurological impairment, respiratory and cardiovascular disease, oxidative stress, and immunosuppression in wildlife, including terrestrial and aquatic species.<sup>561</sup>

Pets can be affected by air pollution as well as wildlife. Venta<sup>562</sup> explains that pets spend the majority of their time indoors. Because of the constant exposure to polluted indoor air, pets are more susceptible to developing nose and throat ailments, as well as asthma and bronchitis. They also point to insects, as one of the most interconnected groups of animals on Earth, being very susceptible to the consequences of air pollution. Small fluctuations in air quality force insects to relocate, alter their food intake and reduce their colony size. Amphibians and fish are also affected. Acid rain falling on shallow bodies of water causes pH

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<sup>559</sup> UNEP, CBD, WHO. Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review. 2015. <https://www.cbd.int/health/SOK-biodiversity-en.pdf>

<sup>560</sup> Pollution | National Wildlife Federation  
<https://www.nwf.org/Educational-Resources/Wildlife-Guide/Threats-to-Wildlife/Pollution>

<sup>561</sup> Sanderfoot, O. V. et al. A review of the effects of wildfire smoke on the health and behavior of wildlife. IOP Science. 13 January 2022. <https://iopscience.iop.org/article/10.1088/1748-9326/ac30f6>

<sup>562</sup> Wildlife and Pets are Affected by Air Pollution Too  
[https://www.venta-air.com/en\\_us/wildlife-pets-affected-air-pollution/](https://www.venta-air.com/en_us/wildlife-pets-affected-air-pollution/)

levels to fluctuate, causing fish to relocate from their native location, have respiratory problems, and even die. Soft-bodied animals like amphibians absorb pollutants through their skin and are much more sensitive to decreased pH levels in water. Some amphibious species are more immune to water acidification than others, altering populations by affecting competition and predation between amphibians. Birds are directly and indirectly affected by air pollution. They spend more time in the open air and have a higher breathing rate than humans, exposing themselves to greater levels of air pollution. Studies have shown that for birds with long-term exposure to pollution, there was reduced egg production and hatching, lung failure, inflammation, and reduced body size. Bird habitats are affected by pollution as well. Ozone damages plants that birds rely on for food, nesting, and shelter. When acid rain impacts the fish population that birds feed on, their food sources become scarce and populations decline.

A team of researchers led by Penn State found that air pollution has contributed to the decline in bee populations, with the spin-off effect that pollinator declines lead to decreases in crop yields. Pollutants interact with and break down plant-emitted scent molecules, which insect pollinators use to locate needed food. The pollution-modified plant odours can confuse bees and, as a result, bees' foraging time increases and pollination efficiency decreases..<sup>563</sup>

The Animal Welfare Institute gives a brief overview of the impacts of pollution on animals..<sup>564</sup> This mentions dead zones in the oceans, and the massive Eastern and Western Pacific garbage patches, an interconnected, rotating pair of plastic trash concentrations in the North Pacific that kill marine mammals and birds who ingest or get tangled in the plastic; or the dead animals and tarry after-effects of the catastrophic oil spills in Prince William Sound, Alaska, the Gulf of Mexico, and numerous other places. They also point out that pollution can include non-physical contaminants, such as noise. In large bodies of water, sound waves can carry with little attenuation (reduction) for miles. Sources of anthropogenic ocean noise include the use of explosives, oceanographic experiments, underwater construction, ship traffic, military active sonar, and airguns used for oil and gas exploration, drilling and shipping activities. Such noise levels are increasing at an alarming rate, with some areas seeing a doubling of levels every decade for the past 60 years. Noise proliferation can pose a significant threat to marine ecosystems and a range of adverse effects in fish, marine mammals and other ocean creatures, from disturbance to injury and death (for example, when sonar causes whales and dolphins to panic and rise rapidly to the surface, causing decompression and embolisms)..<sup>565</sup>

In 2014, the [Marine Environment Protection Committee \(MEPC\)](#) of the International Maritime Organization (IMO) approved guidelines for the reduction of underwater noise from commercial shipping to address adverse impacts on marine life – (MEPC.1/

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<sup>563</sup> Messer, Andrea Elyse. Bees' ability to forage decreases as air pollution increases. 6 July 2016. Phys.Org. <https://phys.org/news/2016-07-bees-ability-forage-decreases-air.html>

<sup>564</sup> Animal Welfare Institute. Pollution <https://awionline.org/content/pollution>

<sup>565</sup> Ocean Care. Underwater Noise: Consequences. <https://www.oceancare.org/en/our-work/ocean-conservation/underwater-noise/underwater-noise-consequences/>

Circ.833).<sup>566</sup> Those both address design considerations for propellers, hulls, and onboard machinery, as well as operational and maintenance considerations in respect to propeller cleaning, underwater hull surface maintenance, selection of ship speed, and re-routing to avoid sensitive areas.

Especially severe anthropogenic underwater noise results from seismic surveys, which are used to locate and estimate the size of offshore oil and gas reserves. The auditory assault from seismic surveys has been found to damage or kill fish eggs and larvae and to impair the hearing and health of fish and marine mammals, making them vulnerable to predators and leaving them unable to locate prey or mates or communicate with each other. These disturbances can disrupt and displace important migratory patterns, pushing marine life away from suitable habitats like nurseries and foraging, mating, spawning, and migratory corridors.<sup>567</sup>

UNEP itself has commented on the impacts of noise pollution on marine mammals in a website story on 25 April 2022. They stated that the deep, dark ocean is often thought of as a peaceful, silent world. However, it is an orchestra of sounds, like the snapping of shrimp, the clicks of dolphins and the songs of whales, but human activity may be drowning out those noises - and having a disorienting and destructive impact on marine animals. “Scientists have been warning about this for a long time,” said Heidrun Frisch-Nwakanma, who leads underwater noise work at the Convention on the Conservation of Migratory Species of Wild Animals (CMS).<sup>568</sup>

Common man-made physical pollutants that reach the ocean include pesticides, herbicides, chemical fertilisers, detergents, oil, sewage, plastics, discarded fishing gear and other solid debris. Often, they are released far upstream. Many of these pollutants collect at the ocean's depths, where they are consumed by small marine organisms and introduced into the global food chain. Solid waste like bags, foam, and other items dumped into the oceans from land or by ships at sea are frequently mistaken for prey and consumed by marine mammals, fish, and birds, often with fatal effects. Discarded fishing nets drift for years, ensnaring fish and mammals, leading to exhaustion, starvation, and slow death.<sup>569</sup>

Marine litter, including plastics and microplastics, is now found in all oceans, at all depths. The growing presence and abundance of microplastics has potential adverse effects on the health of marine organisms, fisheries, aquaculture and agriculture.<sup>570</sup> According to the United Nations, at least 800 species worldwide are affected by marine debris, and as much as 80 percent of that litter is plastic. It is estimated that up to 13 million metric tons of plastic ends up in the ocean each year—the equivalent of a rubbish or garbage truck load

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<sup>566</sup> IMO. Guidelines for the Reduction of Underwater Noise from Commercial Shipping to Address Adverse Impacts on Marine Life. 7 April 2014.

<https://cetsound.noaa.gov/Assets/cetsound/documents/MEPC.1-Circ%20883%20Noise%20Guidelines%20April%202014.pdf>

<sup>567</sup> Surfrider Foundation. Seismic Surveys. [https://beachapedia.org/Seismic\\_Surveys](https://beachapedia.org/Seismic_Surveys)

<sup>568</sup> UNEP. Are humans drowning out the sounds of the seas? 25 April 2022. <https://www.unep.org/news-and-stories/story/are-humans-drowning-out-sounds-seas>

<sup>569</sup> Animal Welfare Institute. Pollution <https://awionline.org/content/pollution>

<sup>570</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6>

every minute. Fish, seabirds, sea turtles, and marine mammals can become entangled in or ingest plastic debris, causing suffocation, starvation, and drowning. Humans are not immune to this threat: While plastics are estimated to take up to hundreds of years to fully decompose, some of them break down much quicker into tiny particles, which in turn end up in the seafood we eat. Some background information is contained in this resource from the Pew Charitable Trusts on Plastic Pollution Affects Sea Life Throughout the Ocean.<sup>571</sup>

An article in National Geographic entitled “The world's plastic pollution crisis explained” includes an explanation of the impacts of plastics on wildlife. Millions of animals are killed by plastics every year, from birds to fish to other marine organisms. Nearly 700 species, including endangered ones, are known to have been affected by plastics. Nearly every species of seabird eats plastics. Most of the deaths to animals are caused by entanglement or starvation. Seals, whales, turtles, and other animals are strangled by abandoned fishing gear or discarded six pack rings. Microplastics have been found in more than 100 aquatic species, including fish, shrimp, and mussels destined for human consumption. Plastics have also been consumed by land-based animals, including elephants, hyenas, zebras, tigers, camels, cattle, and other large mammals; in some cases causing death. Tests have also confirmed liver and cell damage and disruptions to reproductive systems. New research shows that larval fish are eating nanofibers in the first days of life, raising new questions about the effects of plastics on fish populations.<sup>572</sup>

The Center for Biological Diversity includes information on the “direct and deadly effect on wildlife” of plastics pollution. Thousands of seabirds and sea turtles, seals and other marine mammals are killed each year after ingesting plastic or getting entangled in it. Endangered wildlife is also among nearly 700 species that eat and get caught in plastic litter. Some examples given are:

- Fish in the North Pacific ingest 12,000 to 24,000 tons of plastic each year, which can cause intestinal injury and death and transfers plastic up the food chain to bigger fish, marine mammals and human seafood eaters.
- Sea turtles can mistake floating plastic garbage for food. They can choke, sustain internal injury and die — or starve by thinking they are full from eating plastic. Research indicates that half of sea turtles worldwide have ingested plastic.
- Hundreds of thousands of seabirds ingest plastic every year. Plastic ingestion reduces the storage volume of the stomach, causing starvation. It is estimated that 60 percent of all seabird species have eaten pieces of plastic, with that number predicted to increase to 99 percent by 2050.
- Marine mammals ingest, and get tangled up in, plastic. Entanglement in plastic debris has also led to injury and mortality in the endangered Steller sea lion, with packing bands the most common entangling material. Dead whales have been found with bellies full of plastic.<sup>573</sup>

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<sup>571</sup> The Pew Charitable Trusts. Plastic Pollution Affects Sea Life Throughout the Ocean. 24 September 2018. <https://www.pewtrusts.org/research-and-analysis/articles/2018/09/24/plastic-pollution-affects-sea-life-throughout-the-ocean>

<sup>572</sup> Parker, Laura. National Geographic. The world's plastic pollution crisis explained. 7 June 2019. <https://www.nationalgeographic.com/environment/article/plastic-pollution>

<sup>573</sup> The Center for Biological Diversity. Ocean Plastics Pollution. [https://www.biologicaldiversity.org/campaigns/ocean\\_plastics/](https://www.biologicaldiversity.org/campaigns/ocean_plastics/)

WWF Australia states that it has been estimated that plastic pollution kills 100,000 marine mammals every year, with 81 out of 123 marine mammal species known to have eaten or been entangled in plastic, and all seven sea turtle species affected. They state that there are two main ways that encountering marine debris can be fatal for these creatures: ingestion (eating) or entanglement in plastic-based fishing gear. They include information on why marine mammals eat plastic and what happens when they become entangled in plastic.<sup>574</sup>

Pollution is not a natural disaster we have to deal with. It is man-made and a consequence of the current materialistic, consumerist, throw-away lifestyle and lack of effective regulation and enforcement. We can only battle pollution by changing our consumption and production patterns, and establishing effective regulatory systems which prevent and disincentivise pollution, and instead incentivise environmentally-friendly alternatives.

## **4.6. Prevention of Future Pandemics**

### **4.6.1. Introduction to Pandemics**

There is a clear nexus between the use and welfare of animals and pandemics. COVID-19 has caused profound damage to human health, societies and economies in every corner of the world. This illness is a zoonotic disease, one which was transmitted between animals and humans. It is not the first, and it is unlikely to be the last. We already know that 60 per cent of known infectious diseases in humans and 75 per cent of all emerging infectious diseases are zoonotic in nature.<sup>575</sup> Ebola, SARS, the Zika virus and bird flu all came to people by way of animals.

Zoonotic diseases, or zoonoses, are diseases shared between animals – including livestock, wildlife, captive animals, pets – and people. They can pose serious risks to both animal and human health and may have far-reaching impacts on economies and livelihoods. Zoonotic diseases are commonly spread at the human-animal-environment interface – where people and animals interact with each other in their shared environment. Zoonotic diseases can be foodborne, waterborne, or vector-borne, transmitted through direct contact with animals, or indirectly by fomites or environmental contamination. Zoonotic disease threats include:

- zoonotic disease events and emergencies;
- endemic zoonotic diseases;
- new or emerging zoonotic diseases; and
- other threats at the human-animal-environment interface such as antimicrobial resistance (AMR), food safety, and food security.<sup>576</sup>

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<sup>574</sup> WWF Australia. Plastic in our oceans is killing marine mammals. 1 July 2021.

<https://www.wwf.org.au/news/blogs/plastic-in-our-oceans-is-killing-marine-mammals>

<sup>575</sup> UNEP/ILRI. Preventing the next pandemic - Zoonotic diseases and how to break the chain of transmission. 6 July 2020. <https://www.unenvironment.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and>

<sup>576</sup> OIE, FAO, WHO. Taking a Multisectoral, One Health Approach: A Tripartite Guide to Addressing Zoonotic Diseases in Countries. 2019. <https://www.oie.int/app/uploads/2021/03/en-tripartitezoonosesguide-webversion.pdf>

#### 4.6.2. UNEP Research

UNEP states that: “the transmission of diseases, like the Novel Coronavirus COVID-19, between animals and humans (zoonoses) threatens economic development, animal and human well-being, and ecosystem integrity”. It has produced a number of materials such as reports, factsheets and FAQs on COVID-19.<sup>577</sup>

UNEP has also looked into the question of preventing pandemics, and prepared a joint report with the International Livestock Research Centre (ILRI) entitled: “Preventing the next pandemic - Zoonotic diseases and how to break the chain of transmission”.<sup>578</sup> The contribution of UNEP’s Executive Director to the foreword of this report includes the following:

“The report - produced in partnership with universities, research institutions, UN agencies and the secretariats of several multilateral environmental agreements - identifies key anthropogenic drivers for the emergence of zoonoses, from agricultural intensification and increased demand for animal protein to the conversion of land and climate change. These drivers are destroying natural habitats and seeing humanity exploiting more species, which brings people into closer contact with disease vectors. Once established in humans, these diseases quickly spread across our interconnected world, as we have seen with COVID-19. Understanding these drivers is essential to inform effective strategies and policy responses to prevent future outbreaks.”

The contribution to the foreword from the Director General of the International Livestock Research Institute includes this:

“To date, most efforts to control zoonotic diseases have been reactive rather than proactive. COVID-19 has made us all aware that it’s time to change that. To prevent future outbreaks of novel zoonotic diseases, we need to address the root causes of their emergence. We need among other things to break down disciplinary and organisational silos, to invest in public health programmes, to farm sustainably, to end the over-exploitation of wildlife, to restore land and ecosystem health and to reduce climate change. The only way to achieve all of this is to boost collaboration among agencies that work on environment, animal and human health. In the past two decades, ‘One Health’—a holistic, inter-sectoral and interdisciplinary approach that focuses on where the health of people, animals and environments converge—has emerged as the most promising way to prevent and manage zoonotic diseases.”<sup>579</sup>

The report notes as the first three drivers of pandemics (out of seven):

1) increasing human demand for animal protein;

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<sup>577</sup> UNEP. COVID-19 materials from UNEP. <https://www.unep.org/covid-19>

<sup>578</sup> UNEP/ILRI. Preventing the next pandemic - Zoonotic diseases and how to break the chain of transmission. 6 July 2020. <https://www.unenvironment.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and>

<sup>579</sup> UNEP/ILRI. Preventing the next pandemic - Zoonotic diseases and how to break the chain of transmission. 6 July 2020. <https://www.unenvironment.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and>



- 2) unsustainable agricultural intensification;
- 3) increased use and exploitation of wildlife.

In the report's words: "Pandemics such as the COVID-19 outbreak are a predicted and predictable outcome of how people source and grow food, trade and consume animals, and alter environments."<sup>580</sup>

This report contains a strong One Health message, and suggests a phase-out of unsustainable agricultural practices as one policy response option.<sup>581</sup>

The 2015 joint report from UNEP, CBD, WHO entitled "Connecting Global Priorities: Biodiversity and Human Health: A State of Knowledge Review"<sup>582</sup> is also relevant. This includes a chapter on Infectious Diseases (Chapter 7) with a chart that shows the top three drivers of emerging infectious diseases from wildlife as: land-use changes, human susceptibility to infections and agricultural industry changes. There is also a chapter (Chapter 5) on "Agricultural biodiversity, food security and human health". This goes wider than the nexus with pandemics, but does include relevant information. For example, mentioning the role of intensive livestock production on land use change, which - particularly deforestation for agriculture - is a leading contributor of carbon dioxide (CO<sub>2</sub>), the greenhouse gas that is the primary contributor to climate change, which in turn causes greater incidence of disease outbreaks. Agricultural systems which are more favourable to biodiversity are mentioned as potential means of risk mitigation, such as agroecology, conservation agriculture and organic agriculture.<sup>583</sup>

Land use change, food production and agricultural change are reported to collectively account for almost half of all global zoonotic emergent infectious diseases. The relationships between biodiversity loss, disturbance and disease will have enormous consequences for human well-being.<sup>584</sup>

The report notes that infectious diseases threaten wild species as well as the people that depend on them. The health burden of infectious diseases is not limited to humans and domestic species; infectious diseases pose threat to biodiversity conservation as well. Pathogen spill-over can occur from one wild species to another, potentially causing an outbreak if the species or population is susceptible to the pathogen; similarly, diseases of domestic animals and humans can also be infectious to wild species.<sup>585</sup>

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<sup>580</sup> UNEP/ILRI. Preventing the next pandemic - Zoonotic diseases and how to break the chain of transmission. 6 July 2020. <https://www.unenvironment.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and>

<sup>581</sup> UNEP/ILRI. Preventing the next pandemic - Zoonotic diseases and how to break the chain of transmission. 6 July 2020. <https://www.unenvironment.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and>

<sup>582</sup> UNEP, CBD, WHO. Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review. 2015. <https://www.cbd.int/health/SOK-biodiversity-en.pdf>

<sup>583</sup> UNEP, CBD, WHO. Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review. 2015. <https://www.cbd.int/health/SOK-biodiversity-en.pdf>

<sup>584</sup> UNEP, CBD, WHO. Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review. 2015. <https://www.cbd.int/health/SOK-biodiversity-en.pdf>

<sup>585</sup> UNEP, CBD, WHO. Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review. 2015. <https://www.cbd.int/health/SOK-biodiversity-en.pdf>

Wildlife resources such as bushmeat or wild meat (here encompassing non-domesticated terrestrial mammals, birds, reptiles and amphibians harvested in the wild for food) constitute the main source of animal protein in many tropical forested landscapes. It must nonetheless be noted that various activities associated with the handling of bushmeat, its consumption and trade also involve varying levels of health risks for disease emergence. In particular, these include activities associated with unsafe hunting, butchering and transport of some species, especially primates. Moreover, the over exploitation of certain wild animal populations is leading to the depletion of some species.<sup>586</sup>

The report also states that genetic diversity can make a significant contribution to pest and disease control. Industrialised animal farming systems are vulnerable to the same disease risks as crop monocultures. The level of genetic diversity in livestock breeds has fallen dramatically over the past century as a result of intense selection.<sup>587</sup>

A 2022 report from UNEP warned that people around the world are unknowingly being exposed to water laced with antibiotics, which could spark the rise of drug-resistant pathogens and potentially fuel another global pandemic. This includes a section on releases, effluent and waste in animal production, including both terrestrial animals and aquaculture.<sup>588</sup> What the report does not include is that the “end of superbugs starts with better animal welfare”, as recognised by the European Commission. The EU has an ambitious target to reduce sales of antimicrobials for farmed animals and aquaculture by 50% by 2030, as animal health and welfare plans will start to play a greater role in reducing disease.<sup>589</sup>

### 4.6.3. IPBES Workshop

The IPBES Workshop Report on Biodiversity and Pandemics<sup>590</sup> is one of the most scientifically robust examinations of the evidence and knowledge about links between pandemic risk and nature since the COVID pandemic began – with contributions from 22 leading experts in fields as diverse as epidemiology, zoology, public health, disease ecology, comparative pathology, veterinary medicine, pharmacology, wildlife health, mathematical modelling, economics, law and public policy, as authors of the report. The expertise of the 22 authors was further augmented by contributions and knowledge resources from the

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<sup>586</sup> UNEP, CBD, WHO. Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review. 2015. <https://www.cbd.int/health/SOK-biodiversity-en.pdf>

<sup>587</sup> UNEP, CBD, WHO. Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review. 2015. <https://www.cbd.int/health/SOK-biodiversity-en.pdf>

<sup>588</sup> UNEP. How drug-resistant pathogens in water could spark another pandemic. 6 April 2022. <https://www.unep.org/news-and-stories/story/how-drug-resistant-pathogens-water-could-spark-another-pandemic> and UNEP. Environmental Dimensions of Antimicrobial Resistance. Summary for Policymakers. 2022. [https://wedocs.unep.org/bitstream/handle/20.500.11822/38373/antimicrobial\\_R.pdf](https://wedocs.unep.org/bitstream/handle/20.500.11822/38373/antimicrobial_R.pdf)

<sup>589</sup> Ceurstemont, Sandrine. European Commission. The end of superbugs starts with better animal welfare. 25 April 2022. <https://ec.europa.eu/research-and-innovation/en/horizon-magazine/end-superbugs-starts-better-animal-welfare>

<sup>590</sup> Daszak, P et al. IPBES (2020) Workshop Report on Biodiversity and Pandemics of the Intergovernmental Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany, DOI:10.5281/zenodo.4147317

Convention on Biological Diversity, the Intergovernmental Panel on Climate Change, the Convention on International Trade in Endangered Species, the United Nations Convention to Combat Desertification, and the World Health Organization - as well as a peer review process.<sup>591</sup>

These experts forecast more frequent, deadly and costly pandemics: Future pandemics will emerge more often, spread more rapidly, do more damage to the world economy and kill more people than COVID-19 unless there is a transformative change in the global approach to dealing with infectious diseases: importantly, a move from reaction to prevention. COVID-19 is at least the sixth global health pandemic since the Great Influenza Pandemic of 1918, and although it has its origins in microbes carried by animals, like all pandemics its emergence has been entirely driven by human activities. The report estimated that another 1.7 million currently ‘undiscovered’ viruses exist in mammals and birds, including up to 827,000 that could infect people, and stressed that current economic impacts might be 100 times the cost of prevention. It offered options to reduce risk including: an Intergovernmental Council on Pandemic Prevention; addressing risk drivers including deforestation & wildlife trade; and taxing high pandemic-risk activities.<sup>592</sup>

“There is no great mystery about the cause of the COVID-19 pandemic – or of any modern pandemic”, said Dr. Peter Daszak, President of EcoHealth Alliance and Chair of the IPBES workshop. “The same human activities that drive climate change and biodiversity loss also drive pandemic risk through their impacts on our environment. Changes in the way we use land; the expansion and intensification of agriculture; and unsustainable trade, production and consumption disrupt nature and increase contact between wildlife, livestock, pathogens and people. This is the path to pandemics.”<sup>593</sup>

#### **4.6.4. Other Research**

The fact that the COVID-19 crisis very likely arose from the exploitation of animals has drawn greater attention to how human uses of animals can increase the risk of future pandemics. The “Animals Manifesto, preventing COVID-X” is a report which examines all the major interfaces between animal welfare and pandemics. Through this Animals’ Manifesto a coalition of more than 170 NGOs working across the globe have called on world leaders, international institutions, political parties, and all stakeholders to stop and assess the direction of current COVID-19 response efforts, realign these with the glaring need for transformative change, and finally address humanity’s exploitation of animals. It is a call to

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<sup>591</sup> Daszak, P et al. IPBES (2020) Workshop Report on Biodiversity and Pandemics of the Intergovernmental Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany, DOI:10.5281/zenodo.4147317

<sup>592</sup> Daszak, P et al. IPBES (2020) Workshop Report on Biodiversity and Pandemics of the Intergovernmental Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany, DOI:10.5281/zenodo.4147317

<sup>593</sup> Daszak, P et al. IPBES (2020) Workshop Report on Biodiversity and Pandemics of the Intergovernmental Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany, DOI:10.5281/zenodo.4147317

“Build Forward” to create a more sustainable, equitable, and humane world, and prevent the next pandemic.<sup>594</sup>

The Animals’ Manifesto “Challenge to Change” includes these words:

“The COVID-19 crisis makes absolutely clear that to reduce the risk of future world-stopping pandemics, we must fundamentally reorient our relationship with animals, from a relationship of exploitation to a relationship of mutuality. We must do this on a basis of urgency.”<sup>595</sup>

In the foreword, Jane Goodall includes this remark:

“The Animals’ Manifesto is a manifesto which does not conveniently ignore the central role that improvements in animal well-being and a fundamental change in our relationship with non-human living beings has in COVID-19 recovery efforts.”<sup>596</sup>

At least 10,000 virus species have the capacity to infect humans, with the vast majority of these believed to currently circulate silently in wild mammals. However, climate and land use change will produce novel opportunities for viral sharing among previously geographically-isolated species of wildlife. In some cases, this will facilitate zoonotic spill-over. According to a modelling study in *Nature*.<sup>597</sup> climate change will drive more than 15,000 new cases of mammals transmitting viruses to other mammals over the next 50 years, as global warming shifts wildlife habitats causing increased encounters between species that swap pathogens. The research predicts that much of the new virus transmission will happen when species meet for the first time as they move to cooler locales because of rising temperatures. And it projects that this will occur most often in species-rich ecosystems at high elevations, particularly areas of Africa and Asia, and in areas that are densely populated by humans, including Africa’s Sahel region, India and Indonesia. Assuming that the planet warms by no more than 2°C above pre-industrial temperatures this century the number of first-time meetings between species will double by 2070, creating virus-transmission hotspots, the study says.<sup>598</sup> This highlights the urgent need to take the already-identified preventative measures against future pandemics, as well as to place greater priority on the protection and rewilding of wildlife habitats, and increasing wildlife corridors.

A guest blog on the IISD website in February 2022 entitled “Animal Welfare Matters for Sustainable Development: UNEA 5.2 is an Opportunity for Governments to Recognize That”<sup>599</sup> was written by scientists from the Stockholm Environment Institute and New York

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<sup>594</sup> World Federation for Animals. Animals’ Manifesto – preventing COVID-X. <https://wfa.org/animals-manifesto/>

<sup>595</sup> World Federation for Animals. Animals’ Manifesto – preventing COVID-X. <https://wfa.org/animals-manifesto/>

<sup>596</sup> World Federation for Animals. Animals’ Manifesto – preventing COVID-X. <https://wfa.org/animals-manifesto/>

<sup>597</sup> Carlson, C. J. et al. *Nature*. Climate change increases cross-species viral transmission risk. 2022. <https://doi.org/10.1038/s41586-022-04788-w>

<sup>598</sup> Gilbert, Natasha. Climate change will force new animal encounters — and boost viral outbreaks. 28 April 2022. <https://www.nature.com/articles/d41586-022-01198-w>

<sup>599</sup> Verkuil, Cleo, Stockholm Environment Institute; Sebo, Jeff, New York University; and Green, Jonathan, Stockholm Environment Institute. Animal Welfare Matters for Sustainable Development: UNEA 5.2 is an Opportunity for Governments to Recognize That. IISD. 25 February 2022.

University. They expressed support for the animal welfare nexus study for a number of reasons, including the following:

“The COVID-19 pandemic is a reminder that human and non-human health and welfare are linked. Practices that undermine animals’ wellbeing have negative consequences for humans, too. While we might not know how the novel coronavirus originated, we do know that habitat destruction, industrial livestock farming, and wildlife trade and use contribute to the emergence of infectious disease. For instance, profligate antimicrobial use to promote growth and to mitigate infection risk in close-quartered livestock is a leading contributor to antimicrobial resistance (AMR). Deforestation – driven partly by animal agriculture – is a major contributor to zoonotic disease spread.”<sup>600</sup>

World Animal Protection’s 2022 report on “The Hidden Health Impacts of Industrial Livestock Systems”<sup>601</sup> includes information on zoonoses. It points out that a zoonosis is an infectious disease that is transmitted from animals (farmed or wild) to humans. Zoonotic pathogens may be bacterial, viral, or parasitic and can affect humans through direct contact between humans and farmed animals or through food, water, vectors (mosquitoes, flies, ticks, fleas etc.) or indirectly through the contamination of the wider environment (water, surfaces, soils etc). An estimated 60% of known infectious diseases and up to 75% of new or emerging infectious diseases are zoonotic in origin. Many of the most recent pandemics, such as avian flu and swine flu, are associated with intensive poultry and pig production systems with poor animal welfare and animal husbandry standards. The transition from subsistence and extensive to more commercial and intensive factory farming systems has resulted in the greatest zoonotic spill overs, because of higher livestock stocking densities, poor hygiene, lower animal welfare standards, and genetically similar breeds with less resilience to disease. Moreover, as livestock population densities increase, more natural habitats are converted into farmland (for grazing or animal feed), which in turn reduces biodiversity and, thus, the ability of ecosystems to provide crucial functions, such as disease regulation or dilution.

The Vienna-based FOUR PAWS International also has reports and resources on “Pandemics and Animal Welfare”, which include an international Future Study on pandemic prevention.<sup>602</sup>

Although it took COVID-19 to shake the world into action, the impacts of agricultural intensification, and increasing wildlife exploitation, had long been known. Back in 2013, a multidisciplinary team conducted a systematic review to analyse qualitatively best available scientific evidence on the effect of agricultural intensification and environmental changes on the risk of zoonoses for which there are epidemiological interactions between wildlife and

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<https://sdg.iisd.org/commentary/guest-articles/animal-welfare-matters-for-sustainable-development-unea-5-2-is-an-opportunity-for-governments-to-recognize-that/>

<sup>600</sup> Verkuil, Cleo, Stockholm Environment Institute; Sebo, Jeff, New York University; and Green, Jonathan, Stockholm Environment Institute. Animal Welfare Matters for Sustainable Development: UNEA 5.2 is an Opportunity for Governments to Recognize That. IISD. 25 February 2022.

<https://sdg.iisd.org/commentary/guest-articles/animal-welfare-matters-for-sustainable-development-unea-5-2-is-an-opportunity-for-governments-to-recognize-that/>

<sup>601</sup> World Animal Protection. The Hidden Health Impacts of Industrial Livestock Systems.

<https://www.worldanimalprotection.ca/news/hidden-health-impacts-factory-farming>

<sup>602</sup> FOUR PAWS. Pandemics and Animal Welfare. <https://www.four-paws.org/get-involved/pandemics-and-animal-welfare>

livestock. This review found several examples of zoonotic disease emergence at the wildlife–livestock–human interface that were associated with varying combinations of agricultural intensification and environmental change, such as habitat fragmentation and ecotones, reduced biodiversity, agricultural changes, and increasing human density in ecosystems. Expansion of livestock production, especially in proximity to wildlife habitats, has facilitated pathogen spill-over from wildlife to livestock and vice versa and increased the likelihood that livestock become amplifying hosts in which pathogens can evolve and become transmissible to humans.<sup>603</sup>

A 2021 paper on the “Impact of the COVID-19 Pandemic on the Welfare of Animals in Australia”<sup>604</sup> demonstrated that the challenges COVID brought to humans had a knock-on impact on animals. In addition to the effects on livestock production covered above, the aquaculture sector was impacted by major market shifts during the COVID-19 pandemic, which were caused by the closure of restaurants and catering services and a reduction of export capacity. Some other impacts on animals include disruption of the work of wildlife rescue and rehabilitation services, and loss of revenues to zoos and aquaria. The article states that: “Animals are integral to human society. Animals contribute to human well-being, and their welfare often depends on the capacity of humans to provide care for them”. Australia constituted a cross sectoral response group and crisis response centre, and contingency plans, for dealing with such crises.<sup>605</sup>

The Committee on World Food Security report CFS 2016/43<sup>606</sup> includes recognition of the importance of animal welfare in food systems.

The FAIRR investor collaborative notes the investor risks associated with intensive agriculture in these words: “cramped conditions, which are characteristic of factory farms, also facilitate the creation of new zoonotic diseases. Large numbers of animals packed in such close quarters provide a breeding ground for harmful pathogens to spread and create pandemics. COVID-19 is the latest and most significant in a long string of animal-borne diseases, such as swine flu, avian flu, SARS, Ebola, MERS, Zika and Dengue Fever.”<sup>607</sup> The animals in these systems lack genetic diversity, and the stressful conditions and unnatural diet weaken their immune systems.

Pandemics will be more frequent in the future and more severely impactful unless climate changes are mitigated. Zoonotic diseases – illnesses that can jump between humans and animals – are more sensitive to climate change than human or animal-only pathogens. The ranges of disease-carrying insects and other arthropods will expand as the climate warms,

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<sup>603</sup> Jones, Bryony A et al. Zoonosis emergence linked to agricultural intensification and environmental change. 110(21)8399-8404. 13 May 2013. <https://doi.org/10.1073/pnas.1208059110>

<sup>604</sup> Baptista, Jacqueline et al. Impact of the COVID-19 Pandemic on the Welfare of Animals in Australia. *Front. Vet. Sci.*, 28 January 2021. <https://doi.org/10.3389/fvets.2020.621843>

<sup>605</sup> Baptista, Jacqueline et al. Impact of the COVID-19 Pandemic on the Welfare of Animals in Australia. *Front. Vet. Sci.*, 28 January 2021. <https://doi.org/10.3389/fvets.2020.621843>

<sup>606</sup> Committee on World Food Security. FAO. Forty-third Session "Making a Difference in Food Security and Nutrition". 17-21 October 2016. <http://www.fao.org/3/a-ms023e.pdf>

<sup>607</sup> FAIRR. Intensive/Factory Farming. 4 April 2019. <https://www.fairr.org/article/intensive-factory-farming/>



whilst more extreme weather events resulting from climate change will also increase the spread of disease.<sup>608</sup>

#### 4.6.5. Impacts on Animals

Clearly, zoonoses impact the health and welfare of animals, and take animal lives. But COVID-19 also showed the vulnerability of animals in sweeping pandemics in the wider sense.

The US Centres for Disease Control and Prevention (CDC) confirms that people can spread coronaviruses to animals. Reports of animals infected with SARS-CoV-2 have been documented around the world. Most of these animals became infected after contact with people with COVID-19, including owners, caretakers, or others who were in close contact. All of the animals that could become infected is not yet known. But animals reported infected worldwide include:

- Companion animals, including pet cats, dogs, hamsters, and ferrets.
- Animals in zoos and sanctuaries, including several types of big cats (e.g., lions, tigers, snow leopards), otters, non-human primates, a binturong, a coatimundi, a fishing cat, hyenas, hippopotamuses, and manatees.
- Mink on mink farms.
- Wildlife, including white-tailed deer, mule deer, a black-tailed marmoset, a giant anteater, and wild mink near mink farms.<sup>609</sup>

Mink fur farms in the Netherlands, U.S., Denmark, France, Spain, Sweden, Lithuania, Greece, Poland and Italy all experienced outbreaks of SARS-CoV-2. Thousands of minks also died from the virus in the U.S. after infected mink were found on fur farms in Wisconsin, Utah, Michigan and Oregon. Veterinary professionals with the Humane Society Veterinary Medical Association note that it is not surprising that fur farms have experienced outbreaks of the virus. Similar to wildlife markets, animals in fur farms are often housed in crowded conditions where they're exposed to bodily fluids. In November, Denmark announced it would cull all 15 million minks on fur farms after a mutated version of the virus was found in the animals. In the Netherlands, authorities also preventatively killed millions of minks, mostly pups, on fur farms affected by COVID-19. The country - the fourth largest producer of mink fur after Denmark, Poland and China - also announced it would shut down all remaining mink farms next year, before the planned phase-out of the industry by 2024.<sup>610</sup>

During the COVID-19 lockdowns, animal exhibitions, wildlife sanctuaries and ecotourism operators lost revenue, and many planned conservation projects had to be cancelled or

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<sup>608</sup> McIntyre, K.M., Setzkorn, C., Hepworth, P.J. *et al.* Systematic Assessment of the Climate Sensitivity of Important Human and Domestic Animals Pathogens in Europe. *Sci Rep* 7, 7134 (2017). <https://doi.org/10.1038/s41598-017-06948-9>

<sup>609</sup> CDC. Animals and COVID-19. 27 April 2022. <https://www.cdc.gov/coronavirus/2019-ncov/daily-lifecoping/animals.html#:~:text=People%20can%20spread%20SARS%2DCoV,who%20were%20in%20close%20contact.>

<sup>610</sup> Grant, Brianna. How the COVID-19 pandemic impacts animals. The novel coronavirus originated with wild animals, but its fallout affects so many more. 15 December 2020. <https://www.humanesociety.org/news/how-covid-19-pandemic-impacts-animals>

postponed globally. Scientists also expressed concerns that poaching could increase due to economic instability and the reduced presence of law enforcement and tourists. Increased poaching levels have already been reported in Africa and Asia.

A 2020 paper entitled “COVID-19 Effects on Livestock Production: A One Welfare Issue”<sup>611</sup> examined COVID-19's effects on the food supply chain, and specifically livestock production, and the consequent impacts on the wellbeing of animals, people and the environment. In several countries, clusters of COVID cases among workers in meat processing plants evolved quickly to affect human, animal, and environmental welfare. For example, in the US many processing plants shut down when they identified major outbreaks, putting pressure especially on pig and poultry industries. At one point, there was a 45% reduction in pig processing capacity meaning about 250,000 pigs per day were not slaughtered. This resulted in longer transport distances to still operational plants and crowding of animals on farm. Producers were encouraged to slow growth rates, but some had to cull animals on farm in ways that likely included suffering and caused distress to owners and workers. Carcass disposal was also associated with biosecurity risks and detrimental effects on the environment (potentially including harming fish, birds, insects and other wildlife); and food supplies were affected.<sup>612</sup>

This paper stated that the COVID-19 pandemic revealed the harsh reality about the fragility and high “costs” associated with intensive, high-throughput, and highly specialised food production systems like no other threat before. It stated that this is a “One Welfare” issue, affecting human, animal and environmental welfare; and that this model needs to be re-shaped to include the animal, human, and environmental elements across the farm to fork chain.<sup>613</sup>

The 2021 paper in *Frontiers of Veterinary Science* entitled “Impact of the COVID-19 Pandemic on the Welfare of Animals in Australia” gives an overview of the impact of COVID-19 on animals in various uses, and some of the mitigation measures carried out. Clearly, the impact was multi-sectorial, and the lockdowns had serious effects on not only animal production industries, but also zoos and aquariums, animals used in entertainment, wildlife parks, wildlife rehabilitation centres, horse and greyhound racing, animals used in research and testing and companion animals. Economic hardship and disease cause some animal neglect and additional unwanted companion animals. Meanwhile, animal shelters struggled with decreased incomes and less rehoming potential.<sup>614</sup>

#### **4.6.6. Prevention of Pandemics**

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<sup>611</sup> Marchant-Forde, Jeremy N and Boyle, Laura A. COVID-19 Effects on Livestock Production: A One Welfare Issue. *Front. Vet. Sci.*, 30 September 2020. <https://doi.org/10.3389/fvets.2020.585787>

<sup>612</sup> Marchant-Forde, Jeremy N and Boyle, Laura A. COVID-19 Effects on Livestock Production: A One Welfare Issue. *Front. Vet. Sci.*, 30 September 2020. <https://doi.org/10.3389/fvets.2020.585787>

<sup>613</sup> Marchant-Forde, Jeremy N and Boyle, Laura A. COVID-19 Effects on Livestock Production: A One Welfare Issue. *Front. Vet. Sci.*, 30 September 2020. <https://doi.org/10.3389/fvets.2020.585787>

<sup>614</sup> Baptista, Jacqueline. Impact of the COVID-19 Pandemic on the Welfare of Animals in Australia. Perspective article. *Front. Vet. Sci.*, 28 January 2021. <https://doi.org/10.3389/fvets.2020.621843>

It is vital that effective action is taken to prevent future pandemics, as recognised in the title of the UNEP/ILRI report itself: “Preventing the Next Pandemic”.<sup>615</sup> Simply slowing the spread and mitigating the impacts of pandemics is not enough. We need to avoid further pandemics, as much as humanly possible. In a 2021 Lancet paper, Jorge Vinales and a team of researchers argued that the focus should be on “deep prevention”, that far more could be done to reduce the risk of disease outbreaks, and that international law remains unused. Deep prevention means working on “upstream prevention” and “midstream prevention”; addressing the drivers (direct and indirect) of pandemics. The researchers state that these need to be addressed in a global pandemics’ treaty, from a One Health perspective.<sup>616</sup>

The paper notes that there is a link between certain key drivers of environmental degradation, including illicit wildlife trafficking and land-use change, and the increased frequency of zoonotic disease outbreaks, which led WHO and other organisations to call for the suspension of sales of captured living wild mammals and their sale in food markets. This link directs attention to the relevance of some widely ratified environmental treaties – e.g., the Convention on International Trade in Endangered Species, the Convention on Biological Diversity, and the UN Convention to Combat Desertification - for reducing risk of zoonosis. A global pandemic treaty could strengthen the coherence between these environmental treaties and the international health regulations, and help render these legal regimes more enforceable and effective.<sup>617</sup>

A 2020 paper in Science entitled “Ecology and economics for pandemic prevention” points out that prevention is actually cost-effective, as well as necessary. The researchers state that currently, we invest relatively little toward preventing deforestation and regulating wildlife trade, despite well-researched plans that demonstrate a high return on their investment in limiting zoonoses and conferring many other benefits. As public funding in response to COVID-19 continues to rise, the associated costs of these preventive efforts would be substantially less than the economic and mortality costs of responding to these pathogens once they have emerged. The researchers suggest actions to prevent future pandemics, and point out that the gross estimated costs of the actions they propose total \$22 to \$31 billion per year. Reduced deforestation has the ancillary benefit of around \$4 billion per year in social benefits from reduced greenhouse gas emissions, so net prevention costs range from \$18 to \$27 billion per year. In comparison, COVID-19 has shown us the immense potential cost of a pandemic. The world could have lost at least \$5 trillion in GDP in 2020, and the willingness to pay for the lives lost constitutes many additional trillions. These costs exclude the rising tally of morbidity, deaths from other causes due to disrupted medical systems, and the loss to society of foregone activities due to social distancing.<sup>618</sup>

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<sup>615</sup> UNEP/ILRI. Preventing the next pandemic - Zoonotic diseases and how to break the chain of transmission. 6 July 2020. <https://www.unenvironment.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and>

<sup>616</sup> Vinales, Jorge et al. A global pandemic treaty should aim for deep prevention. The Lancet. Volume 397, issue 10287. 15 May 2021. DOI: [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(21\)00948-X/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)00948-X/fulltext)

<sup>617</sup> Vinales, Jorge et al. A global pandemic treaty should aim for deep prevention. The Lancet. Volume 397, issue 10287. 15 May 2021. DOI: [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(21\)00948-X/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)00948-X/fulltext)

<sup>618</sup> Dobson, Andrew P et al. Ecology and economics for pandemic prevention. Science. 24 Jul 2020. Vol 369, Issue 6502. p. 379-381. DOI: [10.1126/science.abc3189](https://doi.org/10.1126/science.abc3189)

To justify the costs of prevention, a year's worth of these preventive strategies would only need to reduce the likelihood of another pandemic like COVID-19 in the next year by about 27% below baseline probability in the most likely scenario, even ignoring the ancillary benefits of carbon sequestration. The researchers explored eight alternative scenarios with varied assumptions drawn from the highest and lowest values of both prevention costs and pandemic damages, and assuming that extreme pandemics occur either once every 100 years or once every 200 years. In all scenarios but one, prevention need only reduce the probability of a pandemic by less than half, and in one case the break-even percent probability reduction is as low as 12%. They estimate the present value of prevention costs for 10 years to be only about 2% of the costs of the COVID-19 pandemic. Conversely, postponing a global strategy to reduce pandemic risk would lead to continued soaring costs.<sup>619</sup>

There is considerable agreement amongst researchers about the drivers of pandemics, but far less about the actions needed to address these. It is, therefore, necessary to drill down further on the drivers in order to effectively analyse what actions are needed; and to consider any political and socio-cultural constraints separately, and how these could be overcome.

The UNEP/ILRI report on Preventing the next Pandemic<sup>620</sup> includes seven human-mediated factors that are most likely driving the emergence of zoonotic diseases:

- 1) increasing human demand for animal protein;
- 2) unsustainable agricultural intensification;
- 3) increased use and exploitation of wildlife;
- 4) unsustainable utilisation of natural resources accelerated by urbanisation, land use change and extractive industries;
- 5) increased travel and transportation;
- 6) changes in food supply; and
- 7) climate change.

Many of these deal with the animal nexus. Indeed, the much-quoted comment in the report also underlines this:

“Pandemics such as the COVID-19 outbreak are a predicted and predictable outcome of how people source and grow food, trade and consume animals, and alter environments.”<sup>621</sup>

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<sup>619</sup> Dobson, Andrew P et al. Ecology and economics for pandemic prevention. Science. 24 Jul 2020. Vol 369, Issue 6502. p. 379-381. DOI: [10.1126/science.abc3189](https://doi.org/10.1126/science.abc3189)

<sup>620</sup> UNEP/ILRI. Preventing the next pandemic - Zoonotic diseases and how to break the chain of transmission. 6 July 2020. <https://www.unenvironment.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and>

<sup>621</sup> UNEP/ILRI. Preventing the next pandemic - Zoonotic diseases and how to break the chain of transmission. 6 July 2020. <https://www.unenvironment.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and>

The UNEP/ILRI report<sup>622</sup> contains ten key policy recommendations, which include some useful and necessary approaches, such as awareness, science, governance (including operationalising One Health), capacity building, monitoring and regulation (including food systems from farm to fork), finance (including cost-benefits of prevention). These also include a section on incentives (including health considerations in incentives for sustainable food systems, including wildlife source foods; augment and incentivise management practices to control unsustainable agricultural practice, wildlife consumption and trade, including illegal activities; develop alternatives for food security and livelihoods that do not rely on the destruction and unsustainable exploitation of habitats and biodiversity etc.). Inter-alia, this includes the removal of subsidies and perverse incentives of industrialised agriculture, and the development of practices that strengthen the health, opportunity and sustainability of diverse smallholder systems. The important role of agriculture and wildlife habitats is mentioned (integrated management of landscapes and seascapes, including through investment in agroecological methods of food production that mitigate waste and pollution while reducing risk of zoonotic disease transmission; reducing further destruction and fragmentation of wildlife habitat and restoration; maintenance of ecological connectivity; reduction of habitat loss etc.).<sup>623</sup>

The need to phase out unsustainable agricultural practices is included in the UNEP-ILRI report. But the need for dietary change is totally missing, despite the fact that this would be the most effective way to address the identified drivers, and to prevent future pandemics. The need for a move to predominantly plant-based diets has multiple environmental, health and animal welfare advantages, as well as pandemic prevention. There is also increasing support for cellular agriculture, which had developed from the potential benefits that culturing animal products could have to animal welfare, environmental protection and sustainability, and the reduced need for antibiotics. Clearly, cellular agriculture replacement of animal-based proteins would effectively prevent future pandemics.<sup>624</sup>

Improving the welfare of farmed animals is an important, but often neglected, contributor to preventing or reducing the incidence of disease - by boosting the immune systems of farmed animals. The Institut National de la Recherche Agronomique (INRA) in France carried out a scoping study on animal welfare which confirmed this fact. INRA is a French public research institute dedicated to agricultural science. It was founded in 1946 and is a Public Scientific and Technical Research Establishment under the joint authority of the Ministries of Research and Agriculture. INRA recommended that farming systems needed to do more than simply decrease animal stress and suffering: they should also allow positive experiences for the animals".<sup>625</sup>

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<sup>622</sup> UNEP/ILRI. Preventing the next pandemic - Zoonotic diseases and how to break the chain of transmission. 6 July 2020. <https://www.unenvironment.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and>

<sup>623</sup> UNEP/ILRI. Preventing the next pandemic - Zoonotic diseases and how to break the chain of transmission. 6 July 2020. <https://www.unenvironment.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and>

<sup>624</sup> UNEP/ILRI. Preventing the next pandemic - Zoonotic diseases and how to break the chain of transmission. 6 July 2020. <https://www.unenvironment.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and>

<sup>625</sup> INRA. Improving the Welfare of Farm Animals. <https://www.inrae.fr/sites/default/files/pdf/improving-the-welfare-of-farm-animals.pdf>

However, it is impossible to give animals positive states of animal welfare in industrial animal agriculture systems – with their intensive conditions. Physical and mental health is compromised, and there is no possibility of “naturalness”. This brings poor immunity, and thus routine use of antibiotics, fuelling antimicrobial resistance – sometimes called the “silent pandemic”. UNEP itself recognises the fact that industrial farming facilitates the spread of viruses, and has been linked to zoonotic diseases.<sup>626</sup> <sup>627</sup>

The IPBES Workshop Report on Biodiversity and Pandemics<sup>628</sup> suggests various policy options to foster transformative change towards preventing pandemics – see Chapter 5. These need to be further analysed, but they clearly make the case for further action than was recommended by the UNEP/ILRI report. The crux is that there is an accepted need to reduce activities that drive pandemic risk. The IPBES Workshop Report calls for an agreement on goals and targets to be met by all partners for implementing the One Health approach, including reducing the activities that drive pandemic risk such as land use change, unsustainable consumption, expansion and intensification of livestock production and the wildlife trade.<sup>629</sup>

The Animals Manifesto (Section 7) called for policies to support a transition to healthy, safe and sustainable plant-rich diets, and for more sustainable, safe and humane agricultural practices. It came out in support of calls by the Wildlife Conservation Society for an end to the commercial trade in wildlife, through a “Just Transition”. It also called for the Post-2020 Global Biodiversity Framework to re-evaluate the concept of “sustainable use” to consider a wider concept of sustainability, including considerations of animal welfare, biodiversity and climate change; and to use the “precautionary principle” in any case of doubt as to potential harms.<sup>630</sup>

End Pandemics is a global alliance of organisations (multi-issue) who have launched a global, coordinated campaign to reduce the risks of pandemics by addressing the root causes of all pandemics.<sup>631</sup> Their work is centred around four action pillars: reduce demand, protect nature, stop trafficking and reform farming, and they have various actions under these pillars.<sup>632</sup>

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<sup>626</sup> UNEP. 10 things you should know about industrial farming. 20 July 2020.

<https://www.unep.org/news-and-stories/story/10-things-you-should-know-about-industrial-farming>

<sup>627</sup> Anomoly, Jonathan. What's Wrong with Factory Farming? Public Health Ethics. January 2015. DOI [10.1093/phe/phu001](https://doi.org/10.1093/phe/phu001)

<sup>628</sup> Daszak, P et al. IPBES (2020) Workshop Report on Biodiversity and Pandemics of the Intergovernmental Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany, DOI:10.5281/zenodo.4147317

<sup>629</sup> Daszak, P et al. IPBES (2020) Workshop Report on Biodiversity and Pandemics of the Intergovernmental Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany, DOI:10.5281/zenodo.4147317

<sup>630</sup> World Federation for Animals. Animals' Manifesto – preventing COVID-X. <https://wfa.org/animals-manifesto/>

<sup>631</sup> End Pandemics. Home Page. <https://www.endpandemics.earth/>

<sup>632</sup> End Pandemics. Newsletter 4. <https://mailchi.mp/2fbc69a90ca6/endpandemics-newsletter-4?e=af943990ed>



A multi-disciplinary 2020 paper entitled: “Emerging Zoonotic Diseases: Should We Rethink the Animal–Human Interface” points out that several anthropogenic factors have intensified the animal-human interface in recent decades, increasing our interactions with animals, and consequently, the risk of disease spill-over. They make specific reference to intensified farming and unsustainable exploitation of natural resources, including an increasing trade in wild animals (with consumptive traditions that include wildlife-meat consumption and traditional medicine also driving this). The paper discusses important interfaces that drive zoonotic disease emergence and spread, including wet markets/live animal markets, wildlife hunting and consumption, intensive wildlife farming and domestic animals (livestock and pets), and then discusses the feasibility of reducing the risks of emerging zoonotic diseases at these interfaces.<sup>633</sup>

A May 2022 article in Nature entitled “Want to prevent pandemics? Stop spill-overs” pressed decision-makers to include four actions to reduce the risk of animals and people exchanging viruses. These were informed by research from the fields of epidemiology, ecology and genetics, and they suggested that an effective global strategy to reduce the risk of spill-over should focus on these four actions:

- First, tropical and subtropical forests must be protected. Including tackling deforestation for agriculture.
- Second, commercial markets and trade of live wild animals that pose a public-health risk must be banned or strictly regulated, both domestically and internationally. *[They pointed out that doing this would be consistent with the call made by the WHO and other organisations in 2021 for countries to temporarily suspend the trade in live caught wild mammals, and to close sections of markets selling such animals.]*<sup>634</sup>
- Third, biosecurity must be improved when dealing with farmed animals. Among other measures, this could be achieved through better veterinary care, enhanced surveillance for animal disease, improvements to feeding and housing animals, and quarantines to limit pathogen spread. *[Poor health among farmed animals increases their risk of becoming infected with pathogens — and of spreading them. And nearly 80% of livestock pathogens can infect multiple host species, including wildlife and humans.]*
- Fourth, particularly in hotspots for the emergence of infectious diseases, people’s health and economic security should be improved.<sup>635</sup>

The same article confirmed that for around US\$20 billion per year, the likelihood of spillover could be greatly reduced. This is the amount needed to halve global deforestation in hotspots for emerging infectious diseases; drastically curtail and regulate trade in wildlife; and greatly improve the ability to detect and control infectious diseases in farmed animals.

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<sup>633</sup> Magouras, Joannis et al. Emerging Zoonotic Diseases: Should We Rethink the Animal–Human Interface? Front. Vet. Sci., 22 October 2020. <https://doi.org/10.3389/fvets.2020.582743>

<sup>634</sup> WHO, OIE and UNEP. Reducing public health risks associated with the sale of live wild animals of mammalian species in traditional food markets Interim guidance. 12 April 2021. [https://cdn.who.int/media/docs/default-source/food-safety/ig--121-1-food-safety-and-covid-19-guidance-for-traditional-food-markets-2021-04-12-en.pdf?sfvrsn=921ec66d\\_1&download=true](https://cdn.who.int/media/docs/default-source/food-safety/ig--121-1-food-safety-and-covid-19-guidance-for-traditional-food-markets-2021-04-12-en.pdf?sfvrsn=921ec66d_1&download=true)

<sup>635</sup> Vora, Neil M et al. Want to prevent pandemics? Stop spillovers. Nature. 12 May 2022. <https://www.nature.com/articles/d41586-022-01312-y>

That is a small investment compared with the millions of lives lost and trillions of dollars spent in response to the COVID-19 pandemic. The cost is also one-twentieth of the statistical value of the lives lost each year to viral diseases that have spilled over from animals since 1918 (US\$212 billion), and less than one-tenth of the economic productivity erased per year. Yet many of the international efforts to better defend the world from future pandemic outbreaks still fail to prioritise the prevention of spill-over. Take, for example, the Independent Panel for Pandemic Preparedness and Response, established by the World Health Organization (WHO). The panel was convened in September 2020, in part to ensure that any future infectious-disease outbreak does not become another pandemic. In its 86-page report released in May 2022, wildlife is mentioned twice; deforestation once.<sup>636</sup>

An analysis of reports and information shows a marked difference between the initial guidance on pandemic prevention, issued when the serious impact of COVID-19 was felt, and subsequent policy positions and guidance. For example, the interim guidance issued by WHO, WOA and UNEP in April 2021<sup>637</sup> called on national authorities to take various actions, including:

1. Suspend the trade in live caught wild animals of mammalian species for food or breeding purposes and close sections of food markets selling live caught wild animals of mammalian species as an emergency measure unless demonstrable effective regulations and adequate risk assessment(s) are in place.
2. Strengthen the regulatory basis for improving standards of hygiene and sanitation in traditional food markets to reduce the risk of transmission of zoonotic diseases.
3. Conduct risk assessments to provide the evidence base for developing regulations to control the risks of transmission of zoonotic microorganisms from farmed wild animals and caught wild animals that are intended to be placed on the market for human consumption.
4. Ensure that food inspectors are adequately trained to ensure that businesses comply with regulations to protect consumers' health and are held accountable; and authorities resourced to ensure that regulations focussed on food animal production, processing and marketing are consistently enforced.
5. Strengthen animal health surveillance systems for zoonotic pathogens to include both domestic and wild animals.
6. Develop and implement food safety information campaigns for market traders, stall holders, consumers and the wide general public.<sup>638</sup>

It is noted that competent authorities did not take significant action in this regard. Although some countries, including China, did temporarily ban wildlife products in markets.<sup>639</sup>

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<sup>636</sup> Vora, Neil M et al. Want to prevent pandemics? Stop spillovers. *Nature*. 12 May 2022.

<https://www.nature.com/articles/d41586-022-01312-y>

<sup>637</sup> WHO, OIE and UNEP. Reducing public health risks associated with the sale of live wild animals of mammalian species in traditional food markets Interim guidance. 12 April 2021.

<sup>638</sup> WHO, OIE and UNEP. Reducing public health risks associated with the sale of live wild animals of mammalian species in traditional food markets Interim guidance. 12 April 2021.

<sup>639</sup> Oxford Martin School. China's Announcement on Wildlife Trade - What's New and What Does It Mean? 12 March 2020. <https://www.oxfordmartin.ox.ac.uk/blog/chinas-announcement-on-wildlife-trade-whats-new-and-what-does-it-mean/>

The weakening policy positions on prevention were also in evidence at UNEA 5.2. when the African Group submitted a draft resolution on Biodiversity and Health. This called upon Member States to suspend their commerce including the closing of sections in food markets which are selling living wild mammals. However, the final text of the resolution was: “Calls on Member States to reduce health risks associated with trade in live wildlife captured for the purposes of food, captive breeding, medicines and the pet trade, through regulation of their commerce and ensuring the sustainable and safe consumption of wild meat, including adequate sanitary controls in food markets which are selling live wild animals.”<sup>640</sup>

Now, as the threat from COVID-19 subsides, most policy pronouncements seem to focus on the “illegal wildlife trade” (or sometimes “illegal and unsustainable”). However, those familiar with the wildlife trade will realise the inadequacy of calls to just regulate and enforce the legal trade. The legal trade permits the illegal trade to function, and pandemics are agnostic to legality.

What is needed is known, even if not politically palatable. So, this needs to be considered in terms of “Just Transitions”, and a prioritised action plan developed. Political overlays must be removed from scientific and research assessments.

### **The WHO Pandemic Preparedness Treaty:**

In March 2021, a group of world leaders announced an initiative for a new treaty on pandemic preparedness and response. This initiative was taken to the World Health Organisation (WHO) and will be negotiated, drafted, and debated by a newly-established Intergovernmental Negotiation Body (INB).

In a March 2021 joint article, the group of leaders said:

“The main goal of this treaty would be to foster an all of government and all of society approach, strengthening national, regional and global capacities and resilience to future pandemics. This includes greatly enhancing international co-operation to improve, for example, alert systems, data-sharing, research and local, regional and global production and distribution of medical and public health counter-measures such as vaccines, medicines, diagnostics and personal protective equipment.”<sup>641</sup>

A key justification for a pandemic treaty is that whilst the technical expertise on how to govern and prevent pandemics exists, the political will to do so is missing. To get there, a member state-led, transparent, inclusive and fair procedure is necessary, with full participation of all Member States and meaningful inclusion of non-state actors. There have been recommendations on involving the World Bank, International Monetary Fund, World Trade Organisation and International Labour Organisation for treaty negotiations. The treaty was expected to be modelled as a Framework Convention complemented by additional instruments (protocols, guidelines or standards) for adoption by governance bodies created

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<sup>640</sup> UNEP. UN Environment Assembly concludes with 14 resolutions to curb pollution, protect and restore nature worldwide. <https://www.unep.org/news-and-stories/press-release/un-environment-assembly-concludes-14-resolutions-curb-pollution#:~:text=Resolution%20on%20Nature%2Dbased%20Solutions,Welfare%20%E2%80%93%20Environment%20%E2%80%93%20Sustainable%20Development%20Nexus>

<sup>641</sup> House of Commons Library. What is the proposed WHO Pandemic Preparedness Treaty? Wednesday, 18 May, 2022. <https://commonslibrary.parliament.uk/research-briefings/cbp-9550/>

through the treaty. This approach would allow parties to reach consensus on high-level legally binding principles and commitments within the initial Convention, followed by agreements adding detailed commitments regarding operationalising these commitments.<sup>642</sup>

A working draft was presented on July 13, 2022.<sup>643</sup> This was "provided as a flexible, 'living' document, which is intended to be informed by discussions and to be descriptive, not prescriptive". It was rather uninspiring, and did not directly address the major problems inherent in industrial agriculture and the wildlife trade. Instead, there were just a couple of oblique references to:

- "measures to strengthen regular monitoring and sharing of pathogens with pandemic potential from wildlife and domesticated livestock"; and
- "cooperation at the international level, to safeguard human health, and to detect and prevent health threats at the interface between animal and human ecosystems".

It is envisaged that specific operational, substantive and otherwise appropriate provisions will be introduced by Member States during further discussions of the INB.

The second meeting of the Intergovernmental Negotiating Body to draft and negotiate a WHO convention, agreement or other international instrument on pandemic prevention, preparedness and response (INB) was held from 18–21 July 2022.<sup>644</sup> The INB agreed that the instrument should be legally binding and contain both legally binding as well as non-legally binding elements, and agreed to a process for intersessional work, with a view to presenting a conceptual zero draft for the consideration at the INB's third meeting, scheduled to be held from 5–7 December 2022.

As can be seen above, it is vital that the pandemics treaty goes beyond this to effectively tackle "deep prevention".<sup>645</sup>

In a recent call on the WHO, medical and public health professionals echoed the message for an international pandemic prevention treaty to be focussed on pandemic prevention; reducing the risk of another pandemic by aligning local, national, and global action in a united approach. In their open letter, medical, public health, and other professionals voiced strong support for an international pandemic prevention agreement rooted in a just One Health approach that addresses the interdependence of human, animal, and planetary health and wellbeing. They stated that a growing body of evidence confirms that ecosystem and habitat loss and degradation, biodiversity loss, encroachment into wildlife habitats, the commercial trade in wild animals, and intensive animal farming increase the risk of

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<sup>642</sup> Voss, Maïke et al. A new pandemic treaty: what the World Health Organization needs to do next. LSE. 30 March 2022. <https://blogs.lse.ac.uk/covid19/2022/03/30/a-new-pandemic-treaty-what-the-world-health-organization-needs-to-do-next/>

<sup>643</sup> WHO. Working draft, presented on the basis of progress achieved, for the consideration of the Intergovernmental Negotiating Body at its second meeting. A/INB/2/3. 13 July 2020.

<sup>644</sup> WHO. Second Meeting on the Intergovernmental Negotiating Body to Draft and Negotiate a WHO Convention, Agreement or Other international Instrument on Pandemic Prevention, Preparedness and Response. A/INB/2/5 Geneva, 18–21 July 2022. [https://apps.who.int/gb/inb/pdf\\_files/inb2/A\\_INB2\\_5-en.pdf](https://apps.who.int/gb/inb/pdf_files/inb2/A_INB2_5-en.pdf)

<sup>645</sup> Vinuales, Jorge et al. A global pandemic treaty should aim for deep prevention. The Lancet. Volume 397, issue 10287. 15 May 2021. DOI: [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(21\)00948-X/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)00948-X/fulltext)

emerging infectious disease outbreaks. Thus, resulting policies must abate human, animal, and environmental exploitation through transformative interdisciplinary strategies, legal remedies, and public engagement.<sup>646</sup>

Rabies is not a pandemic, but a viral zoonotic disease. However, it is a disease which is important to the animal welfare-environment nexus. Rabies is spread through bites or scratches, usually via saliva; and it can affect both domestic and wild animals, as well as people. As wildlife habitats shrink, and there is encroachment of humans and domestic animals, rabies is increasingly spread.<sup>647</sup> The impacts of rabies on wildlife are often overlooked, but they are important. For example, the US Centres for Disease Control and Prevention reported that in the USA: “Wild animals accounted for 92.7% of reported cases of rabies in 2018. Bats were the most frequently reported rabid wildlife species (33% of all animal cases during 2018), followed by raccoons (30.3%), skunks (20.3%), and foxes (7.2%)”.<sup>648</sup> Rabies causes extreme suffering and deaths, and is clearly a One Health issue. Yet there are humane and effective measures to prevent rabies, including vaccination of dogs (including at wildlife boundaries) and oral rabies vaccines for wildlife.

Where stray dogs are involved, humane stray management programmes are needed to prevent proliferation and movement of infected dogs (killing and removing dogs merely encourages movement and transmission).<sup>649</sup> The WOA has updated its animal welfare standard to include a systemic approach to dog population management (DPM). The contribution of DPM to rabies control is clearly an important issue, not least for the WOA who have stated their commitment to eliminate dog-mediated human rabies by 2030. They provide an international standard for rabies elimination (Terrestrial Animal Health Code Chapter 8.14)) and a rabies vaccine bank for those countries with robust plan for rabies elimination. Importantly, that plan for rabies elimination must include a recognised dog population management element.<sup>650</sup>

A Royal Society Publishing paper on “Ecological interventions to prevent and manage zoonotic pathogen spill-over”<sup>651</sup> includes some interesting modelling studies on disease spill-over strategies, which are relevant to the case of zoonoses. This confirms that culling can have adverse impacts such as increased disease transmission (and compensatory reproduction). It recommends an inter-agency, multi-disciplinary approach; and concludes

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<sup>646</sup> Pandemic. 18 May 2022. <https://www.phoenixzonesinitiative.org/medical-and-public-health-professionals-call-on-who-to-advance-pandemic-prevention-treaty/>

<sup>647</sup> WHO. Fact Sheet. Rabies. <https://www.who.int/news-room/fact-sheets/detail/rabies>

<sup>648</sup> CDC. Rabies. Wild Animals. [https://www.cdc.gov/rabies/location/usa/surveillance/wild\\_animals.html](https://www.cdc.gov/rabies/location/usa/surveillance/wild_animals.html)

<sup>649</sup> Clifton, Merritt. Bali: rabies is back. Vaccines can stop it. Killing dogs cannot. Will officials listen? Animals 24-7. 20 May 2022. <https://www.animals24-7.org/2022/05/20/bali-rabies-is-back-vaccines-can-stop-it-killing-dogs-cannot-will-officials-listen/>

<sup>650</sup> ICAM. Global veterinary body gives support for humane DPM. <https://www.icam-coalition.org/global-veterinary-body-gives-support-for-humane-dpm/>

<sup>651</sup> Sokolow, Susanne H. et al. Ecological interventions to prevent and manage zoonotic pathogen spillover. Royal Society Publishing. 12 August 2019. <https://doi.org/10.1098/rstb.2018.0342>

that ecological intervention is a potentially underused approach to find effective, long-lasting and creative solutions to reduce spill-over, with minimal environmental damage.<sup>652</sup>

In the USA, Federal, State, and local governments distribute more than 10 million oral rabies vaccine (ORV) baits every year to reduce wildlife rabies and prevent disease transmission to humans, domestic animals, and pets. Economists at Wildlife Services (WS) - a program within the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) - have conducted cost-benefit analyses of these efforts showing that eliminating wildlife rabies saves lives and can save taxpayers millions of dollars each year.<sup>653</sup>

#### 4.7. Conflict and Disasters

There is also a nexus between animal welfare and the environment in the context of human-human conflicts and disasters.

Wild and domesticated animals have long-suffered abuse, injury or death in armed conflicts. This blog written for the Conflict and Environment Observatory (CEOBS) explores this history of harm and the reasons behind it, arguing that the animal victims of war require greater recognition and protection. This includes an examination of international law and policy with regard to animal protection in conflict. It also includes some examples of the disaster relief work of animal protection organisations.<sup>654</sup> Here are further examples of the sort of disaster relief work carried out:

[FOUR PAWS](#)<sup>655</sup>

[World Animal Protection](#)<sup>656</sup>

Animal Ethics has a brief overview of issues concerning animals in natural disasters.<sup>657</sup>

The International Fund for Animal Welfare (IFAW) recently released a report on "Animals, People and War: The Impact of Conflict" which covers the spectrum of companion pets, livestock, zoo animals and wildlife. IFAW stresses that the impact of conflict regularly spills over into the natural environment with negative effects on individual animals, entire species and communities, with repercussions that have the potential to reverberate for generations.

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<sup>652</sup> Sokolow, Susanne, H. et al. Ecological interventions to prevent and manage zoonotic pathogen spillover. Royal Society Publishing. 12 August 2019. <https://doi.org/10.1098/rstb.2018.034>

<sup>653</sup> US Department of Agriculture. Animal and Plant Health Inspection Service National Wildlife Research Center. Preventing Wildlife Rabies Saves Lives and Money. [https://www.aphis.usda.gov/publications/wildlife\\_damage/2016/fsc-preventing-wildlife-rabies.pdf](https://www.aphis.usda.gov/publications/wildlife_damage/2016/fsc-preventing-wildlife-rabies.pdf)

<sup>654</sup> Janice Cox, Janice and Zee, Jackson. CEOBS. How animals are harmed by armed conflicts and military activities. When faced with the human suffering of conflicts it can be difficult to think about their parallel impact on animals. 18 March 2021. <https://ceobs.org/how-animals-are-harmed-by-armed-conflicts-and-military-activities/>

<sup>655</sup> FOUR PAWS. <https://www.four-paws.org.uk/campaigns-topics/topics/disaster-relief-for-animals>

<sup>656</sup> World Animal Protection. <https://www.worldanimalprotection.org/our-work/animals-disasters#:~:text=When%20disasters%20hit%2C%20animals%20experience,assistance%20to%20animals%20in%20need>

<sup>657</sup> Animal Ethics. Animals in Natural Disasters. <https://www.animal-ethics.org/animals-natural-disasters/>



The report offers a series of recommendations to address the impacts of geopolitical conflicts on animals to better serve them in unexpected times of crisis, and ultimately improve the well-being of human communities as well.<sup>658</sup>

The Emergency Management Institute of the US Department of Homeland Security has a number of resources on Animals in Disasters. These examine the reasons why animal care during disasters is a concern for the animal owners, animal industries, emergency management, and the general public. It describes the animal-care community, examines the societal impacts of animal ownership, and introduces the concept of the human-animal bond as a major factor affecting animal owners and care providers in a disaster.<sup>659</sup>

Animals in Disasters is a comprehensive book on animal rescue, which shares experiences, best practices and lessons learned from domestic and international disasters. It provides a process for communities and states to more effectively address animal issues and enhance their animal response capabilities. Sections include an overview of the history of animal rescue, where we are today, and the steps needed to better prepare for tomorrow. This book is a resource for emergency managers and policy makers, and includes the development of response capability/capacity.<sup>660</sup>

## 5. One Health

One Health is a collaborative, multisectoral, and transdisciplinary approach — working at the local, regional, national, and global levels — with the goal of achieving optimal health outcomes recognising the interconnection between people, animals, plants, and their shared environment.<sup>661</sup>

The US Centres for Disease Control and Prevention has a timeline for the history of the development of One Health. Although the term “One Health” is fairly new, the concept has long been recognised both nationally and globally. Dr. Calvin Schwabe originally named this “One Medicine”, which emphasised the similarities between human and veterinary medicine, but he recognised the broader need for collaboration to effectively cure, prevent, and control illnesses that affect both humans and animals. One Health emerged from One Medicine, and has been gaining increased acceptance and recognition recently, particularly since the COVID-19 pandemic.<sup>662</sup>

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<sup>658</sup> IFAW. Animals, People and War: The Impact of Conflict. 2022.

<https://www.prnewswire.com/news-releases/new-report--animals-people-and-war-the-impact-of-conflict-301541669.html>

<sup>659</sup> The Emergency Management Institute of the US Department of Homeland Security. Resources on Animals in Disasters. [https://training.fema.gov/emiweb/downloads/is10\\_a-2.pdf](https://training.fema.gov/emiweb/downloads/is10_a-2.pdf) & [https://training.fema.gov/emiweb/downloads/is10\\_a-8.pdf](https://training.fema.gov/emiweb/downloads/is10_a-8.pdf)

<sup>660</sup> Green, Dick. Book 2019. Animals in Disasters.

<https://www.sciencedirect.com/book/9780128139240/animals-in-disasters>

<sup>661</sup> Centre for Disease Control and Prevention. One Health Basics.

<https://www.cdc.gov/onehealth/basics/index.html>

<sup>662</sup> The US Centres for Disease Control and Prevention. One Health. History.

<https://www.cdc.gov/onehealth/basics/history/index.html>

The Tripartite partnership for One Health, which brought together the Food and Agriculture Organization of the United Nations (FAO), the World Health Organization (WHO) and the World Organization for Animal Health (WOAH), formally accepted UNEP as a member in March 2022. It signed a Memorandum of Understanding with UNEP, and became the Quadripartite.<sup>663</sup> At this stage, UNEP had already been working with the alliance partners since November 2020.<sup>664</sup>

In 2019, before UNEP joined the “Tripartite”, they updated and expanded the 2008 Guide on addressing zoonotic diseases to cover prevention, preparedness, detection and response to zoonotic threats at the animal-human-environment interface in all countries and regions, and to include examples of best practices and options based on the experiences of countries. This guide is called: “Taking a Multisectoral, One Health Approach: A Tripartite Guide to Addressing Zoonotic Diseases in Countries “. Although focused on zoonotic diseases, the publication is flexible enough to cover other health threats at the human-animal-environment interface (e.g., antimicrobial resistance and food safety).<sup>665</sup> The UNEP/ILRI report on “Preventing the next pandemic” also included strong One Health messaging.<sup>666</sup>

The One Health partners have now embraced the broader definition of One Health prepared by the One Health High Level Expert Panel (OHHLEP). OHHLEP is the One Health Advisory Panel, and its members represent a broad range of disciplines in science and policy-related sectors relevant to One Health from around the world. This definition is:

**One Health** is an integrated, unifying approach that aims to sustainably balance and *optimise the health of people, animals and ecosystems*. It recognises the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and inter-dependent. The approach mobilises multiple sectors, disciplines and communities at varying levels of society to work together to *foster well-being* and tackle threats to health and ecosystems, while addressing the collective need for clean water, energy and air, safe and nutritious food, taking action on climate change, and contributing to sustainable development.<sup>667</sup>

The Terms of Reference for the OHHLEP are [here](#).

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<sup>663</sup> UNEP. UN Environment Programme joins alliance to implement One Health approach. Strengthened partnership aims to accelerate coordinated strategy on human, animal and ecosystem health. 18 March 2022. <https://www.who.int/news/item/18-03-2022-un-environment-programme-joins-alliance-to-implement-one-health-approach>

<sup>664</sup> UNEP. UNEP joins three international organizations in expert panel to improve One Health. 12 November 2020. <https://www.unep.org/news-and-stories/story/unep-joins-three-international-organizations-expert-panel-improve-one-health>

<sup>665</sup> OIE, FAO, WHO. Taking a Multisectoral, One Health Approach: A Tripartite Guide to Addressing Zoonotic Diseases in Countries. 2019. <https://www.oie.int/app/uploads/2021/03/en-tripartitezoonosesguide-webversion.pdf>

<sup>666</sup> UNEP/ILRI. Preventing the next pandemic - Zoonotic diseases and how to break the chain of transmission. 6 July 2020. <https://www.unenvironment.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and>

<sup>667</sup> WHO. Tripartite and UNEP support OHHLEP's definition of "One Health" Joint Tripartite (FAO, OIE, WHO) and UNEP Statement. 1 December 2021. <https://www.who.int/news/item/01-12-2021-tripartite-and-unep-support-ohhlep-s-definition-of-one-health>

It is noted that they do not include animal welfare scientists or ethologists in the disciplines.<sup>668</sup>

A comprehensive Global Plan of Action for One Health is in development, supported and advised by OHHLEP. This Plan aims to mainstream and operationalise One Health at global, regional, and national levels; support countries in establishing and achieving national targets and priorities for interventions; mobilise investment; promote a whole of society approach and enable collaboration, learning and exchange across regions, countries, and sectors.<sup>669</sup>

The Plan of Action builds on the WHA74.7 resolution<sup>670</sup> calling “to build on and strengthen the existing cooperation among WHO, FAO, WOA and UNEP to develop options, for consideration by their respective governing bodies, including establishing a common strategy on One Health, including a joint workplan on One Health to improve prevention, monitoring, detection, control and containment of zoonotic disease outbreaks”. However, it is noted that this resolution was agreed prior to the agreement of the new, wider OHHLEP definition.

The March 2022 draft of the One Health Joint Plan of Action (2022-2026)<sup>671</sup> is a useful start to the operationalisation of One Health. The basic premise of the Plan of Action is sound, for example:

“The complexity and interconnectedness of the health challenges threatening humans, animals, plants and the environment, where they co-exist, require holistic, integrated solutions with a systems approach that incorporates wider structural factors and systemic prevention measures integrating the health of humans, animals, plants, and the environment.”

“One Health is predicated on a systemic understanding of the interdependencies between the health of humans, animals, plants and the environment and how these can manifest as health threats. It enables better understanding of the root causes and drivers of disease emergence, spread and persistence as well as the impacts of biodiversity loss and environmental degradation.”

However, two observations are:

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<sup>668</sup> FAO, OIE, UNEP and WHO (2021) Terms of Reference for the One Health High Level Expert Panel (OHHLEP). Available at: [https://cdn.who.int/media/docs/default-source/food-safety/call-for-experts/call-for-experts-onehealth-tor.pdf?sfvrsn=6e157c0f\\_38](https://cdn.who.int/media/docs/default-source/food-safety/call-for-experts/call-for-experts-onehealth-tor.pdf?sfvrsn=6e157c0f_38) (accessed 9 May 2022).

<sup>669</sup> WHO. Tripartite and UNEP support OHHLEP's definition of "One Health" Joint Tripartite (FAO, OIE, WHO) and UNEP Statement. 1 December 2021. <https://www.who.int/news/item/01-12-2021-tripartite-and-unep-support-ohhlep-s-definition-of-one-health>

<sup>670</sup> SEVENTY-FOURTH WORLD HEALTH ASSEMBLY WHA74.7 Agenda item 17.3 31 May 2021 Strengthening WHO preparedness for and response to health emergencies. [https://apps.who.int/gb/ebwha/pdf\\_files/WHA74/A74\\_R7-en.pdf](https://apps.who.int/gb/ebwha/pdf_files/WHA74/A74_R7-en.pdf)

<sup>671</sup> One Health Joint Plan of Action (2022-2026). Working together for the health of humans, animals, plants and the environment. Draft March 2022. <https://www.oie.int/en/document/one-health-joint-plan-of-action-2022-2026-working-together-for-the-health-of-humans-animals-8-plants-and-the-environment/>

- Firstly, that the focus seems to be primarily health in the narrower meaning, rather than the accepted OHHLEP definition of integrated, unifying approach that aims to sustainably balance and optimise the health of people, animals and ecosystems.
- Secondly, the Plan of Action reads as though it is attempting to integrate environmental aspects, whereas a more systemic approach is needed; one which addresses the converse as well i.e., the integration of animal and human wellbeing into the environmental dimension wherever the interface has potential impacts.

To work in this sort of systemic manner needs more strategic analysis and planning. The Theory of Change, for example, is functional and non-inspirational, and it is doubtful that this will lead to the transformative change needed to tackle the multiple impending crises we are facing. Likewise, the vision: “A world better able to prevent, predict, detect, and respond to health threats and improve the health of humans, animals, plants, and the environment while contributing to sustainable development.” More is needed to “optimise the health of people, animals and ecosystems”. More is needed to inspire and promote transformation. There is a danger that this Plan of Action would become a plan of bureaucracy and meetings without this, particularly as it attempts to coordinate not just amongst the Quadripartite, but also with the many global action plans referenced, and other conventions, plus multiple stakeholders.

The draft Plan of Action further develops ideas for One Health operationalisation, but it remains rather bureaucratic and “step-by-step”, whereas real transformation is what is needed: transformation which effectively changes both the direct and indirect drivers which lead to poor health and well-being of people, animals and the environment. The focus in the Plan of Action is disease prevention. However, the zoonotic problem is just one indicator of the wider problem of the human exploitation of nature and animals, which needs to be addressed in a wider and more systemic way. Yet because UNEP is the recent addition to the quadripartite, the Plan of Action approach is more one of incorporating the environment into One Health work going forward.

There are six **Action Tracks in the Plan of Action**:

Action Track 1: Enhancing One Health capacities to strengthen health systems

Action Track 2: Reducing the risks from emerging and re-emerging zoonotic epidemics and pandemics

Action Track 3: Controlling and eliminating endemic zoonotic, neglected tropical and vector-borne diseases

Action Track 4: Strengthening the assessment, management and communication of food safety risks

Action Track 5: Curbing the silent pandemic of Antimicrobial Resistance (AMR)

Action Track 6: Integrating the Environment into One Health

It is difficult to imagine that these could effectively cover the transformative changes needed to move humankind back onto the track of humane and sustainable development.

The WOAHA has signed a MoU with UNEP with the purpose to provide a framework of cooperation and understanding, and to facilitate collaboration between the Parties to further their shared goals and objectives in regard to matters relevant to the “One Health approach” and in fields of mutual interest. Such fields include but are not limited to climate

action, nature action, and conservation and sustainable use of biodiversity, improvement of animal health and welfare and the promotion of the “One Health” approach to manage the risks at the animal-human-ecosystem interface.

The April 2021 paper on “Operationalising One Health-One Welfare” explores the development of One Health, analyses the need to widen this to One Welfare, and to tackle wider systemic issues in order to achieve transformative and sustainable change. It then moves on to what more is needed to operationalise One Health. Many suggestions are given, but probably the most important is the need to tackle root causes and drivers of major issues at the human-animal-environment interface (beginning with the multiple existential crises). This Scoping Study should help with this process. A starting point should be to tackle the seven drivers of pandemics identified in the UNEP/ILRI report on Preventing the Next Pandemic<sup>672</sup>, plus other pandemic drivers identified in other major reports, and most importantly, dietary change.<sup>673</sup>

There is general agreement that a One Health approach is vital to the prevention of future pandemics.<sup>674</sup> But it is also vital for the prevention of existential environmental crises – climate change, biodiversity loss and pollution; as this Scoping Study shows there is a clear animal welfare nexus for each of these issues (as well as a human health and wellbeing nexus). This is also reflected in the IUCN’s Resolution 135 on “Promoting human, animal and environmental health, and preventing pandemics through the One Health approach and by addressing the drivers of biodiversity loss” which includes these words:

"BELIEVING that the **One Health** approach, involving human health, **animal well-being** (both domestic and wildlife), and plant and ecosystem health, will at the same time guarantee better human and animal health, contribute to **preventing pandemics**, and tackle the **biodiversity** crisis in the context of **climate change**." <sup>675</sup>

It is important that the new global pandemics treaty is firmly anchored in a One Health approach. Proponents of the treaty push to address potential pandemic sources using the concept of One Health and Planetary Health,<sup>676</sup> and “deep prevention” to include antimicrobial resistance (AMR), zoonoses, climate adaptation and mitigation and accidental pathogen release into the content discussion of a pandemic treaty.

Also of relevance is the proposed CITES Resolution entitled "One Health and CITES: Human and animal health risks from wildlife trade", due to be considered at CoP19 in November. This includes a call for a “One Health CITES Action Plan to reduce the risk of zoonotic disease

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<sup>672</sup> UNEP. Preventing the next pandemic - Zoonotic diseases and how to break the chain of transmission. <https://www.unep.org/resources/report/preventing-future-zoonotic-disease-outbreaks-protecting-environment-animals-and>

<sup>673</sup> Cox, Janice H. Operationalising One Health-One Welfare. 23 April 2021. [https://www.wellbeingintlstudiesrepository.org/hw\\_onehealth/5/](https://www.wellbeingintlstudiesrepository.org/hw_onehealth/5/)

<sup>674</sup> World Federation for Animals. One Health essential to prevent pandemics. <https://wfa.org/one-health-essential-to-prevent-pandemics/>

<sup>675</sup> IUCN Resolution 135: Promoting human, animal and environmental health, and preventing pandemics through the One Health approach and by addressing the drivers of biodiversity loss. 4 October 2021. <https://www.iucncongress2020.org/motion/135>

<sup>676</sup> Voss, Maike et al. A new pandemic treaty: what the World Health Organization needs to do next. LSE. 30 March 2022. <https://blogs.lse.ac.uk/covid19/2022/03/30/a-new-pandemic-treaty-what-the-world-health-organization-needs-to-do-next/>

transmission during taking, breeding/ranching/farming, transport, sale (including at markets), inspection, shipment and transshipment of CITES listed species and specimens”<sup>677</sup>

There are many other papers and reports covering the interlinkages between human, animal and environmental health and wellbeing, and the essential role of One Health. Most of these also major on disease/pandemics. A selection is included below.

➤ The Global Environment Outlook 6 Summary for Policymakers (August 2019)<sup>678</sup>: “Environmental and human health are intricately intertwined, and many emerging infectious diseases are driven by activities that affect biodiversity. Changes to the landscape (through natural resource extraction and use, for example) can facilitate disease emergence in wildlife, domestic animals, plants and people. Zoonoses are estimated to account for more than 60 per cent of human infectious diseases.”

➤ UNEP: How drug-resistant pathogens in water could spark another pandemic  
This article from UNEP explains how water laced with antibiotics could spark the rise of drug-resistant pathogens and potentially fuel another global pandemic.<sup>679</sup> UNEP’s 2022 report on the “Environmental Dimensions of Antimicrobial Resistance”<sup>680</sup> explains the deadly problem of antimicrobial resistance, and the reasons why it is essential that this is dealt with as a One Health issue. Antibiotics used in food production systems, and human and animal health treatments, spill over into the environment causing resistance to antibiotics (with potentially deadly consequences). The nexus with animal welfare is clear – with intensive animal production systems routinely using antibiotics, plus the need for antibiotics to keep working for animal treatments.

➤ WOA: Global cooperation in countering emerging animal and zoonotic diseases  
This brief PowerPoint presentation from the WOA – entitled “Global cooperation in countering emerging animal and zoonotic diseases” is also of interest. As well as the fact that 60% of human pathogens are zoonotic and 75% of emerging diseases are zoonotic, the presentation adds that “80% of agents with potential bioterrorist use are zoonotic pathogens”<sup>681</sup>

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<sup>677</sup> CITES. Role of CITES in reducing risk of future zoonotic disease emergence associated with international wildlife trade. One Health and CITES: Reducing Human and Animal Health Risks from Wildlife Trade. CoP19 Doc. 23.2. <https://cites.org/sites/default/files/documents/COP/19/agenda/E-CoP19-23-02.pdf>

<sup>678</sup> UNEP. Global Environment Outlook 6 Summary for Policymakers. 6 August 2019. [https://www.unep.org/resources/assessment/global-environment-outlook-6-summary-policymakers?\\_ga=2.58831021.1679832863.1648133604-1602352062.1634737523](https://www.unep.org/resources/assessment/global-environment-outlook-6-summary-policymakers?_ga=2.58831021.1679832863.1648133604-1602352062.1634737523)

<sup>679</sup> UNEP. How drug-resistant pathogens in water could spark another pandemic. 6 April 2022. <https://www.unep.org/news-and-stories/story/how-drug-resistant-pathogens-water-could-spark-another-pandemic>

<sup>680</sup> UNEP. Environmental Dimensions of Antimicrobial Resistance. Summary for Policymakers. 2022. [https://wedocs.unep.org/bitstream/handle/20.500.11822/38373/antimicrobial\\_R.pdf](https://wedocs.unep.org/bitstream/handle/20.500.11822/38373/antimicrobial_R.pdf)

<sup>681</sup> Keith Hamilton, Keith. OIE. Global cooperation in countering emerging animal and zoonotic diseases. <https://www.oie.int/app/uploads/2021/03/globalcooperation-oie1.pdf>



➤ The IPBES Workshop Report on Biodiversity and Pandemics<sup>682</sup>

This Workshop Report includes strong support for One Health approaches to biodiversity and pandemics. This includes advice on institutionalising One Health in national governments (with only a small number of countries having done this successfully so far). It also states that it is vital to support a new post-2020 global biodiversity framework that promotes a transition to One Health.

➤ Report of the Executive Director of the United Nations Environment Programme to the United Nations Environment Assembly Fifth session Nairobi. February 2021/March 2021.<sup>683</sup>

This report includes significant One Health messages, which go beyond pandemic prevention. For example: “The health of humans, animals and the planet are intertwined. Our approach should be the same: weaving the expertise of each sector into a united effort. The emergence of zoonotic diseases is driven by unsustainable human activities, including an increasingly intensive and industrialised food system, constant encroachment on natural habitat and the illegal and overconsumption of wildlife. The impact of these activities is exacerbated by climate change, which is also contributing to the spread of pathogens. At the same time, significantly fewer resources and less capacity have been invested in considering human, animal and environmental health in a synergistic manner.”

“The interdependence of human, animal, plant and ecosystem health was recognised by the Environment Assembly in its resolution 3/4 on environment and health, particularly in part III on biodiversity and part IV on antimicrobial resistance. The “One Health” approach is also included in the proposed medium-term strategy for the period 2022–2025 and the programme of work for the biennium 2022–2023, under the sections related to nature and chemical and pollution actions. Enhanced, proactive and sound conservation practices and the sustainable use of ecosystems and their biodiversity can contribute to the prevention of accelerated pathogen pathways while also addressing other health issues linked to pollution, unhealthy diets and food insecurity.”

“Additional investment in science to better understand health risks in a holistic manner, including establishing scientific baselines and modelling and testing potential prevention measures, is also important. The urgent adoption of a “One Health” approach to collaboration across human, animal and environmental health expertise and policy is essential to address the root causes of zoonotic diseases and other health hazards.”

“Before the current pandemic, the World Bank and UNEP estimated that an annual investment of \$1.9 billion to \$3.4 billion in strengthened “One Health” systems would yield an annual global public benefit of over \$30 billion annually. The projected cumulative losses from the COVID-19 pandemic during 2020 and 2021 have been estimated at nearly \$8.5

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<sup>682</sup> Daszak, P et al. IPBES (2020) Workshop Report on Biodiversity and Pandemics of the Intergovernmental Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany, DOI:10.5281/zenodo.4147317

<sup>683</sup>

Report of the Executive Director of the United Nations Environment Programme to the United Nations Environment Assembly Fifth session Nairobi. February 2021/March 2021. UNEP/EA.5/2.

Contributions to the meetings of the high-level political forum on sustainable development and implementation of the environmental dimension of the 2030 Agenda for Sustainable Development. Nature at the heart of sustainable development.

<https://wedocs.unep.org/bitstream/handle/20.500.11822/37830/K2103367.pdf?sequence=1&isAllowed=y>

trillion, with projected cumulative losses at \$22 trillion. There is clearly a strong and compelling economic incentive to invest in “One Health”.”

➤ **FAO: One Health**<sup>684</sup>

One Health is a policy framework that seeks to promote human, nonhuman, and environmental health simultaneously. For example, the Food and Agricultural Organization of the United Nations describes One Health as an “integrated approach” that recognises that “the health of animals, people, plants and the environment is interconnected,” and it claims to promote One Health “in work on food security, sustainable agriculture, food safety, antimicrobial resistance (AMR), nutrition, animal and plant health, fisheries, and livelihoods.”

➤ **One Health, COVID-19, and a Right to Health for Human and Nonhuman Animals**<sup>685</sup>

This paper examines many of the One Health nexus issues, and explores some of the limitations of One Health in dealing with these. It states that: “Part of what makes One Health powerful, then, is that it draws attention to how practices such as factory farming, deforestation, and the wildlife trade are harming humans and nonhumans simultaneously, and, as a result, it draws attention to the need for solutions that can reduce and repair harms for humans and nonhumans simultaneously. That said, standard interpretations of One Health are limited in at least three related ways. They do not do enough for humans, they do not do enough for nonhumans, and they focus narrowly on health.”

➤ **WOAH Wildlife Health Framework “Protecting Wildlife Health to Achieve One Health”**<sup>686</sup>

This paper describes how the WOAH can reinforce One Health strategies through a Wildlife Health Framework. This responds to a global need to better manage risks from emerging diseases at the human-animal-ecosystems interface, whilst protecting wildlife. The foundations for building a WOAH Wildlife Health Framework exist. Wildlife health and its relationship with One Health has been overseen by the WOAH Wildlife Working Group, which was launched 25 years ago. At regional level, the WOAH is supported by a network of WOAH Collaborating Centres specialising in wildlife and One Health issues; at national level, the WOAH is supported by a global network of WOAH National Focal Points for wildlife. Unregulated wildlife trade and exploitation has been identified as a risk factor for disease emergence and spread.

However, the WOAH has not yet adopted any animal welfare standards covering wildlife.<sup>687</sup>

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<sup>684</sup> Food and Agriculture Organization of the United Nations, One Health. Available at <http://www.fao.org/onehealth/en/>

<sup>685</sup> Sellars, Laurie; Bernotas, Kimberly; Sebo, Jeff. Health and Human Rights Journal. *One Health, COVID-19, and a Right to Health for Human and Nonhuman Animals*. December 2021. <https://cdn1.sph.harvard.edu/wp-content/uploads/sites/2469/2021/12/sebo.pdf>

<sup>686</sup> WOAH. OIE Wildlife Health Framework “Protecting Wildlife Health to Achieve One Health” [https://www.oie.int/fileadmin/Home/eng/International\\_Standard\\_Setting/docs/pdf/WGWildlife/A\\_Wildlife\\_health\\_conceptnote.pdf](https://www.oie.int/fileadmin/Home/eng/International_Standard_Setting/docs/pdf/WGWildlife/A_Wildlife_health_conceptnote.pdf)

<sup>687</sup> WOAH. Development of Animal Welfare Standards. <https://www.oie.int/en/what-we-do/animal-health-and-welfare/animal-welfare/development-of-animal-welfare-standards/>

- UNEP, CBD, WHO. Connecting Global Priorities: Biodiversity and Human Health - A State of Knowledge Review.<sup>688</sup>

This Knowledge Review includes multiple references to One Health. It states that:

“The value of One Health approaches is increasingly being appreciated for infectious disease prevention and control, seeing application for zoonotic diseases such as avian influenza and rabies, and based on the overlapping drivers of disease emergence and spread and biodiversity loss, as well as domestic animal–wildlife and human transmission cycles. In addition, One Health and Ecosystem approaches have wider potential applications and benefits.”

“A key element is adopting integrative approaches such as the “One Health” approach or other approaches that consider connections between human, animal, and plant diseases and promotes cross-disciplinary synergies for health and biodiversity. In this context, the importance of preventive and precautionary strategies for the management of sustainable ecosystems to optimise health outcomes cannot be overstated.”

- Dutch study on the effects of livestock production on human health and the environment.<sup>689</sup>

This study concluded that livestock production could negatively impact human health with a human disease burden (expressed in disability-adjusted life years) of up to 4% for three different health effects: these related to particulate matter, zoonoses, and occupational accidents.

- World Federation for Animals: The Animals’ Manifesto – preventing COVID-X.<sup>690</sup>

This report examined what was needed to prevent another pandemic by examining potential causes of pandemics involving the use and treatment of animals – and the impact of the pandemic on animals. It contains various references to One Health, including recommendations for the integration of One Health and One Welfare approaches.

- FOUR PAWS: The rise of the recent COVID-19 pandemic, reminds us how interconnected animal welfare, human wellbeing and the environment are.<sup>691</sup>

This FOUR PAWS report makes the case for One Welfare, to complement the One Health approach. This is needed to address the “unprecedented challenges directly linked to animal welfare: food safety, climate change, zoonoses and biodiversity loss.”

- COVID-19 Effects on Livestock Production: A One Welfare Issue.<sup>692</sup>

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<sup>688</sup> UNEP, CBD, WHO. Connecting Global Priorities: Biodiversity and Human Health - A State of Knowledge Review. <https://www.cbd.int/health/SOK-biodiversity-en.pdf>

<sup>689</sup> Post, Pim M. et al. Effects of Dutch livestock production on human health and the environment. Science Direct. 1 October 2020.

<https://www.sciencedirect.com/science/article/pii/S0048969720332228>

<sup>690</sup> World Federation for Animals et al. The Animals’ Manifesto – preventing COVID-X.

[https://pub.lucidpress.com/1c6e4a02-2bae-4656-a238-333d956dc2a0/#VpP~8\\_R-MDuR](https://pub.lucidpress.com/1c6e4a02-2bae-4656-a238-333d956dc2a0/#VpP~8_R-MDuR)

<sup>691</sup> FOUR PAWS. One Welfare. The rise of the recent COVID-19 pandemic, reminds us how interconnected animal welfare, human wellbeing and the environment are. 20 May 2021.

<https://www.four-paws.org/get-involved/pandemics-and-animal-welfare/one-welfare>

<sup>692</sup> Marchant-Forde, Jeremy N and Boyle, Laura A. COVID-19 Effects on Livestock Production: A One Welfare Issue. Front. Vet. Sci., 30 September 2020. <https://doi.org/10.3389/fvets.2020.585787>

This paper examines livestock production and why this is a One Health issue. It focusses on the impact that COVID-19 had on One Welfare within livestock production from farm to fork with particular focus on the pig and poultry industries. Environmental impacts and waste creation are included, as well as animal and human welfare impacts.

It has been estimated that one dollar invested in One Health approaches can generate five dollars' worth of benefits at the country level through increased GDP and the individual level.<sup>693</sup> For example, the cost of treating and controlling bird flu (avian influenza) in people vastly outweighs the cost of vaccinating poultry against the disease. Savings can be used to build resilience to absorb health shocks. Strengthening human, environment and animal health capacity by the One-Health approach could result in 10%–30% cost saving in surveillance and communication costs.<sup>694 695</sup>

A 2019 paper by Donald Broom and colleagues examined: “Human Relationships with Domestic and Other Animals: One Health, One Welfare, One Biology”<sup>696</sup>. This is a simple summary of the paper:

In a situation where human actions are damaging much of the life of the world, it is important to remember that the basic concepts of biology, welfare, and health are the same for humans and all other animals. Human actions have wide consequences and we need to change the way we interact with other living beings. An understanding of the concepts of one health, one welfare, one biology, and their application to daily decisions about production systems, public policies, markets, and consumers could mitigate current negative impacts. In particular, an understanding of human relationships with animals used for food, work, or company helps in dealing with challenges concerning their use and system sustainability, including the animal's welfare. Animal welfare should always be considered in our relationships with animals, not only for direct impacts, e.g., manipulations, but also for indirect effects, e.g., on the environment, disease spread, natural resource availability, culture, and society.

Philip Lymbery underlines the need for joined-up action in his 2022 RSPCA essay entitled “Battle for the planet: Why animal welfare holds the key”<sup>697</sup>:

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<sup>693</sup> ILRI. 2021. Joined up investments reduce health risks and burdens to people, livestock, and ecosystems. Livestock pathways to 2030: One Health Brief 1. Nairobi: International Livestock Research Institute.

[https://cgspace.cgiar.org/bitstream/handle/10568/113055/OH1\\_brief.pdf?sequence=1&isAllowed=y](https://cgspace.cgiar.org/bitstream/handle/10568/113055/OH1_brief.pdf?sequence=1&isAllowed=y)

<sup>694</sup> ILRI. 2021. Joined up investments reduce health risks and burdens to people, livestock and ecosystems. Livestock pathways to 2030: One Health Brief 1. Nairobi: International Livestock Research Institute

[https://cgspace.cgiar.org/bitstream/handle/10568/113055/OH1\\_brief.pdf?sequence=1&isAllowed=y](https://cgspace.cgiar.org/bitstream/handle/10568/113055/OH1_brief.pdf?sequence=1&isAllowed=y)

<sup>695</sup> World Animal Protection. The Hidden Health Impacts of Industrial Livestock Systems.

[https://www.worldanimalprotection.ca/sites/default/files/media/Health\\_Impacts\\_of\\_Industrial\\_Livestock\\_Systems-FINAL-Web.pdf](https://www.worldanimalprotection.ca/sites/default/files/media/Health_Impacts_of_Industrial_Livestock_Systems-FINAL-Web.pdf)

<sup>696</sup> Tarazona, Ariel M.; Ceballos, Maria C.; and Broom, Donald M. Human Relationships with Domestic and Other Animals: One Health, One Welfare, One Biology. 24 December 2019.

<https://doi.org/10.3390/ani10010043> &

[https://www.academia.edu/41851676/Human\\_Relationships\\_with\\_Domestic\\_and\\_Other\\_Animals\\_One\\_Health\\_One\\_Welfare\\_One\\_Biology?email\\_work\\_card=view-paper](https://www.academia.edu/41851676/Human_Relationships_with_Domestic_and_Other_Animals_One_Health_One_Welfare_One_Biology?email_work_card=view-paper)

<sup>697</sup> Lymbery, Philip. Battle for the planet: Why animal welfare holds the key. RSPCA. 2022 Essay Collection. <https://www.rspca.org.uk/whatwedo/latest/essays/battlefortheplanet>

“In this growing age of planetary crisis, there is a pressing need for bigger, bolder, more urgent solutions, ones that join the dots between our predicaments, making for game-changing solutions that bring multiple benefits.

Thinking about how best to improve the welfare of animals farmed and wild, it is possible to see great potential in a fusion of welfare and environmentalism. Ending animal cruelty is both a huge ethical issue and a global imperative for a sustainable future. Embracing both together opens up a richness of beautiful, visionary solutions: landscapes bursting with life, providing healthy, nutritious food in ways that allow animals to experience the joy of life.”

## **6. Just Transitions for Change**

The above makes a solid case for the need for transformational change to address the nexus between the inhumane and unsustainable exploitation of animals and the multiple environmental crises, and zoonoses. There is general agreement in the identified reports that the changes needed must be far-reaching, and that they must be tackled using “Just Transitions”, protecting the public good and human rights, and prioritising the wellbeing of people, nature and animals over unsustainable infinite economic growth.

During the research for this Scoping Study, many suggestions for “Just Transitions” were encountered – in reports, papers and advocacy messaging. These have been compiled and are given below in [Annex 1](#). It is recognised that these may be outside the scope of the animal welfare-environment-sustainable development nexus report which UNEP has been tasked to organise. However, the suggestions are too valuable to overlook: So, they have been captured to assist in subsequent analysis and decision-making on what to do about the nexus report.

As stated in the May 2022 Stockholm+50 background report on “Mainstreaming animal welfare in sustainable development”<sup>698</sup>:

“It is widely recognised that transitioning towards a better world for humans and the environment will require fundamental change. A shift towards a more compassionate world for animals will similarly entail significant - and interrelated - changes to our economies and everyday practices. Through “Just Transition” planning and support, governments can maximise the benefits of these transitions and transformations and minimise the disruptions.”

## **7. Nexus with Sustainable Development**

### **7.1. General**

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<sup>698</sup> Verkuijl, Cleo et al. Mainstreaming animal welfare in sustainable development A policy agenda. SEI & CEEW. May 2022. <https://euagenda.eu/upload/publications/animal-welfare-stockholm50backgroundpaper.pdf>

The UNEA 5 resolution is on the “nexus between animal welfare, the environment and sustainable development”.<sup>699</sup> This infers sustainable development more broadly than just the Sustainable Development Goals (SDGs). There are a number of papers and research about the links between animal welfare and sustainable development, but most of these focus on the SDGs – and yet SDGs and their targets were drafted from an anthropocentric perspective. Furthermore, it is noted that consideration usually focusses on the impacts of incremental improvements in animal welfare, whereas it is transformative changes in human-animal interactions and their welfare which have the potential to yield major returns in sustainable development, including tackling major environmental crises and the prevention of pandemics.

UN General Assembly Resolution 70/1 which adopted the 2030 Sustainable Development Agenda explicitly envisaged a world “in which humanity lives in harmony with nature and in which wildlife and other living species are protected”.<sup>700</sup> However, the Sustainable Development Goals (SDGs)<sup>701</sup> and their targets never did truly reflect the aspirations of UN General Assembly resolution 70/1, and remained largely anthropocentric. Indeed, none of the 2030 Agenda’s 169 targets references the welfare of individual animals. Our current treatment of animals affects our ability to achieve the Sustainable Development Goals, and both human-induced environmental challenges and our interventions to mitigate or adapt to them often affect animals.<sup>702</sup>

The 2030 Agenda for Sustainable Development recognises that the welfare of people depends entirely on the welfare of the ecosystems in which we live and, increasingly, that the welfare of these ecosystems depends on our collective ability to protect them. Animals are a critical part of our global ecosystem. People’s reliance on animals may have become less evident in daily lives but it has not ended. It has evolved and, in some cases, our reliance has become even more acute. Animal welfare matters to the sustainability of human development and the health of global ecosystems and human populations.<sup>703</sup>

The 2019 Global Sustainable Development Report (GSDR), “The Future is Now”, a document prepared by an independent group of scientists appointed by the UN Secretary-General,<sup>704</sup>

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<sup>699</sup> UNEP. Resolution adopted by the United Nations Environment Assembly on 2 March 2022 5/1. Animal welfare–environment–sustainable development nexus. <https://wedocs.unep.org/handle/20.500.11822/39791>

<sup>700</sup> UN General Assembly. Transforming our world: the 2030 Agenda for Sustainable Development. A/RES/70/1. Resolution adopted by the General Assembly on 25 September 2015. [https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A\\_RES\\_70\\_1\\_E.pdf](https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_70_1_E.pdf)

<sup>701</sup> UN Department of Economic and Social Affairs. Do you know all 17 SDGs? <https://sdgs.un.org/goals>

<sup>702</sup> Verkuil, Cleo et al. Mainstreaming animal welfare in sustainable development A policy agenda. SEI & CEEW. May 2022. <https://euagenda.eu/upload/publications/animal-welfare-stockholm50backgroundpaper.pdf>

<sup>703</sup> Keeling L, Tunón H, Olmos Antillón G, Berg C, Jones M, Stuardo L, Swanson J, Wallenbeck A, Winckler C and Blokhuis H (2019) Animal Welfare and the United Nations Sustainable Development Goals. Front. Vet. Sci. 6:336. doi: 10.3389/fvets.2019.00336 Frontiers in Veterinary Science - <https://www.frontiersin.org/articles/10.3389/fvets.2019.00336/full>

<sup>704</sup> Independent Group of Scientists appointed by the Secretary-General. Global Sustainable Development Report 2019: The Future is Now – Science for Achieving Sustainable Development, United Nations, New York, 2019, online at: <https://sustainabledevelopment.un.org/gsdr2019>.



acknowledged for the first time that the improvement of animal welfare was missing from the enumeration of the UN's sustainable development goals (SDGs):<sup>705</sup>

"The clear link between human health and well-being and animal welfare is increasingly being recognized in ethics- and rights-based frameworks. Strong governance should safeguard the well-being of both wildlife and domesticated animals with rules on animal welfare embedded in transnational trade."<sup>706</sup>

The Human Development Report 2020 - The Next Frontier: Human Development and the Anthropocene<sup>707</sup> which for the first time adjusted the Human Development Index to reflect the impact on planetary pressures of that development, also explored the ethical dimensions of human-animal relationships. This includes these prophetic words: "the future of the planet and its sentient beings is one of the largest ethical issues facing humanity going forward."

This Scoping Study underlines the inextricable linkages between the wellbeing of people, animals and nature. This serves to highlight the way in which each and every SDG interacts with others, and how human-animal interactions and animal welfare are at the heart of sustainability.

The World Organisation for Animal Health (WOAH) has an agreed Global Animal Welfare Strategy with the stated objective of achieving: "A world where the welfare of animals is respected, promoted and advanced, in ways that complement the pursuit of animal health, human well-being, socio-economic development and environmental sustainability". The Food and Agriculture Organization of the UN (FAO) describes animal welfare as a "global common good", and addresses this not as a stand-alone topic, but related to other relevant topics such as food safety and security, human and animal health, sustainability and rural development.

As the FAO states in "Animal Welfare at the Heart of Sustainability", there is a need for animal welfare to be fundamental to sustainability; and the recognition that animal welfare is inextricably linked with environmental, political, economic, and social issues.<sup>708</sup> This is confirmed by the impacts on many SDGs of animals and animal welfare, and the converse, underlining the vital need for the One Health approach. Indeed, given the range of interlinkages, the case could be made for broadening this to a One Welfare approach.

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<sup>705</sup> Bridgers, Jessica. "Just in Time for World Animal Day, UN Global Sustainable Development Report Identifies Animal Welfare as Issue Missing from the Sustainable Development Agenda, World Animal Net", 4 October 2019, online at: <http://worldanimal.net/world-animal-net-blog/item/503-just-in-time-for-world-animal-day-unglobal-sustainable-development-report-identifies-animal-welfare-as-issue-missing-from-the-sustainable-development-agenda>.

<sup>706</sup> Page 117 of the Independent Group of Scientists appointed by the Secretary-General, Global Sustainable Development Report 2019: The Future is Now – Science for Achieving Sustainable Development, United Nations, New York, 2019 [underlined by the author]. <https://sustainabledevelopment.un.org/gsdr2019>.

<sup>707</sup> <http://hdr.undp.org/sites/default/files/hdr2020.pdf>

<sup>708</sup> FAO. Animal Welfare at the Heart of Sustainability. AGA News. [https://www.fao.org/ag/againfo/home/en/news\\_archive/2014\\_Animal\\_Welfare\\_at\\_the\\_Heart\\_of\\_Sustainability.html](https://www.fao.org/ag/againfo/home/en/news_archive/2014_Animal_Welfare_at_the_Heart_of_Sustainability.html)

The FAO has also stated: “a paradigm shift has become urgent. Animals are to be addressed as living beings to take care of and valorise, not only as a source of commodities to exploit. Scientific information, policy options, good and best practices, technological advances and innovations are available for us to take better care of our animals and valorise their contributions to several important Sustainable Development Goals”.<sup>709</sup>

Andrea Gavinelli of the European Commission has confirmed that animal welfare is a societal concern and it is important that it be included in the sustainability agenda. He has stated: “The welfare of animals is not only about changing values, but about added value for all those involved”.<sup>710</sup>

Prof. Donald Broom has published a number of papers around the theme of animal welfare and sustainability. A 2017 paper explores “Sustainability and the role of animal welfare” from the proceedings of the 33rd World Veterinary Congress.<sup>711</sup> This covers aspects such as consumer impact on agriculture, welfare concepts and assessment, pain, sustainability, silvopastoral systems.

In a paper entitled “Components of sustainable animal production and the use of silvopastoral systems”<sup>712</sup>, Prof. Broom has the following to say about animal welfare and sustainability:

“A system or procedure is sustainable if it is acceptable now and if its expected future effects are acceptable, in particular in relation to resource availability, consequences of functioning, and morality of action. What might make any animal usage system unsustainable? The system might involve depletion of resources such that a resource becomes unavailable or a product of the system might accumulate to a degree that prevents the functioning of the system. However, any effect which the general public find unacceptable makes a system unsustainable. A production system might be unsustainable because of inefficient usage of world food resources; adverse effects on human health; poor animal welfare; harmful environmental effects, such as low biodiversity or insufficient conservation; unacceptable genetic modification; not being “fair trade”, in that producers in poor countries are not properly rewarded; or damage to rural communities. Consumers might judge, because of any of these inadequacies, that the quality of the product is poor. Animal welfare is a component of sustainability and good quality of product.”

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<sup>709</sup> FAO. Because animals, people and the environment matter. Newsletter No 108. 15 January 2020. <http://newsletters.fao.org/q/1bk0rZhw7JjTwvubPnf/wv>

<sup>710</sup> FAO. Animal Welfare at the Heart of Sustainability. AGA News. [https://www.fao.org/ag/againfo/home/en/news\\_archive/2014\\_Animal\\_Welfare\\_at\\_the\\_Heart\\_of\\_Sustainability.html](https://www.fao.org/ag/againfo/home/en/news_archive/2014_Animal_Welfare_at_the_Heart_of_Sustainability.html)

<sup>711</sup> Broom, D.M. 2017. Sustainability and the role of animal welfare. In Proceedings of the 33rd World Veterinary Congress, Incheon Korea, 632-635. World Veterinary Association. Consumer impact on agriculture, welfare concepts and assessment, pain, sustainability, silvopastoral systems. [https://www.academia.edu/37753261/Sustainability\\_and\\_the\\_role\\_of\\_animal\\_welfare?email\\_work\\_card=view-paper](https://www.academia.edu/37753261/Sustainability_and_the_role_of_animal_welfare?email_work_card=view-paper)

<sup>712</sup> Broom, Donald Maurice. Components of sustainable animal production and the use of silvopastoral systems. August 2017. <https://doi.org/10.1590/S1806-92902017000800009> & [https://www.academia.edu/37753495/Components\\_of\\_sustainable\\_animal\\_production\\_and\\_the\\_use\\_of\\_silvopastoral\\_systems](https://www.academia.edu/37753495/Components_of_sustainable_animal_production_and_the_use_of_silvopastoral_systems)

Prof. Broom has expanded and further developed considerations of sustainability in subsequent research. His paper on “Welfare of Animals: Political and Management Issues”<sup>713</sup> includes an overview of current concepts of sustainability and animal welfare and its role in sustainability (together with some examples). Close confinement systems which do not meet the needs of the animals are unsustainable because they are disliked and increasingly avoided by consumers. In addition to poor animal welfare, other reasons why a food system is unsustainable include human health and welfare and harmful environmental impacts. The latter would include climate change, biodiversity loss and pollution, as well as use of scarce resources. The paper includes systems for the future, such as three-level plant production and three-level silvopastoral systems.

Prof. Broom’s paper on “A method for assessing sustainability, with beef production as an example” gives an example of how the sustainability of a production system could be measured, taking into account a range of sustainability components. This scoring system makes it possible and rational for those making ethical decisions about sustainability to allow components to compensate for one another. For example, a slightly higher increase in greenhouse gas output in one system may be accepted if the efficiency of resource use or animal welfare is better in that system. However, Prof. Broom includes an important consideration here: that not all decisions are made using such consequentialist ethics in which various costs and benefits are balanced. Some ethical decisions are based on deontological arguments, using which a production system may be unacceptable, and hence unsustainable, because consumers consider one of its actions or consequences always to be wrong. He added that the welfare of animals is the most important component of sustainability for many consumers.<sup>714</sup>

The 2019 paper on Animal Welfare and the United Nations Sustainable Development Goals by Keeling et al.<sup>715</sup> evaluates the extent to which achieving the UN Sustainable Development Goals (SDGs) is compatible with improving animal welfare. The analyses were based on discussion and independent scoring in a group of 12 participants with academic backgrounds within agricultural or veterinary sciences. The results of this study suggest a mutually beneficial relationship between improving animal welfare and achieving SDGs. However, the researchers themselves suggested a wider study, and this Scoping Study strongly indicates that multi-disciplinary researchers and experts with practical experience of both animal welfare issues and the environmental nexus would be able to identify even more inter-linkages.<sup>716</sup>

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<sup>713</sup> Broom, Donald M. Welfare of Animals: Political and Management Issues. 2018.

<https://doi.org/10.1016/B978-0-08-100596-5.22494-3> & [https://www.academia.edu/39369307/Welfare\\_of\\_animals\\_political\\_and\\_management\\_issues?email\\_work\\_card=view-paper](https://www.academia.edu/39369307/Welfare_of_animals_political_and_management_issues?email_work_card=view-paper)

<sup>714</sup> Broom, Donald M. A method for assessing sustainability, with beef production as an example. *Biol. Rev.* (2021), pp. 000–000. 1. doi: 10.1111/brv.12726 & <https://onlinelibrary.wiley.com/doi/full/10.1111/brv.12726>

<sup>715</sup> Keeling L, Tunón H, Olmos Antillón G, Berg C, Jones M, Stuardo L, Swanson J, Wallenbeck A, Winckler C and Blokhuis H (2019) Animal Welfare and the United Nations Sustainable Development Goals. *Front. Vet. Sci.* 6:336. doi: 10.3389/fvets.2019.00336 *Frontiers in Veterinary Science* - <https://www.frontiersin.org/articles/10.3389/fvets.2019.00336/full>

<sup>716</sup> Keeling L, Tunón H, Olmos Antillón G, Berg C, Jones M, Stuardo L, Swanson J, Wallenbeck A, Winckler C and Blokhuis H (2019) Animal Welfare and the Sustainable Development Goals, doi:

The Keeling et al study considers both the SDGs and their targets, and many useful linkages have been discovered; and it shows clearly how improvements in animal welfare can contribute to achieving many of the SDGs. This is from a veterinary-agricultural perspective. Also, the focus is on improving animal welfare incrementally, rather than the transformational changes which are necessary to actually achieve sustainable development for example, dietary change to plant-based diets and cellular alternatives to animal products – which is probably the greatest animal-environment related contribution that could be made to the achievement of the SDGs).

Also, it is not surprising that the study found that the impact of achieving an SDG was considered, on average, to be slightly better at leading to improved animal welfare, than the impact of improving animal welfare was on achieving the SDG (apart from SDG 2, which deals with zero hunger) – simply because the SDGs were drafted from an anthropocentric perspective. Animal welfare and individual animals are not covered at all; and environmental issues are not adequately represented either – and, as we have seen in this Scoping Study, the use and treatment of animals plays a major role in driving our multiple environmental crises. These really need more priority and prominence within the SDGs and indicators, given that if the misuse and exploitation of animals is not addressed, and the environmental crises spiral, all of the currently-drafted SDGs will be put firmly out of attainment.

Indeed, when animal welfare is not specifically mentioned in any of the SDGs, targets or indicators, the very fact that Keeling et al found that when all SDGs were considered, 66 targets of the total of 169 were considered relevant indicates the strong inter-relationships between animal, human and environmental wellbeing. The same applies to their finding that SDG 12, which deals with responsible production and consumption, and SDG 14, which deals with life below water, were strongly mutual reinforcing, with most of the targets under these two SDGs considered relevant to animal welfare.

A 2021 paper by Johan Rockström entitled “Protecting planetary boundaries: aligning the SDGs to ensure humankind’s future” recognised that, like tipping points, the SDGs are deeply interconnected: “The achievement of one goal can influence the feasibility of achieving other goals. Transitioning towards sustainable and resilient societies strongly depends on maintaining a stable planet and responsible stewardship of natural resources. Research has identified sustainable land use, oceans and food systems to be the most important enabling conditions for achieving the SDGs. These are all areas which are deeply linked to the treatment and welfare of animals.”<sup>717</sup> This is supported by the findings of Cleo Verkuil et al that: “The industries that impact the largest number of animals are industrial

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10.3389/fvets.2019.00336. Frontiers in Veterinary Science - <https://www.frontiersin.org/articles/10.3389/fvets.2019.00336/full>

<sup>717</sup> Rockström, Johan. Protecting planetary boundaries: aligning the SDGs to ensure humankind’s future. SDG Action. 16 June 2021. <https://sdg-action.org/protecting-planetary-boundaries-aligning-the-sdgs-to-ensure-humankinds-future/>

animal agriculture, industrial fishing, and other industries that interact with wild animals”<sup>718</sup>

The report of UNEP’s Executive Director to UNEA 5 (Contribution to the HLPF on “Nature at the heart of sustainable development”)<sup>719</sup> confirms these interconnections and priorities: “Ours is a connected planet. Health, food, economies and the well-being of nearly 8 billion people and more than 8 million other species across diverse ecosystems constitute a web of life that is inextricably interlinked. Nature is that web, yet human activities have altered 75 per cent of the planet’s land surface, 85 per cent of its wetlands and 66 per cent of its oceans, and in doing so have undermined the very foundation of our societies and economies.”

“The last 18 months have seen the United Nations Food Systems Summit engage hundreds of thousands of people from around the world, and across all constituencies, to accelerate action to transform global food systems in pursuit of the 2030 Agenda for Sustainable Development. The 2030 Agenda recognises that the international community can no longer look at food, livelihoods and the management of natural resources in silos. From ending poverty and hunger to responding to climate change and sustaining natural resources, food and agriculture lie at the very heart of achieving the 2030 Agenda for Sustainable Development.”

A guest blog on the IISD SDG Knowledge Hub in February 2022 entitled “Animal Welfare Matters for Sustainable Development: UNEA 5.2 is an Opportunity for Governments to Recognize That”<sup>720</sup> was written by scientists from the Stockholm Environment Institute and New York University. They affirmed that our relationship with animals matters for our health and the environment, but that animal welfare has been largely neglected in international sustainable development governance. The authors stated:

“Adopted in 2015, the world’s development agenda envisages a world “in which humanity lives in harmony with nature and in which wildlife and other living species are protected.” Yet, although several of the Agenda’s 169 targets focus on conservation of species, biodiversity, and habitats, no target references the well-being of individual animals, whether wild or domesticated.”

They stressed the connection between animal and human wellbeing:

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<sup>718</sup> Verkuijl, Cleo et al. Mainstreaming animal welfare in sustainable development A policy agenda. SEI & CEEW. May 2022. <https://euagenda.eu/upload/publications/animal-welfare-stockholm50backgroundpaper.pdf>

<sup>719</sup> Report of the Executive Director of the United Nations Environment Programme to the United Nations Environment Assembly Fifth session Nairobi. February 2021/March 2021. UNEP/EA.5/2. Contributions to the meetings of the high-level political forum on sustainable development and implementation of the environmental dimension of the 2030 Agenda for Sustainable Development. Nature at the heart of sustainable development. <https://wedocs.unep.org/bitstream/handle/20.500.11822/37830/K2103367.pdf?sequence=1&isAllowed=y>

<sup>720</sup> Verkuijl, Cleo, Stockholm Environment Institute; Sebo, Jeff, New York University; and Green, Jonathan, Stockholm Environment Institute. Animal Welfare Matters for Sustainable Development: UNEA 5.2 is an Opportunity for Governments to Recognize That. IISD. 25 February 2022. <https://sdg.iisd.org/commentary/guest-articles/animal-welfare-matters-for-sustainable-development-unea-5-2-is-an-opportunity-for-governments-to-recognize-that/>

“The COVID-19 pandemic is a reminder that human and non-human health and welfare are linked. Practices that undermine animals’ wellbeing have negative consequences for humans, too. While we might not know how the novel coronavirus originated, we do know that habitat destruction, industrial livestock farming, and wildlife trade and use contribute to the emergence of infectious disease. For instance, profligate antimicrobial use to promote growth and to mitigate infection risk in close-quartered livestock is a leading contributor to antimicrobial resistance (AMR). Deforestation – driven partly by animal agriculture – is a major contributor to zoonotic disease spread.”<sup>721</sup>

They then gave different examples of ways in which our relationship with animals affects our health, the environmental and sustainable development, and suggested ways in which this could be changed. For example, pointing out that the world could [save USD 1.6 trillion](#) by 2050 in health and climate change damages by transitioning to a plant-based diet. They concluded by saying that: “We need to include animals in sustainable development governance for both our sakes and theirs. Governments have a responsibility to consider animal welfare when deciding how to tackle our sustainable development challenges.”<sup>722</sup>

SEI researchers collaborated with the Council on Energy, Environment and Water (CEEW) on a separate paper entitled “Mainstreaming animal welfare in sustainable development: A policy agenda”. They considered the mainstreaming of animal welfare in sustainable development and concluded that:

“Increased awareness and recognition of the relationships between animal welfare and sustainable development can help improve outcomes for humans, animals and the environment. It can help us to maximise synergies and recognise, minimise and resolve trade-offs where possible. As increasingly recognised in discussions on sustainability transitions and transformations, transformative solutions can move beyond trade-offs and allow us to find shared solutions to shared problems. In short, considering the impacts of sustainable development more holistically will allow us to make more informed policy decisions.”<sup>723</sup>

Key points from this study are included under individual SDGs below.

One of the key points made in a SEI and CEEW paper entitled “Stockholm+50: Unlocking a Better Future”<sup>724</sup> was:

“Protect animal welfare by mainstreaming it in sustainable development governance – Animal welfare matters morally, but many of the ways in which we currently interact with

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<sup>721</sup> Verkuijl, Cleo, Stockholm Environment Institute; Sebo, Jeff, New York University; and Green, Jonathan, Stockholm Environment Institute. Animal Welfare Matters for Sustainable Development: UNEA 5.2 is an Opportunity for Governments to Recognize That. IISD. 25 February 2022. <https://sdg.iisd.org/commentary/guest-articles/animal-welfare-matters-for-sustainable-development-unea-5-2-is-an-opportunity-for-governments-to-recognize-that/>

<sup>722</sup> Verkuijl, Cleo (SEI) and Sebo, Jeff (NYU). Animal Welfare Matters for Sustainable Development: UNEA 5.2 is an Opportunity for Governments to Recognize That. IISD. 25 February 2022. <https://sdg.iisd.org/commentary/guest-articles/animal-welfare-matters-for-sustainable-development-unea-5-2-is-an-opportunity-for-governments-to-recognize-that/>

<sup>723</sup> Verkuijl, Cleo et al. Mainstreaming animal welfare in sustainable development A policy agenda. SEI & CEEW. May 2022. <https://euagenda.eu/upload/publications/animal-welfare-stockholm50backgroundpaper.pdf>

<sup>724</sup> SEI & CEEW (2022). Stockholm+50: Unlocking a Better Future. Stockholm Environment Institute. DOI: 10.51414/sei2022.011. <https://www.stockholm50.report/unlocking-a-better-future.pdf>



animals also limit our ability to achieve sustainable development goals and impact the environment. Stronger protection of animal welfare will help build human-nature connectedness, and can also directly or indirectly benefit many other societal goals.”

SEI also hosted a webinar on “Animal welfare and sustainable development: key linkages, collective responsibilities and policy opportunities” on 25 May 2022. There is a recording online, and links to papers.<sup>725</sup>

An article entitled “The 18th Sustainable Development Goal”<sup>726</sup> makes the case for an 18th Sustainable Development Goal (SDG) covering animal health and welfare. It points out that we have neglected animal considerations in our discussions on sustainable development - including on the SDGs on food, water, sustainable consumption and production, conservation, and climate change. The paper first provides an overview of the relationships between, and academic and policy debates on, animal and sustainability governance. The paper then argues for the integrative governance of animal and sustainability concerns in order to avoid trade-offs and enable synergies. We should integrate the interests of the individual animal into our definition of sustainable development and the SDGs. By doing so, we can develop one overarching global guidance system on all aspects of sustainable development, namely human, environmental and animal concerns.

This paper entitled “Mainstreaming animal welfare in sustainable development: A policy agenda”<sup>727</sup> also stresses that developments in science and ethics show that safeguarding animal welfare is an important goal in its own right. 50 years after the first UN conference on the human environment, the time has come to consider animal welfare in sustainable development governance. Animals matter for sustainable development. Our current treatment of other animals contributes to global threats like disease outbreaks and climate change. Sustainable development matters for animals too. Global environment and health threats impact other animals, as do our efforts to mitigate and adapt to these threats. While governments consider animal welfare, they can identify a range of informational, financial, regulatory, and Just Transition policies that benefit humans, animals, and the environment alike.

There are many other papers on the links between animal welfare and sustainable development, and when these are all considered, there is no doubt that there is a strong case for claiming that animal welfare can contribute to the achievement of all the SDGs. These are considered in general terms here, and in connection with each of the SDGs below.

A presentation by UNEP’s Isaiah Otieno to the WOAHA Global Forum on Animal Welfare made the case for animal welfare contributing to many of the goals and targets in the 2030

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<sup>725</sup> SEI Webinar. Animal welfare and sustainable development: key linkages, collective responsibilities and policy opportunities. 25 May 2022.

<https://www.sei.org/events/animal-welfare-sustainable-development-policy/>

<sup>726</sup> Visseren-Hamakers, Ingrid J. The 18th Sustainable Development Goal. March 2020.

[https://globalgoalsproject.eu/globalgoals2020/wp-content/uploads/2020/06/GlobalGoals2020\\_Visseren-Hamakers.pdf](https://globalgoalsproject.eu/globalgoals2020/wp-content/uploads/2020/06/GlobalGoals2020_Visseren-Hamakers.pdf)

<sup>727</sup> Verkuijl, Cleo et al. Mainstreaming animal welfare in sustainable development A policy agenda. SEI & CEEW. May 2022. <https://euagenda.eu/upload/publications/animal-welfare-stockholm50backgroundpaper.pdf>

agenda. This also acknowledged that all species are connected by the way of their interaction, and this is at the core of achieving the SDGs. Included in the conclusions was this plea: “It would therefore be a great step if the agencies in this partnership (WHO, OIE, FAO and UNEP) would pursue the path of moving towards integrating animal welfare in their core mandates, activities and projects; to further buttress this critical linkage of animal welfare to global concerns involving human health, food security and a healthier environment.”<sup>728</sup>

The Animal Issues Thematic Cluster (AIRC) is a coalition of animal protection and conservation organisations advocating for the care, protection, and conservation of animals and biodiversity within the United Nations Sustainable Development Agenda. They prepared a booklet which examined the connections between the welfare and conservation of animals and the Sustainable Development Goals (SDGs) under review at the 2019 High Level Political Forum (HLPF): SDGs 4, 8, 10, 13, 16 and 17. In addition, for each SDG, the booklet provides examples of case studies showcasing successful projects which simultaneously address human and animal wellbeing problems, while contributing to the implementation of the SDGs. Key points are included under these SDGs below, although the paper includes much more information at the level of individual targets. The publication’s major conclusions include:

“Animal welfare and conservation are cross-cutting issues which, if positively addressed, can accelerate the implementation of the Sustainable Development Agenda. This can be accomplished by the incorporation of the care, protection and conservation of animals into global, regional and national sustainable development policies, plans and strategies.”<sup>729</sup>

Wolf Clifton of Animal People, a member of the NGO Major Group’s Animal Issues Thematic Cluster, explored the various ways in which animal issues relate to all of the 17 SDGs.<sup>730</sup> Key points are included under individual SDGs below.

The NGO Major Groups official position papers for the High-Level Political Forums (HLPFs) also include some animal welfare aspects, which will be included in relation to individual SDGs below. They also make the case that prioritising economic growth in a world of finite resources and growing inequalities is detrimental to nature, animals and humans. For example:

“Notions of development based entirely on economic growth present a myopic view of progress and must be discarded, and corporations must be held to account for their social and environmental records. We call for a new development paradigm which furthers the

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<sup>728</sup> Otieno, Isaiah. UNEP. UNEP Animal Welfare in the Context of The Sustainable Development Goals (SDGs). PowerPoint presentation to the WOAHA Global Forum on Animal Welfare. April 2020. <https://www.oie.int/app/uploads/2021/08/3-i-otieno-unesp-sdg-apr2021.pdf>

<sup>729</sup> Clifton, Wolf Gordon; Bridgers, Jessica; and Bazzi, Maha et al. Animal Interest Thematic Cluster (AIRC). Animal Protection and Sustainable Development: An Indivisible relationship. <https://static1.squarespace.com/static/5b2543425cfd79f3074bf90c/t/5d23d461aa03990001fbb109/1562629270666/Animal+Protection+and+Sustainable+Development+-+An+Indivisible+Relationship-compressed.pdf>

<sup>730</sup> Clifton, Wolf Gordon. Animal People. How Animal Protection Impacts All 17 U.N. Sustainable Development Goals. 1 July 2020. <https://animalpeopleforum.org/2020/07/01/how-animal-protection-impacts-all-17-u-n-sustainable-development-goals/>

well-being of humans, nature and animals, and which sees as its ultimate aim the achievement of equity and justice, to “leave no one behind”.”<sup>731</sup>

The International Fund for Animal Welfare (IFAW) has prepared a publication entitled “Thriving Together: The Critical Role of Animals in Achieving the SDGs”.<sup>732</sup> This examines the connections between animal welfare, wildlife conservation and the natural world and their critical role in achieving the SDGs. IFAW points out that animals and their habitats are interwoven with the fate of humans: “All species, big and small, imperilled and ubiquitous, have an important role to play in building a healthy, prosperous and sustainable future for people. There is no better example than the COVID-19 pandemic. Zoonotic disease emergence and spill over to people have become more and more common due the mistreatment of domestic animals and wildlife and their habitat.” Key points are included under individual SDGs below.

The paper on “Good Practices for Animal Welfare in Agriculture Development: Impact on Sustainable Development and the Achievement of the SDGs”<sup>733</sup> was prepared for the “Wageningen Project” on “Guidance on the Implementation of Good Practices for Animal Welfare in Agriculture Development Projects” by Janice Cox. This is a joint project from the following partners: World Bank, Wageningen University and Research (WUR), World Animal Net (WAN)/now World Federation for Animals (WFA), Food and Agriculture Organization (FAO), World Organisation for Animal Health (WOAH). This paper also makes the case that improved animal welfare can support each one of the SDGs, and extracts are given below under individual SDGs.

In more general terms, the above paper also states:

“In wider policy circles, it is increasingly recognised that animal welfare should be at the heart of sustainability. It is an important ethical issue, and a societal value which is strongly supported by citizens/consumers across the world. Indeed, this was demonstrated in the Sustainable Development Goal consultation process when animal protection achieved the second highest score for the 17th – additional – option given in the My World 2015 survey. It is also an internationally-accepted policy issue; and a practical issue which can help with the achievement of most, if not all, of the SDGs.”<sup>734</sup>

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<sup>731</sup> NGO Major Group. Official Position Paper for the 2017 High-Level Political Forum.

<http://nebula.wsimg.com/47b20fccb88656e5a802c7936cc567cd?AccessKeyId=E3A2183630CD52C7534E&disposition=0&alloworigin=1>

<sup>732</sup> Hofberg, Mark et al. Thriving Together: The Critical Role of Animals in Achieving the SDGs. Second Edition. IFAW. 2022.

[https://d1jyxxz9imt9yb.cloudfront.net/resource/1304/attachment/original/IFAW\\_SDG\\_REPORT\\_RGB\\_FINAL\\_DIGITAL\\_20220627.pdf](https://d1jyxxz9imt9yb.cloudfront.net/resource/1304/attachment/original/IFAW_SDG_REPORT_RGB_FINAL_DIGITAL_20220627.pdf)

<sup>733</sup> Cox, Janice H. Good Practices for Animal Welfare in Agriculture Development: Impact on Sustainable Development and the Achievement of the SDGs. World Animal Net. July 2019.

[https://www.wellbeingintlstudiesrepository.org/es\\_unsdg/2/](https://www.wellbeingintlstudiesrepository.org/es_unsdg/2/)

<sup>734</sup> Cox, Janice H. Good Practices for Animal Welfare in Agriculture Development: Impact on Sustainable Development and the Achievement of the SDGs. World Animal Net. July 2019.

[https://www.wellbeingintlstudiesrepository.org/es\\_unsdg/2/](https://www.wellbeingintlstudiesrepository.org/es_unsdg/2/)

Compassion in World Farming (CIWF) has briefing on how “Industrial Animal Agriculture will put Several Sustainable Development Goals out of Reach”.<sup>735</sup> Relevant extracts are given below under individual SDGs.

A recent article on “Accelerating Sustainable Development through Animal Welfare”<sup>736</sup>, points out that the United Nations General Assembly Resolution 70/1, which sets out the sustainable development agenda, envisaged a world in which “all life can thrive” and “humanity lives in harmony with nature and in which wildlife and other living species are protected”. This was based on a long history of UN resolutions and Secretary General reports on Harmony with Nature. Resolution 74/224 specifically “recognised that protecting and conserving ecosystems and avoiding harmful practices against animals, plants, microorganisms and non-living environments contributes to the coexistence of humankind in harmony with nature”. Yet, as the authors point out: “the sustainable development agenda remains human-centred and omits critical considerations for the protection and welfare of all animals”. This article points out the inextricable linkages between animal welfare and other aspects of sustainable development, including the environment, and how consideration of animal welfare could be an accelerator to sustainable development – also providing examples.<sup>737</sup>

The paper concludes by stating that: “If we are to truly transform our world as per the 2030 Sustainable Development Agenda, a shift to systems that consider and care for animal welfare is essential. These will help us mitigate risks, as systems that are beneficial to human, environmental and animal welfare are also systems that avoid, or are resilient to, disasters, health, and climate crises. Such systems also contribute to the achievement of the sustainable development goals (SDGs), including to achieve zero hunger (SDG 2), healthy lives for all (SDG 3), water availability for all (SDG 6), and sustainable production and consumption patterns (SDG 12). Considering animal welfare in policies will also strengthen actions to combat climate change (SDG 13), conserve the oceans, sea, and marine resources (SDG 14), and protect and restore ecosystems while halting biodiversity loss (SDG 15).”<sup>738</sup>

The Sustainable Development Goals Knowledge Platform published a blog entitled “The care, protection and conservation of animals is critical to the successful implementation of the 2030 Agenda” in February 2018.<sup>739</sup> This gives a useful overview on why including

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<sup>735</sup> CIWF. Industrial Animal Agriculture will put Several Sustainable Development Goals out of Reach. August 2018. <https://www.ciwf.org.uk/media/7435794/industrial-animal-agriculture-will-put-several-sdgs-out-of-reach-august-2018-final.pdf>

<sup>736</sup> Mantilla, Silvia and Bridgers, Jessica. Accelerating Sustainable Development through Animal Welfare. 12 May 2022. <https://thegreenforum.org/blog/accelerating-sustainable-development-through-animal-welfare>

<sup>737</sup> Mantilla, Silvia and Bridgers, Jessica. Accelerating Sustainable Development through Animal Welfare. 12 May 2022. <https://thegreenforum.org/blog/accelerating-sustainable-development-through-animal-welfare>

<sup>738</sup> Mantilla, Silvia and Bridgers, Jessica. Accelerating Sustainable Development through Animal Welfare. 12 May 2022. <https://thegreenforum.org/blog/accelerating-sustainable-development-through-animal-welfare>

<sup>739</sup> McQuibban, Jack; Bridgers, Jessica and Wyper, Bonnie. Members of the Animal Issues Thematic Cluster of the NGO Major Group. The care, protection and conservation of animals is critical to the successful implementation of the 2030 Agenda. Sustainable Development Goals Knowledge Platform. 23 February 2018. <https://sustainabledevelopment.un.org/hlpf/2018/blog#23feb>

animals in all decisions and policies related to the implementation of the 2030 Agenda, could accelerate the creation of sustainable and resilient societies worldwide. It includes the following of interest:

“In the search for solutions to create sustainable and resilient societies, it is important to note the vital link between people and animals in many communities, whether for sustenance, livelihoods, health or security. When disasters strike, humans’ dependence on animals often means animal protection is a community priority. From protecting national parks whilst increasing local employment and food security in Malawi, to saving forest habitat for elephants in India through innovations that reduce the need for wood in local households, it is increasingly evident that engaging local communities in long-term sustainable development solutions simultaneously benefits communities.”

“However, despite these opportunities, our current commodification of animals for human use is creating barriers to the full implementation of the Sustainable Development Agenda. Animal production uses one-third of the world’s fresh water and 45% of the world’s grain production; drives deforestation, biodiversity loss, greenhouse gas emissions and climate change; and pollutes water, air and soil. The way we treat animals is a multi-sectoral issue, deserving the attention of the sustainable development community. Without addressing the care, protection and conservation of animals, successful implementation of the 2030 Agenda will remain out of reach.”

Some extracts are given below under individual SDGs. The conclusions include:

“The closer we look, the more obvious the link between our wellbeing and the wellbeing of animals becomes.”

Other influential reports and papers also refer to the need to take human-animal interactions and animal welfare into consideration for the achievement of sustainable development. Some key extracts and quotes are given briefly below.

FAO: The Future of Food and Agriculture:<sup>740</sup>

From Concluding Remarks:

“Business as usual” is no longer an option if the targets set by the 2030 Agenda for Sustainable Development – and specifically those directly concerning food and agriculture – are to be met. The high-input, resource-intensive farming systems that have caused massive deforestation, water scarcity, soil depletion, the loss of biodiversity, antimicrobial resistance of pests and diseases and high levels of GHG emissions cannot guarantee the sustainability of food and agricultural systems”

The joint publication by FAO, UNDP and UNEP entitled “A Multi-Billion Dollar Opportunity: Repurposing agricultural support to transform food systems”<sup>741</sup> also points to the centrality of transforming food systems to the achievement of the SDGs, and the vital need of repurposing agricultural support. Animal welfare interventions are specifically mentioned as an area for the repurposing of subsidies.

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<sup>740</sup> FAO. The Future of Food and Agriculture: Alternative Pathways to 2050. 2018.  
<https://www.fao.org/3/I8429EN/i8429en.pdf> & <https://www.fao.org/publications/fofa/en/>

<sup>741</sup> FAO, UNDP, UNEP. A Multi-Billion Dollar Opportunity: Repurposing agricultural support to transform food systems. <https://www.fao.org/3/cb6562en/cb6562en.pdf>

The WOA's 2021 Animal Welfare Global Forum Report "Animal Welfare and the UN Sustainable Development Goals"<sup>742</sup> also considered the linkages between animal welfare and sustainable development. In conclusion, the WOA's Deputy Director General, Dr Matthew Stone, stated that:

"Overall, participants believed that the link between the SDGs and animal welfare was positive with very few negative interactions. In other words, participants were of the opinion that improving animal welfare would contribute positively to the achievement of the SDGs and likewise, achieving the SDGs would help improve animal welfare. He also noted discussions highlighting that the linkage is moderated through human choices and behaviours; that there are still potential for negative impacts on animal welfare depending on choices made in pursuing SDGs; and that there is a need to consider animal welfare in the context of policy and planning under each SDG."

The French National Institute for Agricultural Research (INRA), which has now merged into the National Institute for Agriculture, Food and Environment (INRAE), recommended that farming systems needed to do more than simply decrease animal stress and suffering: they should also allow positive experiences for the animals. The INRA report on "Improving the Welfare of Farm Animals" also stated that: "Animal welfare is central to what makes livestock systems sustainable"<sup>743</sup>

The Convention on Biological Diversity's Global Biodiversity Outlook 5<sup>744</sup> mentioned the interrelationship between biodiversity and the SDGs. The following is taken from the introduction:

"The Aichi Biodiversity Targets are reflected directly in many of the targets within the Sustainable Development Goals (SDGs). Biodiversity is explicitly highlighted in SDGs 14 (Life Below Water) and 15 (Life on Land), but also underpins a much wider set of Goals. For example, it is a key factor for the achievement of food security and improved nutrition (SDG 2) and the provision of clean water (SDG 6). All food systems depend on biodiversity and a broad range of ecosystem services that support agricultural productivity, for example through pollination, pest control and soil fertility. Healthy ecosystems also underpin delivery of water supplies and water quality, and guard against water-related hazards and disasters. The conservation and sustainable use of biodiversity may therefore be regarded as foundational to the whole 2030 Agenda. Conversely, the achievement of the Sustainable Development Goals contributes to the conservation and sustainable use of biodiversity. For example, some Goals address the drivers of biodiversity loss, such as climate change (SDG 13), pollution (SDGs 6, 12 and 14) and overexploitation (SDGs 6, 12, 14 and 15). Others address unsustainable production and consumption, the efficient use of natural resources and reducing food waste (SDG 12)."

Whilst animal welfare is not specifically mentioned, clearly this is integral to biodiversity, and many of the same considerations apply. What is of interest is that there is recognition

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<sup>742</sup> OIE. Animal Welfare Global Forum Report "Animal Welfare and the UN Sustainable Development Goals" Paris, France, 26 – 28 April and 4 May 2021.

<https://www.woah.org/app/uploads/2021/08/report-3rd-oie-animal-welfare-global-forum.pdf>

<sup>743</sup> INRA. Improving the Welfare of Farm Animals.

<https://www.inrae.fr/sites/default/files/pdf/improving-the-welfare-of-farm-animals.pdf>

<sup>744</sup> The Convention on Biological Diversity. Global Biodiversity Outlook 5.

<https://www.cbd.int/gbo/gbo5/publication/gbo-5-en.pdf>



of some “potential trade-offs” between some of the CBD objectives and some of the SDGs, and of the need for these to be avoided or minimised through coherent and integrated decision-making. The same is true for any policy intersections, including the animal welfare-environment-sustainable development nexus. And this should be approached with a view to critically analysing differences, reconsidering policy options, and always taking the agreed One Health path of aiming to “sustainably balance and optimise the health of people, animals and ecosystems”.

The 2015 UNEP, CBD, WHO report on Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review contains a section on the Sustainable Development Goals and Post-2015 Sustainable Development Agenda.<sup>745</sup> also refers to the need for ongoing evaluation of synergistic and antagonistic issues:

“Ongoing evaluation of synergistic and antagonistic effects of complementary sustainable development goals and targets is needed. This includes sustainable development goals and targets addressing health, food and freshwater security, climate change and biodiversity loss and evaluate the long-term impacts of trade-offs is needed; such as the trade-off and short-term gains from intensive and unsustainable agricultural production, against longer-term nutritional security.”

This Scoping Study has shown that two animal welfare issues, in particular, have deep and wide-ranging impacts on the environment and across SDGs: industrial animal agriculture (including aquaculture) and the over-exploitation of wildlife (including over-fishing).

The exploitation of wildlife is vital, in terms of biodiversity loss and ecosystem destruction, disease and pandemic risks, and climate change.

The transformation of food systems is also vital. As was stated in the FAO’s “Livestock’s Long Shadow” report “an important general lesson is that the livestock sector has such deep and wide-ranging environmental impacts that it should rank as one of the leading focuses for environmental policy”.

Food systems are currently unsustainable from a natural resources perspective. The way in which these food systems currently operate are responsible for land degradation, depletion of fish stocks, nutrient losses, impacts on terrestrial and aquatic biodiversity, impacts on air, soil and water quality, and greenhouse gas emissions contributing to climate change. The expected population growth, expansion of cities, dietary shifts to unhealthy and unsustainable consumption will increase the pressures even more. They are responsible for 60% of global terrestrial biodiversity loss, around 24% of the global greenhouse gas emissions, 33% of degraded soils, the depletion of 61% of ‘commercial’ fish populations, and the overexploitation of 20% of the world’s aquifers

A reduction in food loss and waste across food systems, and a levelling off of meat and dairy consumption in developed countries could reduce the global cereal demand by 15%; while the reduction by 50% of meat and dairy consumption in these countries could lead to up to 40% lower nutrient losses and greenhouse gas emissions.

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<sup>745</sup> UNEP, CBD, WHO. Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review. 2015. <https://www.cbd.int/health/SOK-biodiversity-en.pdf>

The 2016 report by UNEP/International Resource Panel on “Food Systems and Natural Resources”<sup>746</sup> also stresses the massive pressure on natural resources and the environment from food systems. The foreword was written by Achim Steiner, previously UNEP Executive Director and now Administrator of the UN Development Programme (UNDP). In this, he states that:

“The authors provide solid evidence on the need to transition to more ‘resource-smart food systems’, an imperative for the achievement of at least 12 out of the 17 Sustainable Development Goals (SDGs).”

The Executive Summary also states that environmentally-sustainable food systems are an imperative for sustainable development.

One Health could be an important framework for taking forward these issues, if it can develop effectively in the short-term. The One Health Joint Plan of Action.<sup>747</sup> states that:

“One Health is a powerful approach that can enable achieving health for humans, animals, plants, and the environment and for food and water security and safety. It can therefore help pave the way towards achieving the SDGs, including those on poverty, hunger, health and well-being, inequality, clean water and sanitation, work and economic growth, sustainable and responsible consumption and production, and partnerships.”

“The effects of environmental degradation, and corresponding erosion of ecosystem services influence the relationships between health, food production, and natural systems. There is therefore an urgent need for a reassessment and transformation of the interactions between humans, animals, plants, and the environment they share. Balancing these interactions ensures human, animal and plant health and wellbeing and charts the path toward economic, environmental, and social sustainability. This is critical to achieve the Sustainable Development Goals (SDGs).”

The SDGs and their targets should not be set in stone. Not should other - siloed - conventions and their targets. We are just beginning to understand the complexity of our interconnected world; and systemic analysis, cross-fertilisation and integration/mainstreaming is essential. There must be regular reviews, and also the acknowledgement of changing priorities. For example, with existential environmental crises taking precedence – and animal welfare as a key driver incorporated and mainstreamed at very least.

Keeling et al.<sup>748</sup> stated that methodologies are starting to be developed to assess interactions between targets and to explore how they might be visualised. This needs to be explored and analysed in greater detail. Not only using existing SDGs and indicators. But

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<sup>746</sup> UNEP/International Resource Panel. Food Systems and Natural Resources. <http://www.resourcepanel.org/reports/food-systems-and-natural-resources>

<sup>747</sup> One Health Joint Plan of Action (2022-2026). Working together for the health of humans, animals, plants and the environment. Draft 2022. <https://www.oie.int/en/document/one-health-joint-plan-of-action-2022-2026-working-together-for-the-health-of-humans-animals-8-plants-and-the-environment/>

<sup>748</sup> Keeling L, Tunón H, Olmos Antillón G, Berg C, Jones M, Stuardo L, Swanson J, Wallenbeck A, Winckler C and Blokhuis H (2019) Animal Welfare and the United Nations Sustainable Development Goals. *Front. Vet. Sci.* 6:336. doi: 10.3389/fvets.2019.00336 *Frontiers in Veterinary Science* - <https://www.frontiersin.org/articles/10.3389/fvets.2019.00336/full>

also, other issues, and how these both impact sustainable development and are impacted by sustainable development. Computer modelling will doubtless be needed for such a complex task. Backed by multi-disciplinary research and analysis. There needs to be more focus on animal welfare, and more focus on environmental crises and their drivers. This will necessitate the integration/mainstreaming of animal welfare issues. But this may still not be sufficient for the achievement of sustainable development.

An IISD article entitled “Researchers Find Limited Evidence of SDGs’ Political Impact”<sup>749</sup> reported on an article, published in Nature Sustainability, which was based on an analysis of more than 3,000 scientific studies on the SDGs. This concluded that the impact of the SDGs was “largely discursive” as opposed to bringing meaningful and transformative political change. The article also stated that countries prioritised economic over environmental SDGs. This is short-sighted and unsustainable, given that there will be no development if the multiple environmental crises are not effectively tackled with urgency – and the same applies to animal use and animal welfare, as this Scoping Study shows.

There is a growing global scientific and policy consensus that human actions that have a negative impact on animal health and welfare are the dominant drivers of biodiversity loss and zoonotic disease emergence and contribute significantly to climate change and environmental pollution. Moreover, an increasing body of science and experience demonstrates that improving animal welfare will produce direct positive benefits for nature and can strengthen our collective efforts at achieving the SDGs.

This Scoping Study shows the vital importance of explicitly including animal welfare across the SDGs – for its own sake, and for the sake of achieving environmental, social and economic targets. The SDGs will simply not be achieved without this inclusion.

## **7.2. Major Impacts on Individual SDGs**

A high-level summary of how animal welfare impacts each of the SDGs is given below. This is not comprehensive, but provides brief information on major impacts. This was extracted from the detailed record of different authors’ research and analysis of the impacts of animal welfare on the SDGs which is given at [Annex 2](#) below (where source references are available)

## **7.3. UNEP & Environmental SDGs**

The SDG framework has a total of 17 goals, 169 targets and 244 indicators— 93 of which are environment related. The SDGs aim to measure the most pressing issues facing the planet, including the interactions between topics. In terms of the environmental dimension of development, the SDGs cover natural resource management, climate change, water-related

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<sup>749</sup> IISD. Researchers Find Limited Evidence of SDGs’ Political Impact. 3 August 2022. [http://sdg.iisd.org/news/researchers-find-limited-evidence-of-sdgs-political-impact/?utm\\_medium=email&utm\\_campaign=SDG%20Update%20-%204%20August%202022&utm\\_content=SDG%20Update%20-%204%20August%202022+CID\\_3e0c9c2f7ba98efa01ecd5418a668ba4&utm\\_source=cm&utm\\_term=Read](http://sdg.iisd.org/news/researchers-find-limited-evidence-of-sdgs-political-impact/?utm_medium=email&utm_campaign=SDG%20Update%20-%204%20August%202022&utm_content=SDG%20Update%20-%204%20August%202022+CID_3e0c9c2f7ba98efa01ecd5418a668ba4&utm_source=cm&utm_term=Read)

issues, marine issues, biodiversity and ecosystems, circular economy, environmentally sound management of chemicals and waste, and many other topics.<sup>750</sup> As the leading global environmental authority, UNEP is the custodian for just 25 SDG indicators – across SDG Goals 6, 8, 12, 14, 15 and 17.<sup>751</sup> These indicators cover topics related to resource management and protection of water, marine and terrestrial ecosystems, circular economy, and environmentally sound management of chemicals and waste.<sup>752</sup>

*[Some UNEP sources, however, indicate that UNEP is responsible for 30 indicators across the six SDGs, and include an itemisation of these.<sup>753</sup>]*

UNEP states that the environment underlies each of the Sustainable Development Goals (SDGs) – from eliminating hunger to reducing inequalities to building sustainable communities around the world.<sup>754</sup> While UNEP is responsible for monitoring only six of the 17 goals, all of the SDGs are linked and ultimately impact each other. UNEP also measures progress towards their implementation, where data is available (although there are acknowledged gaps), and has mapped interactions between the goals.<sup>755</sup>

These are covered by UNEP's Medium-Term Strategy and Programme of Work, and all are affected by human interactions with animals and animal welfare. In addition to mitigating the key drivers of biodiversity loss, climate change, pollution and pandemic disease emergence, animal welfare can contribute to the attainment of all other SDGs, as can be seen below.

The (2019) global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)<sup>756</sup> also states that nature is essential for achieving the Sustainable Development Goals. However, IPBES points out that taking into consideration that the Sustainable Development Goals are integrated, indivisible, and nationally implemented, current negative trends in biodiversity and ecosystems will undermine progress towards 80 per cent (35 out of 44) of the assessed targets of Goals related to poverty, hunger, health, water,

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<sup>750</sup> UNEP. Sustainable Development Goals. World Environment Situation Room <https://wesi.unep.org/sdgs>

<sup>751</sup> UNEP. Sustainable Development Goals. <https://www.unep.org/explore-topics/sustainable-development-goals>

<sup>752</sup> UNEP. UNEP and the SDGs. A briefing note published in September 2020 to coincide with the 75<sup>th</sup> Session of the UN General Assembly. <https://www.unep.org/unep-and-sdgs>

<sup>753</sup> UNEP. Sustainable Development Goals in UN Environment. <https://wedocs.unep.org/bitstream/handle/20.500.11822/27284/SDGs%20related%20to%20Environment%2024.01.17.pdf?sequence=2&isAllowed=y> and UNEP. Sustainable Development Goals. <https://www.unep.org/evaluation-office/our-evaluation-approach/sustainable-development-goals>

<sup>754</sup> UNEP. UNEP and the SDGs. A briefing note published in September 2020 to coincide with the 75<sup>th</sup> Session of the UN General Assembly. <https://www.unep.org/unep-and-sdgs>

<sup>755</sup> UNEP. Measuring Progress Environmental SDGs. <https://www.unep.org/interactive/measuring-progress-environment-sdgs/> & UNEP. Measuring Progress: Environment and the SDGs. <https://www.unep.org/resources/publication/measuring-progress-environment-and-sdgs>

<sup>756</sup> IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany. 1148 pages. <https://doi.org/10.5281/zenodo.3831673>

cities, climate, oceans and land (Sustainable Development Goals 1, 2, 3, 6, 11, 13, 14, and 15).

IPBES also found Important positive synergies between nature and the Goals related to education, gender equality, reducing inequalities and promoting peace and justice (Sustainable Development Goals 4, 5, 10 and 16). Land or resource tenure insecurity, as well as declines in nature, have greater impacts on women and girls, who are most often negatively impacted. However, the current focus and wording of the targets of these Goals obscures or omits their relationship to nature, thereby preventing their assessment in this regard. There is a critical need for future policy targets, indicators and datasets to more explicitly account for aspects of nature and their relevance to human well-being in order to more effectively track the consequences of trends in nature on the Sustainable Development Goals..<sup>757</sup>

UNEP's Global Environment Outlook (GEO) 6 includes a chapter on sustainable development. This shows that a healthy environment is both a prerequisite and a foundation for economic prosperity, human health and wellbeing..<sup>758</sup>

GEO 6 shows that the world is not on track to achieve the environmental dimension of the Sustainable Development Goals or other internationally agreed environmental goals by 2030; nor is it on track to deliver long-term sustainability by 2050. Urgent action and strengthened international cooperation are urgently needed to reverse those negative trends and restore planetary and human health..<sup>759</sup>

GEO-6 also provides data that illustrate the sort of costs involved. This is of interest to assessment of the SDGs, and because many of the examples relate to areas where animal welfare is a key contributor/driver. The following examples relate to air pollution (which strangely does not fall under an environmental SDG/target, but SDG 3 on health and wellbeing – a clear indication of focus on impacts, rather than drivers):

- Exposure to indoor/outdoor air and water pollution costs at least 9 million lives annually including 300,000 in the G7 countries in 2015 (OECD 2017). About 2.8 million people died in 2015 from indoor air pollution and about 2.8 million depend on unclean traditional biomass. Many more millions suffer from ill-health and loss of livelihoods. Pollution-related costs have been estimated at \$US 4.6 trillion annually (about 6.2 per cent of global economic output).

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<sup>757</sup> IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany. 1148 pages. <https://doi.org/10.5281/zenodo.3831673>

<sup>758</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6> & UNEP. Global Environment Outlook 6 Summary for Policymakers. 6 August 2019. [https://www.unep.org/resources/assessment/global-environment-outlook-6-summary-policymakers?\\_ga=2.58831021.1679832863.1648133604-1602352062.1634737523](https://www.unep.org/resources/assessment/global-environment-outlook-6-summary-policymakers?_ga=2.58831021.1679832863.1648133604-1602352062.1634737523)

<sup>759</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6> & UNEP. Global Environment Outlook 6 Summary for Policymakers. 6 August 2019. [https://www.unep.org/resources/assessment/global-environment-outlook-6-summary-policymakers?\\_ga=2.58831021.1679832863.1648133604-1602352062.1634737523](https://www.unep.org/resources/assessment/global-environment-outlook-6-summary-policymakers?_ga=2.58831021.1679832863.1648133604-1602352062.1634737523)

- *On the other hand, protecting the environment, as well as preventing and mitigating the impacts of pollution, are also major sources of economic opportunity, providing jobs, reducing poverty, driving innovation and addressing resource availability/scarcity and depletion.*
- Air pollution is the main environmental contributor to the global burden of disease, leading to between 6 million and 7 million premature deaths and welfare losses estimated at US\$5 trillion annually..<sup>760</sup>

As Verkuil et al.<sup>761</sup> pointed out:

“Some of the biggest environmental problems of our time have profound consequences not only for humans, but also for other animals. The climate crisis is already exposing animals to a host of new threats, including extreme weather events, changes in food and water availability, and heightened disease risk. Ocean acidification, ozone depletion, and air, land and water pollution from sources such as fossil fuels, chemicals and plastics can similarly harm animals. And while some species will be able to adapt, many will not, since human-caused environmental changes will occur much faster than evolution typically does.”<sup>762</sup>

### 7.3.1. SDG 6 Clean Water and Sanitation

Taken together, industrial crop and animal agriculture and aquaculture are responsible for the vast majority of water pollution globally. Agriculture uses a global average of 70% of all surface water supplies. Animal agriculture has an enormous water footprint. Industrial food systems are responsible for the overexploitation of 20% of the world’s aquifers.

A meat-based diet uses 15 times more water than a plant-based diet.

Clean water and sanitation are affected by contamination from organic and inorganic wastes from agriculture and chemical run-offs, including antibiotics and hormones (inland and coastal waters and land). This is most pronounced in areas with concentrated livestock operations and intensively cultivated crops (including for animal feed). Aquaculture also causes water pollution.

Animals can play a role in water conservation (such as beavers).

In water-scarce areas, animals can be in competition with humans for water supplies.

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<sup>760</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6> & UNEP. Global Environment Outlook 6 Summary for Policymakers. 6 August 2019. [https://www.unep.org/resources/assessment/global-environment-outlook-6-summary-policy-makers?\\_ga=2.58831021.1679832863.1648133604-1602352062.1634737523](https://www.unep.org/resources/assessment/global-environment-outlook-6-summary-policy-makers?_ga=2.58831021.1679832863.1648133604-1602352062.1634737523)

<sup>761</sup> Verkuil, Cleo et al. Mainstreaming animal welfare in sustainable development A policy agenda. SEI & CEEW. May 2022. <https://euagenda.eu/upload/publications/animal-welfare-stockholm50backgroundpaper.pdf>

<sup>762</sup> Verkuil, Cleo et al. Mainstreaming animal welfare in sustainable development A policy agenda. SEI & CEEW. May 2022. <https://euagenda.eu/upload/publications/animal-welfare-stockholm50backgroundpaper.pdf>



Experts predict that because pollution can no longer be remedied by dilution in many countries, freshwater quality will become the principal limitation for sustainable development in these countries.

### **7.3.2. SDG 8 Decent Work and Economic Growth**

600 million of the poorest people in the world rely on animals for their livelihoods. Animals often serve as the single biggest store of wealth they own.

Through agriculture and ecotourism, animals are fundamental to economies around the world. Nature-based tourism is a substantial driver of the tourism sector. For example, 80% of all trips to Africa are for wildlife viewing. Agriculture contributes one third of GDP in Africa and more than 65% of the workforce depends on this sector.

However, trends towards industrialised animal production and dwindling wildlife populations pose a grave risk not only to animals, but to the people and economies that rely on them.

Industrial agriculture is a high-input, low-labour system, meaning loss of agricultural jobs - which are the mainstay of developing country economies - whereas small-scale, high welfare, agroecological production provides local food security and labour opportunities.

Ethical concerns about certain agricultural industries or practices can affect the nature and sustainability of work, and future prospects for growth.

A development path that will create sustainable and broad-based jobs and livelihoods, and reduce poverty, must include the encouragement of more labour-intensive agricultural systems, especially smallholder farming. Sustainable livestock systems can increase the value of animals, leading to additional incentives to increase welfare and vice versa.

Better management of wild fish could boost catches and add 14m jobs and \$170bn in value.

It is vital to end the \$2bn subsidies given daily to agriculture which damage the planet and harms animals. At a time when many countries' public finances are constrained, particularly in the developing world, global agricultural support to producers currently accounts for almost USD 540 billion a year. Over two-thirds of this support is considered price-distorting and largely harmful to the environment.

This money could be repurposed to support animal welfare, the environment and the SDGs.

A global shift towards plant-based diets could avoid 8.1 million human deaths, reduce food-related emissions by 70%, and save USD 1.6 trillion in health and climate change costs by 2050.

A shift away from animal-based food production and towards more plant-based agriculture could involve significant employment gains: For example, in Latin America, a shift to higher-value fruit and vegetable production would gain 19 million jobs, compared to 4 million lost.

The transmission of diseases, like the Novel Coronavirus COVID-19, between animals and humans (zoonoses) threatens economic development, as well as health. The world could have lost at least \$5 trillion in GDP in 2020, and the willingness to pay for the lives lost constitutes many additional trillions. These costs exclude the rising tally of morbidity, deaths

from other causes due to disrupted medical systems, and the loss to society of foregone activities due to social distancing.

Conversely, estimated net prevention costs range from \$18 to \$27 billion per year.

It has been estimated that one dollar invested in One Health approaches can generate five dollars' worth of benefits at the country level through increased GDP and the individual level.

Pollution-related costs have been estimated at \$US 4.6 trillion annually (about 6.2 per cent of global economic output).

Continued reliance on economic growth, as measured by GDP, as the key indicator of development is at odds with the achievement of environmental and social well-being needed for sustainable development. Economic growth does not always go hand-in-hand with decent work. For example, support for industrial animal agriculture adversely impacts local small-scale farmers and fishers and their livelihoods, in favour of high-tech, low employment businesses.

### **7.3.3. SDG 12 Responsible Consumption and Production**

Transformation toward a sustainable world requires fundamental changes in how our societies produce and consume goods and services. Worldwide, especially in the Global North, over-consumption and mass resource waste negatively impact caring for land, wildlife, water, and humanity. Our current food systems are unsustainable on a number of fronts. In particular, industrial livestock production impacts detrimentally on the environment (through biodiversity loss, land and water use; water, soil and air pollution and climate change impacts), human health (through antimicrobial resistance and emerging zoonotic diseases), social structures (through rural abandonment, poor working conditions and low wages) and causes immense animal suffering. UN agencies and NGOs alike are calling for food policy and dietary changes.

Overfishing is threatening fish stocks and species, and impacting food security and livelihoods. Aquaculture also impacts the environment and human health (including antimicrobial resistance).

The world wastes or loses around a third of the food it produces, while almost 1 billion people go undernourished and another 1 billion go hungry. Conversely, 2 billion people globally are overweight or obese; with overconsumption of food adding detrimental impacts to both our health and the environment.

Feeding edible crops to animals is another wasteful consumption practice (which according to the World Economic Forum is the largest loss in the food supply chain is from animal feed, amounting to a net 20% of the calories produced per person per day).

The achievement of SDG 12 necessitates a reduction in the global consumption of animal products and products tested on animals. Decreasing consumption of food from animal

origin (including fish) and increasing willingness to pay the true cost of animal foods would help farmers to improve welfare and reduce negative environmental consequences. Also, ending the use of animals for inessential purposes, including luxury products, entertainment, and medicinal purposes which are not effective.

#### **7.3.4. SDG 14 Life Below Water**

The primary pressures on open ocean biodiversity are overexploitation, pollution from land-based activities and climate change.

Two-thirds of the marine environment has also been changed by fish farms, shipping routes, subsea mines and other projects.

Globally, the over-exploitation of current – industrialised - food systems is responsible for 60% of global terrestrial biodiversity loss (terrestrial and aquatic) and the depletion of 61% of “commercial” fish populations. Factory farming of livestock and aquaculture are inherently bad for animal welfare, and they contribute to marine pollution and eutrophication, which in turn impacts the habitats and lives of marine animals.

34 per cent of freshwater invertebrates and 25 per cent of marine invertebrates are considered at risk of extinction.

Two in five amphibian species are at risk of extinction, and close to one-third of other marine species.

The ocean produces more than 50 per cent of the planet’s oxygen, is the main source of sustenance for more than a billion people, and provides work through its industries for some 40 million employees. Yet, more than one third of the world’s fish stocks are harvested at biologically unsustainable levels.

Commercial aquaculture is one of the primary pressures on ocean biodiversity, with significant detrimental impacts on oceans and marine environments.

Capture fisheries – industrial uses include feed for aquaculture: Fishmeal and fish oil are used in aquaculture systems, adding to the pressures on wild fish stocks.

The commercial fishing industry is doing widespread damage to the ocean through taking too many fish for populations to rebuild, using harmful techniques such as bottom trawling – destroying habitats and killing non-target species.

The fishing industry also uses methods such as introducing explosives and poisons into the water, causing enormous loss of animal life and environmental destruction.

Noise pollution in oceans is an enormous animal welfare problem too.

Ghost fishing gear is another impact of the fishing industry - the deadliest form of marine plastic as it unselectively catches wildlife, entangling marine mammals, seabirds, sea turtles, and sharks, subjecting them to a slow and painful death. Ghost fishing gear also damages critical marine habitats such as coral reefs.

The sustainability of aquaculture is questionable. One quarter of wild caught fish are used as feed for fish on farms, with less than 30% efficiency, so that aquaculture is itself a major driver of overfishing.

Improved welfare of farmed fish leads to reduction in antibiotics in aquaculture.

The ecological destruction caused by fishing and aquaculture can be avoided by the development of cell-cultured seafood and plant-based alternatives.

#### **7.3.5. SDG 15 Life on Land**

An estimated one million of the world's eight million or so species of plants and animals, including insects, are threatened with extinction. Two in five amphibian species are at risk of extinction, and close to one-third of other marine species. Insect species are also in decline, with at least one in 10 threatened with extinction and some regions suffering declines in the region of 75% over 25 years. Insects are crucial for pollination, so this impacts food security. Globally, the massive over-exploitation of current - industrialised - food systems is responsible for 60% of global terrestrial biodiversity loss (terrestrial and aquatic) and 33% of degraded soils. Intensive monocultures deplete soil and leave it vulnerable to erosion. Chemical-soaked monocultures have devastated birds, butterflies and other pollinators.

Land use change is the major driver of biodiversity loss. The livestock sector is by far the single largest anthropogenic user of land, as well as the major driver of deforestation, and one of the leading drivers of land degradation and pollution.

Amongst the key anthropogenic drivers for the emergence of zoonoses are agricultural intensification and land use conversion, fuelled by increased demand for animal protein. Human meat eating is the major driver of the current biodiversity crisis.

A dietary shift from animal-based to plant-based food would reduce crop use as animal feed, which in turn would reduce demand for land and biodiversity loss.

Exploitation of wildlife has been identified as the second most significant direct driver of biodiversity loss.

Without addressing animal agriculture and land use, we will not achieve SDG 15. Poaching, hunting, wildlife trafficking and certain legal trade in wildlife are also driving biodiversity loss.

Land and biodiversity would reap significant benefits from rewilding, agroecology and regenerative practices, integrated soil and water management, grazing/rangeland management, and agroforestry/silvopastoral systems.

Responsible ownership of animals (farm and pets) can reduce the incidence of detrimental interactions with wildlife.

Deforestation and habitat loss impact the lives and welfare of animals.

Each species threat represents the suffering of thousands of individual sentient beings, and even millions or billions in some cases. Furthermore, their demise will inevitably have “knock-on” effects on other animals, species and habitats.

### **7.3.6. SDG 17 Partnership for the Goals**

Public private partnerships can be effective nationally and globally in initiatives supporting animal welfare.

Animal welfare and conservation are increasingly recognised as priorities in international policy, for example in the OIE's animal welfare standards, the African Union's animal welfare strategy, and in SDGs 14 and 15 of the U.N.'s 2030 Agenda.

One Health provides a potential platform for partnerships for the goals in the many cases where SDGs cut across human-animal-environmental wellbeing.

A proactive programme of “Just Transitions” for transformative change is a major exercise, and should harness partnerships across different stakeholder groupings.

Partnerships between governments, intergovernmental institutions, research and academic institutions, and civil society are critical to gaining the comprehensive perspectives, expertise and resources necessary to fully implement the 2030 Agenda, as well as ensure effective monitoring, review, and accountability.

## **7.4. Climate Change SDG**

Although UNEP is not officially responsible for any of the indicators under SDG 13, The UN Environment Programme (UNEP) stands at the core of the action in the fight against climate change.<sup>763</sup> Climate stability is one of UNEP’s three strategic objectives, and one of its three principal areas of action, along with tackling biodiversity and nature loss and pollution and waste. Its strategy speaks of “by developing responses and deploying solutions that aspire to achieve three interlinked and mutually reinforcing strategic objectives”.<sup>764</sup>

This Scoping Study underlines the centrality of human interactions with animals and animal welfare to the achievement of these strategic objectives, including climate change and the achievement of SDG 13, which is dealt with in more detail below.

### **7.4.1. SDG 13 Climate Action**

The global food system as a whole (farming, transportation, packing, etc.) contributes 20 to 30 percent of anthropogenic greenhouse gas emissions and is the leading cause of deforestation.

According to the FAO, global livestock supply chains account for 14.5 percent of anthropogenic greenhouse gas (GHG) emissions, although more recent studies recommend updating this figure to 16.5%.

Feed production and processing, and digestive fermentation from ruminants are the two main sources of emissions, representing 45% and 39% of sector emissions, respectively. Manure storage and processing represent 10%.

The remainder is attributable to the processing and transportation of animal products.

Included in feed production, the expansion of pasture and feed crops into forests accounts for about 9% of the sector’s emissions.

Beef and cattle milk production account for the majority of emissions, respectively contributing 41% and 20% of the sector’s emissions.

There is an urgent need to transform food systems.

Adaptation options included agroecological principles and practices, ecosystem-based management in fisheries and aquaculture, and other approaches that work with natural

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<sup>763</sup> UNEP. Spotlight on Climate Action. 3 February 2022. <https://www.unep.org/news-and-stories/news/spotlight-climate-action>

<sup>764</sup> UNEP. For People and Planet: The United Nations Environment Programme strategy for tackling climate change, biodiversity and nature loss, and pollution and waste from 2022—2025. <https://wedocs.unep.org/bitstream/handle/20.500.11822/35875/K2100501-e.pdf>

processes support food security, nutrition, health and well-being, livelihoods and biodiversity, sustainability and ecosystem services. Other adaptation strategies include the reduction of food waste at all stages of production and consumption.

Climate change is one of the key anthropogenic drivers for the emergence of zoonoses. The oceans cover over 70% of the Earth's surface and play a crucial role in taking up CO<sub>2</sub> from the atmosphere. Increasing CO<sub>2</sub> in the ocean alters the chemistry of seawater – an effect known as ocean acidification – which has negative impacts on marine life. Another serious impact of livestock farming is its contribution to dead zones in the ocean, which are like oceanic deserts unable to support marine life. These dead zones are releasing one of the worst greenhouse gases, nitrous oxide (N<sub>2</sub>O). The aquaculture industry also contributes to global warming.

Dietary change (towards predominantly plant-based diets) is one of the most promising approaches for addressing climate change and other environmental challenges, and cellular agriculture and cultured meat and seafood could support this transition. Emissions could be reduced by as much as 70 percent through adopting a vegan diet and 63 percent for a vegetarian diet, which includes cheese, milk, and eggs.

The main natural carbon sinks are plants, trees, the ocean and the soil. The oceans cover over 70% of the Earth's surface and play a crucial role in taking up CO<sub>2</sub> from the atmosphere. The U.S. government estimates that 90 percent of the world's global warming has taken place in the oceans. The phenomenon is exacerbated by other factors in the water, including overfishing and destructive fishing practices, seabed mining, and plastic and chemical pollution.

Marine vertebrates influence the capacity of ecosystems to release, fix, store, or sequester carbon; and also, themselves function as carbon stores and contribute to carbon flux (downward movement of carbon to deeper waters and sediment).<sup>765</sup> Fish Carbon mechanisms are the natural life processes of marine vertebrates that enable capture of atmospheric carbon, allow carbon storage in benign form in the ocean, and provide a potential buffer against ocean acidification. The carbon capture potential of whales is significant.

Another often-forgotten interlinkage is that between working Equidae and climate change which stretches across the world with horses, mules and donkeys used in sustainable cities, farming, rewilding or forestry. This helps to reduce carbon footprint.

Climate change will increasingly impact terrestrial animals, marine ecosystems, fisheries and aquaculture alike. The climate emergency is also a major contributor to insect loss, including essential pollinator species.

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<sup>765</sup> Martin, Angela Helen et al. Integral functions of marine vertebrates in the ocean carbon cycle and climate change mitigation, Science Direct. 21 May 2021.  
<https://www.sciencedirect.com/science/article/pii/S2590332221002384>



Mammals play dominant roles in many ecological contexts. Large herbivores, such as elephants and gorillas, play a particular role in distributing seeds to regenerate forests.

SDG 13 will not be achieved unless more is done to persuade consumers to shift to more plant-rich diets.

Replacing just 20% of global beef consumption with a meat substitute could halve deforestation and the carbon emissions associated with it. Incorporating novel foods into diets can reduce global warming potential, water use and land use by over 80%. The mitigation potential of emerging food technologies, such as cellular fermentation, cultured meat, and plant-based alternatives to animal-based food products are widely agreed.

Unless animal agriculture in itself is recognised and dealt with as a major contributor to rising temperatures, climate change and its deleterious effects on humans and animals cannot be mitigated.

It will not be possible to reach the Paris targets or to implement SDG 13 without addressing animal agriculture and current levels of meat and dairy consumption, because of the contribution of animal agriculture to greenhouse gases.

## **7.5. Other SDGs**

### **7.5.1. SDG 1 No Poverty**

The transformation of food and agricultural systems has a critical role to play in ending poverty in all its forms, eradicating hunger, achieving food security and improved nutrition, and reducing inequalities.

Industrial animal agriculture profits are made by large corporations, and its products go to feed well-off urban populations. The “trickle down” effect does not occur in ways that benefit the poor.

Industrial animal agriculture exacerbates poverty through unfair competition with family and small-scale farmers, and its detrimental impacts on rural communities.

Industrial animal agriculture is associated with reduced employment and hence greater poverty which has cascading harmful effects on rural communities and contributes to rural abandonment.

The introduction of high welfare, sustainable, agroecological systems will provide a pathway out of poverty, building food-secure and sustainable rural populations for many generations to come.

In general, healthy, well-cared for animals can make a real difference to raising people out of poverty.

Overfishing from industrial methods is threatening the livelihoods of local coastal communities and fisher folk.

The accelerated decline in wildlife populations deepens poverty and inequality. The converse is also true.

Healthy wildlife populations sustain local communities through ecotourism and job creation.

Accelerating decline in wildlife populations will have long-term negative impacts on local communities as it robs communities of their natural capital and livelihoods - \$70 billion per year is lost due to crimes affecting natural resources - deepens poverty and inequality, and threatens national security by causing instability and fuelling conflicts.

Poverty is a major driver of wildlife crime. In one poll, 80% of poachers reported poverty and/or food insecurity as their primary motivation. Up to 96% of poachers reported that they would give up poaching if alternative livelihoods were available to them.

Zoonotic diseases are particularly prevalent among the poorest and most marginalised populations who live in proximity with their animals or who are dependent on livestock for their livelihoods. About 70% of the world's 1.4 billion people living in extreme poverty live close to livestock or fresh markets where diseases spread easily.

Poverty also relates to the keeping of working animals. 650 million people worldwide, many below the poverty line, are directly reliant on animals for income. Improved welfare of working animals increases transport and carrying capacity, and incomes.

### **7.5.2. SDG 2 Zero Hunger**

Animal-based foods require more land, water and fossil energy compared to a plant-based diets. Reduction of natural resource use and environmental impacts will support sustainability.

62 per cent of the energy (in terms of kcal) harvested as crops and other biomass, is lost or wasted after accounting for losses from food waste, trophic losses from livestock, and human overconsumption.

36% of calories produced by cropping systems is used for animal feed of which only 12% are ultimately used for human consumption. It has been estimated that if these calories were consumed by people directly, the current global food production system could feed an additional 4 billion meeting estimated population growth forecasts for 2050.

For every 100 calories fed to animals in the form of human-edible crops, we receive just 30 calories in the form of meat and dairy products.

For every kilogram of beef produced, 5kg of feed is needed (not including grass fodder).

Today, the double burden of malnutrition - the prevalence of both undernutrition and obesity - seems to represent the main food and nutrition security challenge. Inequality, not unavailability, is the main driver of food insecurity.

The decline of genetic diversity is threatening food security and the resilience of ecosystems, including agricultural systems and food security.

The COVID-19 pandemic revealed the harsh reality about the fragility and high "costs" associated with intensive, high-throughput, and highly specialised food production systems. The pandemic affected the food supply chain, in particular livestock production.

GEO reports include what is needed to transform food systems. This includes a whole-system approach towards sustainability, including tackling food losses and greenhouse gas emissions along supply chains, wasteful consumption patterns including high consumer food waste and overconsumption of animal products. The reports are clear on the need for demand-side measures, as well as supply-side measures. These would include reduced food

consumption (to healthier and more sustainable diets), reduced waste and/or reduced feed/fuel use.

The aim of food systems transformation should be to ensure humane and sustainable food supplies. This would mean eating further down the food chain, minimising resources and environmental impacts, severely reducing waste (including the waste of feeding edible crop calories through animals), reducing animal products and ensuring high welfare standards. Plant-based products and cellular and cultured meat and seafood products have the potential of supporting food sustainability.

Consumers need information to make healthy, humane and sustainable food choices, and they need meaningful product labelling which makes good decision making possible.

Healthy and cared-for domestic animals and healthy populations of wild animals support the agricultural and natural processes that promote food security and mitigate global hunger. Furthermore, these close-confinement animal systems and crop monocultures are particularly vulnerable to disease and accidents, increasing food insecurity and health risks. Various pharmaceutical and chemical inputs are used, including antibiotics, to keep such systems functional in the short-term, but these have detrimental impacts over the longer term (in terms of sustainable food security; as well as health, environment and animal welfare).

Working animals contributed to agricultural productivity.

Plant-based replacements for each of the major animal categories in the United States (beef, pork, dairy, poultry, and eggs) can produce twofold to 20-fold more nutritionally similar food per unit cropland. Replacing all animal-based items with plant-based replacement diets can add enough food to feed 350 million additional people, more than the expected benefits of eliminating all supply chain food loss.

### **7.5.3. SDG 3 Good Health and Wellbeing**

WHO states overall, a diet that is predominantly plant-based and low in salt, saturated fats and added sugars is recommended as part of a healthy lifestyle.

The EAT-Lancet Commission quantitatively described a universal healthy reference diet, based on an increase in consumption of healthy foods (such as vegetables, fruits, whole grains, legumes, and nuts), and a decrease in consumption of unhealthy foods (such as red meat, sugar, and refined grains) that would provide major health benefits, and also increase the likelihood of attainment of the Sustainable Development Goals.

More than 820 million people have insufficient food and many more consume an unhealthy diet that contributes to premature death and morbidity.

There is a burgeoning problem with non-communicable diseases among wealthier segments of the world's population, associated with high intakes of animal source foods, and in particular animal fats and red meat.

Dietary shifts toward more plant-based foods that maintain protein intake and other nutritional needs could improve human health and reduce agricultural air quality-related mortality by 68 to 83%.

Intensified farming systems and unsustainable exploitation of natural resources, including an increasing trade in wild animals, are fuelling zoonoses.

The cramped, unhealthy environmental conditions in factory farms and feedlots increase the risk of infectious and non-communicable food-borne diseases.

There is a clear nexus between the use and welfare of animals and pandemics. COVID-19 has caused profound damage to human health, societies and economies in every corner of the world. This illness is a zoonotic disease, one which transmits between animals and humans. 60 per cent of known infectious diseases in humans and 75 per cent of all emerging infectious diseases are zoonotic in nature. UNEP identified key drivers of zoonoses including: agricultural intensification and increased demand for animal protein to the conversion of land and climate change.

There are health and disease risks from bushmeat – handling, consumption and trade. In particular, these include activities associated with unsafe hunting, butchering and transport of some species, especially primates.

Reducing global wildlife trade, particularly in markets where live animals are sold or slaughtered, would have a profound effect on protecting people from zoonotic disease spill-over events.

In general, SDG 3 must be approached from a One Health perspective, in order to ensure a systemic understanding of the interdependencies between the health of humans, animals, plants and the environment and how these can manifest as health threats.

The agreed One Health definition includes: *“One Health is an integrated, unifying approach that aims to sustainably balance and optimise the health of people, animals and ecosystems.”* This means developing and using a more thorough understanding of the animal welfare-environment-sustainable development nexus.

There is a risk of disease and physical attacks from feral animals, particularly dogs. This is where humane and effective population control programmes are needed.

There is also a human health risk from the use of wild-caught animals in animal experiments and research (and from the use of animal “models” to test drugs and products intended for humans).

Rabies is not a pandemic, but a viral zoonotic disease. However, it is a disease which is important to the animal welfare-environment nexus. Humane dog population control is an important component of rabies prevention, as is oral vaccination for wildlife at the human-interface.

Pollution threatens the health of ecosystems, animals, and people alike.

The ways in which humans use animals are a leading cause of pollution and, conversely, animals and their welfare are massively impacted by pollution.

A wide variety of chemical products are used in agriculture, such as pesticides (including insecticides, herbicides and fungicides), as well as synthetic fertilisers, hormones and antibiotics. Dangerous compounds found in agrichemicals end up as pollutants when wind and rain disperse them into the environment. They pose human health risks, and cause antibiotic resistance. Antibiotic resistance is a “ticking time bomb” for human health.

Heavy metals such as lead or mercury and other toxic chemicals – like pesticides - in aquatic ecosystems can bioaccumulate in the food chain with potential adverse impacts on humans and animals.

Marine litter and plastics break down and end up in seafood which humans then consume. Exposure to mycotoxins, aflatoxins, biotoxins and water-borne pathogens is another problem of concern affecting the health of animals, as well as humans and plants.

The use of animal experimentation can also impact human health and wellbeing. Animal experimentation often significantly harms humans through misleading safety studies, potential abandonment of effective therapeutics, and direction of resources away from more effective testing methods.

Owning a companion animal can be good for both physical and psychological health. Animal-assisted therapy can be used for physical and psychological disorders, contributing to human well-being.

#### **7.5.4. SDG 4 Quality Education**

Humane Education is a tried and tested vehicle for developing an understanding of the need for compassion and respect for people, animals and the environment. The Academy of Prosocial Learning defines humane education as follows: “Humane education encourages cognitive, affective, and behavioural growth through personal development of critical thinking, problem solving, perspective taking, and empathy as it relates to people, animals, the planet, and the intersections among them.”

This will help to build caring and supportive societies; which will in turn support the attainment of many other SDGs.

Governments should play an important role in education to bring about food systems change, both for food producers and consumers. Children are the next generation consumers, who can create a market for higher welfare products.

Public procurement: plant-based diets for schools would bring educational benefits.

Educational programmes should be included in further and higher education. For example, teaching about the animal welfare – environment nexus in agricultural and veterinary training, and in environmental sciences.

Training veterinary professionals (especially in developing countries) in animal welfare can help them to educate farmers, breeders, and others economically dependent on animals how to properly care for them, minimising financial loss due to preventable health issues, and helping to prevent and contain zoonotic diseases threatening both animal and human lives.

Animal collections can provide unhelpful educational experiences, particularly where they are not kept in natural conditions, exhibiting natural behaviours. Animals used in circuses or entertainment can provide the false impression that it is acceptable for humans to take and

use animals simply for human entertainment. Where animal welfare is poor, the experience can also have the effect of lessening empathy and respect for animals.

To understand and promote the human-animal bond and how animals can enrich the lives and wellbeing of humans through companionship and therapeutic benefits.

On the flip side, children who are exposed to animal cruelty are significantly more likely to commit violent acts impacting humans, highlighting the consequences of failing to model proper treatment of animals, or counteract harmful modelling, early in life.

#### **7.5.5. SDG 5 Gender Equality**

78% of the poor live in rural areas, and 500 million are small farmers. Of these, 170 million are women farmers, and this is the main source of their livelihood.

Women comprise about 43 percent of the agricultural labour force globally and in developing countries, where it has been confirmed that they make essential contributions to the agricultural and rural economies in all developing countries.

Women represent nearly half of those working in fisheries and aquaculture worldwide.

Women often have a prominent role in managing poultry and dairy animals, and in caring for other animals that are housed and fed within the homestead.

Many women worldwide are reliant on animals for their livelihood, including two thirds of livestock keepers living in poverty.

It is noted that women's groups support organic agriculture.

Perverse subsidies and incentives paid to commercial agriculture are disadvantaging women and other smallholder farmers in the sector.

Women, who are the main fieldworkers in many regions, and at greater risk of pesticide poisoning.

Working animals in good welfare hence offer women big a level of freedom from heavy chores like ploughing and fetching water which are ordinarily are done by women.

It has been found that there is a strong link between animal abuse and domestic violence, which disproportionately impacts women.

#### **7.5.6. SDG 7 Affordable and Clean Energy**

A dietary pattern that is higher in plant-based foods, such as vegetables, fruits, whole grains, legumes, nuts, and seeds, and lower in animal-based foods, is not only more health-promoting, but is also associated with lower energy use.

There is a large and wasted energy use in industrial agriculture. Animal production is a poor converter of energy because it is based on a double energy transformation. First, solar energy and soil nutrients are converted into biomass by green plants. Then, when the plants are fed



to animals, for which a major share of energy intake is spent on maintaining body metabolism and only a small portion is used to produce meat, milk or eggs. Other relevant factors are:

- Animals can convert only 17-30% of the feed input energy (GE) to usable product (milk and meat energy).
- Fossil energy is a major input of industrial livestock production systems, used mainly for the production, transport, storage and processing of feed.
- Depending on location (climate), season of the year and building facilities, energy is also needed for control of the thermal environment (cooling, heating or ventilation) and for animal waste collection and treatment.

Many high welfare systems will be local production for local markets; and these are also energy efficient food solutions, as opposed to industrial agricultural systems which are largely based on exported commodities (such as feed) for inputs.

Working animals save energy, and are most productive with good welfare.

Animals or their waste products can be used to create renewable energy, increasing their importance and value to the community.

### **7.5.7. SDG 9 Industry, Innovation and Infrastructure**

There is a need to transform food and agricultural industries so they are humane and sustainable.

Perverse subsidies must be removed, and repurposed towards transformation, including support for small-scale producers using regenerative and agroecological methods. There should be more support for new technologies that will increase sustainability (and protect the environment and animals), including cellular and cultured meat and seafood alternatives.

There are business opportunities to develop new systems and technologies that enhance animal welfare and the environment. Interest in the welfare of farm, companion, laboratory animals etc. can lead to new industries to supply demand and innovation.

One promising area of technological innovation is in alternatives to animal use. For example, compared to animal research, tests using human volunteers, cell cultures, chemistry, or computer models often yield more accurate results.

The alternative protein industry, which develops plant-based and cellular replacements for meat, dairy, and eggs as food sources, has an estimated value of \$2.2 billion USD as of 2019, and could grow to as much as \$140 billion (10% the current value of the meat industry) within ten years.

In the area of infrastructure development, there is a need to mitigate the impact of new building projects on wildlife and their habitats, for example by routing highways and train lines around wilderness areas, and installing overpasses and underpasses for wildlife to safely cross, reducing roadkill and fragmentation of habitat.

### **7.5.8. SDG 10 Reduced Inequalities**

More than 820 million people have insufficient food and many more consume an unhealthy diet that contributes to premature death and morbidity.

Inequality, not unavailability, is the main driver of food insecurity.

industrialised agriculture has resulted in lower relative incomes for farm workers and greater income inequality and poverty. Corporate concentration of agricultural inputs, production, processing and distribution, known as vertical integration, has increased substantially in recent decades, giving these corporations a major advantage over small to medium-sized farmers.

Many agricultural subsidies provide further unfair price advantages to large-scale enterprises, with producers not held responsible for external costs such as social and environmental impacts.

With better animal welfare that will advocate for less industrial livestock and more of small-scale livestock, wealth will be distributed in the communities. This will improve the livelihood of the majority of the population and thus reduce economic inequality within the country and globally among countries.

Harmonisation of animal welfare standards globally reduces inequality and provides increased trade opportunities for high welfare products and prevents trade inequalities leaving some countries behind.

Financial loans to industries and farmers can be conditional upon improved animal welfare. Sharing of veterinary services can reduce inequalities in animal disease control.

Globally countries that are developing depend on ecotourism as a way of economic development via foreign exchange and a sector that's creates employment for its citizen and thus an asset. This helps in creation of jobs and elevation from poverty hence reducing inequalities among countries.

Oppression of human populations and exploitation of non-human animals have often been closely linked. For example, economic desperation may drive marginalised people to adopt livelihoods that exploit animals, such as wildlife poaching and trafficking and low-wage, high-risk employment such as slaughterhouse work.

Certain wildlife "sustainable use" policies rely upon and exacerbate existing inequalities. Legal trophy hunting upholds a de facto system which rewards wealthy trophy hunters who kill wildlife for sport, while punishing poor local communities who hunt for food or economic survival.

The accelerating decline in wildlife populations will have long-term negative impacts on local communities as it robs communities of their natural capital and livelihoods - \$70 billion per year is lost due to crimes affecting natural resources - deepens poverty and inequality.

Policies which promote sustainable local livelihoods and food security can play a role in stemming wildlife poaching and crime. Furthermore, policies which alienate local communities from their land and resources and privilege use to wealthy, foreign interests should be lifted.

#### **7.5.9. SDG 11 Sustainable Cities and Communities**

Humane and effective dog population control programmes are needed (and in some cases for cats too) to guard against feral animals causing injury and disease in the streets.

Cities can be designed to be pet-friendly (e.g., dog parks) and responsible ownership reduces stray dogs with associated health problems.

Human communities are intrinsically linked to the ecosystems surrounding them and the ecosystems that human settlements replace. One factor that is systematically destroying nature and biodiversity, and pushing wildlife to the brink of extinction, is the expansion of industrial livestock farming. Urban and peri-urban agriculture is often introduced as a development and poverty alleviation scheme. However, livestock projects can bring negative impacts for communities through the over-use of pesticides and human exposure to pollution, contaminants and pathogens. Zoonotic diseases (disease of animals that can be transmitted to humans and vice versa) can also be a risk of urban livestock raising. Building new markets and slaughterhouses in cities, necessitating greater transport/movement of animals, can further exacerbate these risks.

Municipal ordinances to remove farm animals from city limits have played a central part in defining city planning's role in urban ecosystems, economies, and public health for decades. This has aligned the field with the field of public health in creating a hygienic city.

Urban wildlife management and reducing habitat loss improves biodiversity and sustainability, but also requires that waste from cities is managed appropriately.

Sustainable cities need sustainable supply of food which can only be achieved by better animal welfare.

#### **7.5.10. SDG 16 Peace, Justice and Strong Institutions**

Strong institutions, effective governance frameworks, and peaceful and inclusive societies are all instrumental to addressing environmental challenges, including the degradation of ecosystems and climate change, which are driven by food systems and the dramatic loss of wildlife.

There is a strong body of science supporting animal sentience, and this is already recognised in the EU's Lisbon Treaty, the Animal Welfare Strategy for Africa (under the African Union), and the WOAH's Global Animal Welfare Strategy. Yet animals are still not included in the SDGs, which infers lack of justice. Also, weak institutions, because as this Scoping Study shows, their inclusion is essential to the achievement of all of the SDGs.

Improved governance of veterinary services and competent authorities can guide and enforce good animal welfare policies.

Increased participatory and representative decision-making, such as by stakeholder involvement, will help ensure that animal welfare regulations are appropriate and enforceable.

Animals are negatively affected by injustice, trafficking, and corruption. Wildlife crime, and particularly the illegal wildlife trade, is increasingly recognised as transnational organized crime, worth an estimated USD 23 billion each year. Driven by rising demand, wildlife crime is often facilitated by corruption and weak governance.

Many countries continue to fail to recognise wildlife crime as a serious crime. Challenges include a deficiency in legislation, insufficient law enforcement, weak prosecutorial and judiciary capacities, lack of expertise and capacity to effectively investigate and prosecute wildlife offences, low-level penalties that fail to deter wildlife criminals, lack of coordination between relevant competent authorities, and a lack of adequate intelligence-sharing between countries.

Animal welfare is at risk when countries are performing poorly or in countries at war. Including animals in disaster response and risk reduction programmes improves survival and recovery outcomes for the entire community and can help reduce poverty, hunger and conflict.

Peace and food security are often mutually reinforcing.

There is also a demonstrated connection between cruelty and violence towards animals and violence towards other humans. This is borne out by an increasing body of research by psychologists, sociologists and criminologists. There are also coalitions addressing “The Link” between animal and human violence across the world.

Awareness and proactive action to take account of “The Link” between cruelty to animals and violence against other humans can help to create peaceful and less violent societies. This will include cooperation between different enforcement agencies and animal protection organisations, and training on “The Link” and its implications. Reporting, investigating and prosecuting animal cruelty can help take dangerous criminals off the streets.

## **8. Further Comments and Considerations on the Animal Welfare - Environment - Sustainable Development Nexus**

This Scoping Study has shown the immense, inextricable and complex interlinkages between animal welfare, the environment and sustainable development. Human relationships with animals and their welfare impact the environment in multiple ways and, conversely,

environmental changes – and indeed environmental policies and programmes – impact the lives and welfare of animals. Beyond this lies a complex web of causality based on root causes and drivers of both environmental and animal welfare impacts, plus another complex web of impacts on the Sustainable Development Goals (SDGs).

This Scoping Study has been prepared primarily from the knowledge base of human-animal interactions and animal welfare. It purely provides resources and background information that may be helpful when preparing the full nexus report. The full report will need to be developed using a multi-disciplinary team of experts who can critically analyse – drill down into - these inter-relationships from various perspectives.

It is worth noting here that this Scoping Study research showed that most of the nexus areas examined are in fact aligned, rather than the “trade-offs”, which are so often mentioned. This makes perfect common sense: protecting animals protects nature, and both of these are essential for human wellbeing. In particular, preventative and proactive actions are most likely to coincide. For example, protecting natural populations and habitats, preventing the introduction of alien species, protecting animals in their habitats (naturalness as an integral part of both animal welfare and ecosystem protection).

It is not only true that there are considerable causal inter-relationships between good animal welfare and environmental protection. But also, conversely, where animal welfare is severely compromised, there are greater risks across environmental issues. Take the example of industrial animal agriculture. This is inherently bad for animal welfare. There is no “naturalness” inherent in the system. More inputs and resources are needed, feed use is not effective (feeding edible crops through livestock for fewer calories), land-use change is needed to grow feed crops, there are greater pollution and waste problems, and increased disease risks. Industrial aquaculture systems have very similar inherent problems. There is greater opportunity for higher welfare, higher biodiversity within more natural extensive systems.

It is where human intervention is maximised that any “trade-offs” seem to occur. This is largely because of different interests and disciplines working in silos, without systemic policy-making and implementation. This indicates the vital importance of One Health approaches – but also of ensuring that One Health work is applied broadly and more proactively. To ensure “deep prevention” (and “wide prevention”), wherever possible. This is the only way of ensuring policy coherence, and of maximising policy effectiveness – across different dimensions. As in the One Health definition: “an integrated, unifying approach that aims to sustainably balance and optimise the health of people, animals and ecosystems”.

This may mean revisiting the One Health action plan. The systemic analysis needed as a base for critical decision-making about policies and approaches will need a degree of complexity which may only be achievable by well-programmed computer technology. Or, at the very least, well-designed ethical matrices.

The use of ethical matrices is especially important for the effective implementation of One Health. The domains chosen will need to be carefully selected to ensure that the health of people, animals and ecosystems can indeed be optimised. Using the SDGs alone will not be

sufficient to optimise environmental and animal health and wellbeing. The factors included in Doughnut Economics may be preferable, as these include the planetary boundaries (which should not be caused to deteriorate, and definitely not be breached). For animals, there should be no detrimental impacts on animal welfare, and the five freedoms/five domains should in no way be compromised.

There is also a real need for Animal Welfare Impact Assessments to be routinely used, as well as Social and Environmental Impact Assessments – to identify and catch any potentially deleterious impacts (which will – as we have seen - also have knock-on impacts).

There is a mass of evidence to support the inclusion of considerations of human-animal interactions and animal welfare in environmental policy and programmes. The most compelling and urgent issues are the need to transform food systems and the over-exploitation and trade in wildlife. The inclusion of animal welfare within both of these will undoubtedly support actions to address the major environmental crises.

What is needed for food systems transformation is well-known, and has been reiterated in many of reports/studies covered in this Scoping Study. Most important amongst the changes needed are: dietary change (to healthier, predominantly plant-based diets, supported by cellular agriculture); move away from industrial animal agriculture and commodity-based trade in animal products, towards agroecology, local production-consumption and seasonal consumption; and the elimination of food waste at all stages (farm to fork).

However, the real problem here is the lack of political will to highlight this, and to deal with it decisively and effectively. The massive environmental problems caused by industrial animal agriculture have been known for many years. The FAO's "Livestock's Long Shadow" report should have been a turning point when it was produced back in 2006. But despite a promising initial reaction, industry pressure was brought to bear and this was avoided. With the current multiple crises, UNEP needs to ramp up pressure for change, and spearhead the action which is now urgently needed.

As regards the over-exploitation of wildlife, one key problem is that the promotion of sustainable use has not led to the sustainable use of wildlife, but to its over-exploitation and the existential biodiversity loss. This is tragic for animals and humans alike, and needs to be urgently addressed.

Beyond these immediate actions needed, there are broader, systemic issues which have to be addressed in order to achieve transformation. The most important is the need for work on "Beyond Growth", in order to move away from the underlying development paradigm which is fuelling over-consumption, the commoditisation and exploitation of natural resources and environmental destruction. The obvious place for this work to sit would be under the One Health umbrella, as the need for a new development paradigm which prioritises the flourishing of people, animals and nature aligns perfectly with the One Health objective of optimising the health of people, animals and ecosystems.

This Scoping Study has shown that the many scientific reports and research studies carried out are also predominantly carried out in silos of expertise, including flagship reports which



underpin UNEP's work. There is an evident need for more of a One Health approach to underly these, using a cross-fertilisation of disciplines and expertise. Only then will the critical analysis needed for effective policy-making be available.

Finally, this Scoping Study provides incontrovertible evidence that without this critical analysis it will be impossible to address the existential “triple planetary crises” of human-driven climate change, widespread biodiversity loss and unmitigated pollution which now threaten to surpass the planetary boundaries necessary to live safely on earth. It will also be impossible to meet the new human right to a clean, healthy and sustainable environment or – indeed – to achieve the sustainable development goals.<sup>766</sup>

## **Annex 1: Just Transitions**

### **Annex 1.1. Introduction**

During the research for this Scoping Study, many suggestions for “Just Transitions” were encountered – in reports, papers and advocacy messaging. Combined, these have the potential to achieve effective systemic change, through approaches which will be “win-win” over time.

This list of suggestions focusses on nexus issues relating to animals and the environment, but clearly transitions would also be needed in the social sphere.

Food systems and wildlife trade have been separately listed as the nexus areas where the most far-reaching changes are needed; but all nexus issues of inhumane animal exploitation with links to UNEP's responsibilities, policies and programmes should be included.

Most importantly, “Just Transitions” of this complexity and magnitude must begin with action by policy makers – as changes are needed to public and economic policies, programmes and structures before there can be enduring societal change.

### **Annex 1.2. Policy and Regulation**

***Policies, structures and programmes need to be transformed as a priority, so these can address the transformative changes needed, and work in a complex, concerted and systemic manner.***

This is an overview of the sort of changes needed:

- Integrate animal welfare considerations into work of intergovernmental and development organisations, and trade agreements, and strengthen interdisciplinary

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<sup>766</sup> World Economic Forum. The UN just declared a new human right. 9 August 2022. <https://www.weforum.org/agenda/2022/08/the-un-just-declared-a-universal-human-right-to-a-healthy-sustainable-environment-here-s-where-resolutions-like-this-can-lead/>

governance to support work on the nexus at regional and national levels, as well as at international level.

- Integrate animal welfare considerations into all “Green New Deals” and “Blue New Deals” and pandemic recovery programmes, always ensuring that policies and programmes take account of the nexus (“building forward” for people, animals and nature). These should include food system transformation and prevention of future pandemics.
- Strengthen the work of One Health to identify and support the “Just Transitions” needed for transformational change.
- Create a separate division within UNEP to address animal welfare and the nexus. This would need a multi-disciplinary team of experts who could examine potential conventions, instruments, programmes and “best practices” which could be used for “Just Transitions” in support of UNEP’s strategy and mission.
- Mainstream animal welfare into the work of all relevant UNEP divisions and programmes. Animal welfare improvement should be consistently linked with environmentally sustainable development due to mutual causes and effects, and considered an integral part of “harmony with nature” and the human right to a clean and healthy environment.<sup>767</sup>.
- Consider forming an Open-Ended Working Group to support the introduction of this work.
- Promote greater recognition of animal welfare, and the integration of animal welfare concerns into political declarations and international legal instruments.
- Animal welfare to be made a cross-cutting issue across all key UN priorities.
- Explicitly integrate animal welfare into the 2030 Agenda.
- In particular, integrate the use and treatment of animals, and their welfare, as a key component of work on Sustainable Production and Consumption.
- An implementation system with strong enforcement and monitoring and evaluation frameworks.
- The introduction of a system to build in prevention, and uphold the principles of “precaution” and “non-regression”. For example, impact assessments not just for environmental and social impacts, but also for animal welfare impacts (see below).

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<sup>767</sup> UN News. UN General Assembly declares access to clean and healthy environment a universal human right. 28 July 2022 <https://news.un.org/en/story/2022/07/1123482>

- Include a programme within UNEP – and in conjunction with One Health partners – to encourage the procurement programmes of national governments, regional and multilateral organisations (including UNEP and its conventions) to move to humane and environmentally-sustainable procurement practices and products, and to support and promote these. Use publicly-accessible tracking systems to record and compare performance in this regard.  
*[Governments are often the largest buyers of food products, for example, for schools, state institutions like hospitals, schools, prisons, and government ministries, and militaries. Governments should work towards only financing healthy, humane and environmentally-friendly food products, including plant-based alternatives to meat and dairy.]*
- Work on what is needed “Beyond Growth” in order to move away from the underlying development paradigm which is fuelling over-consumption, the commoditisation and exploitation of natural resources and environmental destruction. Take as the “gold standard” the call from Major Groups and Stakeholders for a new development paradigm which prioritises the flourishing of people, animals and nature. This aligns perfectly with the One Health objective of optimising the health of people, animals and ecosystems.
- Whilst working on the above, it is important that Animal Welfare Impact Assessments are introduced – and promoted amongst Member States and other regional and international policy organisations – in order to ensure the necessary consideration of animal welfare impacts in policy development and projects. This will ensure that there are no detrimental impacts across the nexus, and support policy coherence. Environmental Impact Assessments (and Social Impact Assessments) are widely used (ESA), but combining with animal impact assessments will enable policy-makers to make more informed decisions that benefit humans, animals, and the environment.
- Countries must introduce regulatory changes to simplify and streamline the regulatory acceptance, marketing and sales of meat, dairy and seafood alternatives.

### **Ethical Matrix for Impact Assessments:**

One useful way of weighing and balancing different impacts is through an “ethical matrix”. This tool was originally devised by Professor Ben Mepham, Director of the Centre for Applied Bioethics at the University of Nottingham and a member of the Food Ethics Council. It is intended to help people make ethical decisions, and can be adapted to suit different needs (to evaluate win-wins, trade-offs, potentially adverse impacts etc.). For example, for UNEP’s purpose, this could be used to evaluate major environmental policies and programmes against animal welfare and social impacts (or vice versa). In cases where animal welfare improvements could make a significant difference, then strategies could be developed to influence/advocate for such change.<sup>768</sup>

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<sup>768</sup> Food Ethics Council. Ethical matrix. <https://www.foodethicscouncil.org/resource/ethical-matrix/>

Where action clearly needs to be taken, then one ethical approach is to use the 3Rs approach (formulated by Russel and Burch), which has been internationally accepted as an ethical framework to improve the welfare of animals used in research. It stands for “Replacement, Reduction and Refinement”, and seeks to reduce the numbers of animals used, refine the methods used (to improve welfare and/or environmental impacts) and ultimately to replace animal use with alternatives (for example, as in dietary change). This ethical approach should be extended to all uses of animals. In the case of wildlife, it is urgently needed to address the existential biodiversity loss crisis. This approach would also be particularly useful for addressing food systems transformation. It is ethical in that it examines the need for certain uses against their detrimental impact. This approach can be linked with financial and economic measures designed to build “Just Transitions”.

### **New Development Paradigm:**

With regard to the need to move towards a new development paradigm based on the thriving/flourishing of people, animals and nature (as opposed to prioritising endless economic growth), there needs to be more research and analysis, more advocacy, more “best practice” projects. This is most probably the greatest “Just Transition” needed. But if you examine what has been done already, there have been some useful initiatives, but much of the work is largely anthropocentric in nature, with insufficient coordination, harmony and cross-fertilisation. There is also inadequate coverage of environmental aspects (some measures include this, but not in sufficient depth to provide the focus needed to prevent the multiple and impending environmental crises); and there is no inclusion of animal welfare. These are things that UNEP should research, and positively influence.

Some of the important developments in this area include:

The [Human Development Index](#) (developed by UNDP)

The [Planetary pressures–adjusted Human Development Index](#) (developed by UNDP as an experimental index)

The [Better Life Index](#) (developed by the OECD)

[Gross National Happiness Index](#) (developed by Bhutan)

[Happy Planet Index](#) (developed by the New Economics Foundation and now housed by the Wellbeing Economy Alliance) – this does include ecological footprint

[Global Wellbeing Indicators](#)

[Wellness Index](#)

A recent Springer Link article reviewed and compared wellbeing indicators..<sup>769</sup>

Clearly, there is a proliferation of wellbeing indexes and indicators. Yet none has included animal welfare. The results of this nexus study show that this is an enormous omission – especially when trying to solve the drivers of the multiple environmental crises and future pandemics.

There has been substantial research on human wellbeing/happiness, and some of this is reflected in the indicators. For example, Penn University Positive Psychology Centre’s

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<sup>769</sup> Facchinetti, S., Siletti, E. Well-being Indicators: A Review and Comparison in the Context of Italy. Soc Indic Res 159, 523–547 (2022). <https://doi.org/10.1007/s11205-021-02761-0>  
<https://link.springer.com/article/10.1007/s11205-021-02761-0>

work<sup>770</sup> and the OECD's research.<sup>771</sup> But wellbeing/happiness would be short-lived if the wellbeing of the environment and animals are not equally considered (living a good life for now will not help when the climate emergency strikes and/or loss of pollinator species disrupts food supplies).

Also, the substantial research on the welfare of animals – and what is needed to ensure their wellbeing – has been ignored.

A 2022 book entitled “Happiness – Concept, Measurement and Promotion”<sup>772</sup> approaches the subject of happiness from an economist's perspective. However, it includes two relevant chapters: One on Environmentally Responsibility and Happiness and one on Animal Welfare: Beyond Human Happiness. The Animal Welfare chapter notes three basic questions in economics: What (to produce)? How? For whom? The author also argues there are three basic questions for welfare biology: “Which (species are capable of welfare)? Whether (their welfare is positive or negative)? How (to increase their welfare)? He suggests that the ability to feel must have evolved and that it must, therefore, have survival value and that sentience (the ability to feel) leads to learning, behavioural flexibility, and evolutionary fitness.

Any wellbeing indicators need to ensure that the SDGs can be met, take full account of the need to respect planetary boundaries, and have a supportive economic system. There is more about this below in the “Finance and Economics” section. It would be a big task to change to a new development paradigm, and supportive economic system – but this is well overdue. In order to achieve this, national development planning and international development assistance would need to be radically changed. Development policies, funding and projects should focus on positively building the well-being of humans, animals and the environment, as well as ensuring no harm. In many cases that would mean planning and implementing a humane, sustainable and equitable transition.

### **Annex 1.3. One Health**

***Strengthen the work of One Health to support the “Just Transitions” needed for transformational change, based on root causes and drivers of major issues of concern. This should include stronger research, analysis and strategic planning in order to effectively optimise the health of people, animals and ecosystems.***

This is an overview of the sort of changes needed:

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<sup>770</sup> Penn University. Measuring the Well-Being of Nations. Positive Psychology Center Public policy follows what we measure. <https://ppc.sas.upenn.edu/learn-more/measuring-well-being-nations>

<sup>771</sup> Measuring Well-being and Progress: Well-being Research – OECD <https://www.oecd.org/wise/measuring-well-being-and-progress.htm>

<sup>772</sup> NG, Yew Kwang. Happiness – Concept, Measurement and Promotion. 2022. <https://www.wellbeingintlstudiesrepository.org/ebooks/31/>

- The draft One Health Joint Plan of Action (2022-2026) should be further considered and developed using the nexus points in this Scoping Study and the final report on the Animal Welfare – Environment – Sustainable Development nexus.
- The Joint Plan of Action should be strengthened to proactively address and target the root causes and drivers of environmental degradation and the inhumane and unsustainable use of animals; including land-use changes, agricultural expansion, livestock farming intensification, exploitation and trade in wildlife, and consumption patterns.
- One Health cooperation is essential to the prevention of future pandemics, but it needs to be widened to consider all aspects of wellbeing and welfare at the human-animal-environment interface to reflect the agreed OHHLEP definition. This means ensuring that [One Welfare](#) frameworks are incorporated into policies at all levels.
- As recognised by the One Health High Level Expert Panel, the One Health approach must be preventative and seek “to identify the up-stream drivers of zoonotic spill-over and how to mitigate these to prevent disease emergence from occurring in the first place.” To achieve this, the application of One Health needs to focus on “deep prevention” and be transformational, including in the Pandemics Instrument.
- Establish a separate office to develop, coordinate and run One Health transformations and programmes, including education and communication to promote One Health with the general public (in order to close gaps between what scientists and experts know and what the general public understands).
- One Health-One Welfare policies also need to run through every level – from international, to regional, to national, to local.
- Considerable capacity building at all levels to ensure full understanding of the animal welfare-environment-sustainable development, and the root causes and drivers that need to be tackled.
- National One Health, One Welfare action plans and national AMR plans must be developed that recognise the environmental and health impacts of industrialised animal agriculture; taking account of the need to restrict its growth; phase it out; and transition to plant-based alternatives and cellular agriculture.
- One Health – One Welfare policies need to run through every institution, organisation and department – in a systemic and consistent way, across silos.
- Mainstreaming of One Health - integrating the wellbeing of people, animals and nature across all relevant issues, with an all of government/all of society approach.
- The One Health/One Welfare approach must be utilised within food systems – as a transformational and preventative policy measure as well as mitigation and response



- to ensure environmental sustainability, animal welfare, and lowering pandemic risk.

- As far as UNEP is concerned, to systematically analyse and integrate animal (and human) wellbeing into the environmental dimension, wherever the interface has potential impacts.
- The One Health High Level Expert Panel (OHHLEP) must be expanded to include animal welfare experts and ethologists.
- OHHLEP experts to be included in the drafting and review of all relevant flagship reports, to ensure that One Health aspects are adequately captured.
- The development of dedicated One Health science/research, including to inform the development and application of One Health policies and programmes.
- Education and awareness development.
- Recognition that animals and ecosystems have intrinsic (as well as instrumental) value, in themselves and in communities and relationships.
- Acknowledgement of our responsibility as individuals, civil society, businesses, governments, and international organisations to change behaviour and adopt sustainable solutions that recognise the importance of animal welfare.
- Ensure that the Intergovernmental Negotiating Body convened under the World Health Organisation (WHO) to draft and negotiate an international instrument strengthening pandemic prevention, preparedness, and response, fully embraces the One Health-One Welfare approach. This must necessarily be transformational, with paradigm shifts in potential root causes such as existing food systems and the intensification of animal agriculture, wildlife trade and habitat destruction, and their socioeconomic and political drivers.
- Inclusion of all sectors and disciplines that aim to improve the health and wellbeing of humans, animals and the environment, including civil society, non-exploitative business sectors and government departments.
- Influencing the inclusion of One Health issues in international and national development planning and programmes, including the development work of “developed” countries and international/regional organisations.
- Developing and incorporating pandemic and emerging disease risk health impact assessments in major development and land-use projects, while reforming financial aid for land-use so that benefits and risks to biodiversity and health are recognised and explicitly targeted.

- Consider the inclusion of UNDP as a One Health partner, in view of the vital importance of development issues at the human-animal-environment interface.

Research and influence the inclusion of One Health issues in the context of wellbeing indexes and economic systems (see separate sections).

## Annex 1.4. Food Systems

***Given the enormous contribution of food systems to the major environmental crises of climate change, biodiversity loss, pollution and pandemics (as documented in this Scoping Study), UNEP should be championing the need for food system transformation as a major strand of its strategy and work. This should include all stages of the food chain, from “farm to fork”, and include support for more humane and sustainable farming practices (agroecology), the tackling of food waste, plus demand-side measures i.e., a move away from animal proteins to plant-based and cellular products.***

*UNEP has been engaged with food systems transformation discourse for quite some time. It is leading a Transformative Partnership Platform on agroecology, has an International Resource Panel working group on food systems (“resource smart food systems”), and it works with the One Planet Network on Sustainable Food Systems. However, much more needs to be done to achieve transformation. The analysis in this Scoping Study indicates what more should be done.*

This is an overview of the sort of changes needed:

- UNEP should play a key role in ensuring that other international and regional organisations and governments understand the full importance of the environment-animal welfare nexus for human wellbeing and the attainment of the SDGs. This should include calling for such issues to be included in every relevant flagship report and expert committee; and for experts and drafters to represent every relevant discipline, including animal and environmental health and wellbeing.  
*[For example, the recent [draft Note on Critical, Emerging and Enduring Issues](#) of the High Level Panel of Experts on Food Security and Nutrition, which advises the World Committee on Food Security and Nutrition, was weak on the massive environmental impacts wrought by animal agriculture, and included no explicit references to animal health and welfare or zoonotic disease in the context of emerging and re-emerging infections challenging food security and nutrition.]*
- UNEP should play a key role in ensuring that other international and regional organisations and governments recognise the inter-connected planetary, public health and animal welfare impacts of industrialised farming systems and commit to stopping support for, and phasing out, industrial animal agriculture (factory farms). This should include international, regional and national development organisations and financial institutions.

- UNEP and its One Health partners should promote humane, sustainable, and healthy diets, including those that support an average global reduction in meat and dairy consumption and production of 50% by 2040, through consumer awareness campaigns, the provision of healthy eating advice, and other financial incentives (see also section below on Finance and Economics). UNEP should encourage, support and assist a move by WHO to include wider criteria in its nutrition guidance, including environmental and animal welfare considerations.
- UNEP and its One Health partners should promote a shift away from industrial livestock towards livestock systems based on high welfare agroecology, regenerative and pastoral systems, with a just transition approach to enable this transformation. The transition must be supported in a way that works for farmers, farmworkers, abattoir workers, processors, and disadvantaged citizens; and must provide them with the fiscal incentives, support, safety nets and social protection required to make these shifts. There is strong potential for those negatively impacted by the industrial livestock system to become advocates for change if equity considerations are prioritised.<sup>773</sup>
- UNEP and its One Health partners should ensure support for alternative livelihoods and resources for communities that currently depend on high-risk activities involving wildlife trade and trafficking or intensive animal production systems for subsistence, must be prioritised in order to reduce risks to human and animal health, while meeting vulnerable people's needs.
- UNEP and its One Health partners should guide and help countries to establish national plans to support a Just Transition away from industrialised livestock production towards agroecological systems that produce sustainable plant-based foods and fewer farmed animals in high welfare environments.
- UNEP and its One Health partners should guide and help countries to introduce public procurement policies and practices which replace animal uses which detrimentally impact the environment or animal welfare. For example, moving to plant-based food options and cellular protein replacements.
- UNEP should support the introduction of trade policy incentives that support agroecological, regenerative and pastoral production, and facilitate shorter value chains.
- Integrating food systems transformation into the Nationally Determined Contributions (NDCs) — national climate actions at the heart of the Paris Agreement — is critical. UNEP should encourage countries who have not already done so to include food system transformation in their Nationally Determined Contributions (NDCs) under the Paris Agreement (both supply and demand-side). Progress could be monitored by UNEP and regularly reviewed, in order to build competition and

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<sup>773</sup> World Animal Protection. The Hidden Health Impacts of Industrial Livestock Systems. <https://www.worldanimalprotection.ca/news/hidden-health-impacts-factory-farming>

encourage action. The Global Alliance for the Future of Food has prepared an assessment “Untapped Opportunities for Climate Action: An Assessment of Food Systems in Nationally Determined Contributions.”<sup>774</sup>, a toolkit and case studies.

- UNEP and its One Health partners should develop advocacy and promotional programmes to support agroecological and regenerative agriculture, agrobiodiversity, cutting down waste and food miles, consuming locally-sourced, diverse and seasonal foods, more environmentally-friendly plant-based foods etc.
- UNEP could work to encourage the spread of local and indigenous initiatives such as local and Indigenous farmers’ markets, community vegetable gardens (including in schools), allotments, private vegetable and herb gardens etc.
- UNEP and its One Health partners should develop pilot projects and concrete actions that governments, farmers and consumers can take include promoting agroecological solutions and practices, supporting agrobiodiversity, cutting down waste and food miles, consuming locally-sourced, diverse and seasonal foods, more environmentally-friendly plant-based foods etc.
- UNEP and its One Health partners should document and promote best practices and, in particular, food systems which support the wellbeing of people, animals and the environment.
- UNEP should urge its One Health partners to develop an action plan to urgently tackle food loss and waste, throughout the food chain - including edible calories fed through animals, in order to feed a growing population without putting further pressures on the environmental and animals.  
*There is endless talk about this, but no effective action.*
- UNEP should carry out research into the detrimental impacts of aquaculture on the environment and animal welfare, and raise awareness on this and the need for change.
- UNEP should carry out further research, including social science, on effective programmes to reduce the consumption of animal products, especially meat and dairy, and promoting plant-based proteins and cellular alternatives, and share this with One Health partners – to safeguard the future wellbeing of people, animals and nature.
- UNEP and its One Health partners should consider working with UNESCO to develop educational programmes on humane and environmentally-friendly practices and consumption. Research has shown that animal welfare motivations are a vital force

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<sup>774</sup> Future of Food. Untapped Opportunities: Assessment Food Systems in Nationally Determined Contributions. <https://futureoffood.org/insights/untapped-opportunities-for-climate-action-food-systems-in-nationally-determined-contributions/>

to drive environmental protection behaviour changes. Our children want a world in which humans protect animals.

- Ensure that the nexus issues in this Scoping Study and the nexus report are included and considered in all future flagship reports of relevance to food systems. The research must no longer be kept in silos, but considered systemically, always addressing One Health, One Welfare issues.

Other issues which UNEP should tackle, include:

- Destructive forms of fishing such as Bottom Trawling - where giant nets capture everything in the area, from target to non-target species, and the trawling destroys the habitat, flattening it, meaning it can no longer support life.
- Plastic fishing waste, including discarded fishing gear. Eliminating single-use plastic is important if we want to stem the tide entering the ocean, and the fishing is a major contributor.
- Hold the fishing industry to account: pressing for greater transparency and independent checks.

The International Covenant on Economic, Social and Cultural Rights, Article 11, includes this: “To improve methods of production, conservation and distribution of food by making full use of technical and scientific knowledge, by disseminating knowledge of the principles of nutrition and by developing or reforming agrarian systems in such a way as to achieve the most efficient development and utilisation of natural resources.” This clearly supports the above-proposed transformations of food systems, and the phasing out of industrial animal agriculture systems which are harmful to natural resources, the environment and animals.

Changing both diets and local and indigenous food production systems will not be easy, as these are often based on entrenched habits and cultural attitudes. However, a combination of education/awareness, strong policy measures, and a well-targeted systems of incentives and disincentives should bear results over time. To achieve success, measures should be informed by social science (best methods for achieving sustainable societal change), as well as political objectives. Well-considered planning is necessary for “Just Transitions”. This would include the provision of alternative livelihoods for any low-income households which would be affected. In the case of industrial animal agriculture, this has adversely impacted small-scale local producers, and phasing out may improve the competitiveness of local, small-scale producers. It will also bring new opportunities for local plant protein producers. However, in the case of cellular agriculture, more work will be needed on ensuring that this can be done in a way supportive of local communities, instead of being monopolised by wealthy large-scale producers, at the expense of local farmers and pastoralists. Equal access to resources must be guaranteed. “Just Transitions” are essential in the adoption of alternative livelihoods. These measures will empower people and communities while giving them opportunities to become a part of the solution.

More work needs to be done on how best to bring about the necessary dietary change. The authors of a recent study on the environmental benefits of “plant-based nudging” examined the effectiveness of different strategies for nudging people’s choices towards more

environmentally-friendly and sustainable food choices. They concluded that implementing a default nudge towards such food in a conference could lower food-based emissions by 63%, food-based land-use change by 75%, and food-based water use change by 64%. The takeaway was that plant-based nudges can support the environment in meaningful ways. The authors suggest that their framework can be used by advocates/organisations who work with food service groups. At the very least, it can serve as a springboard, helping environmentally-conscious chefs, restaurateurs, and food business employees plan their menus and select the most effective ingredients. It can also help with the implementation of humane and environmentally-friendly public procurement.<sup>775</sup>

A book “Rethinking Food and Agriculture 2020-2030: The Second Domestication of Plants and Animals, the Disruption of the Cow, and the Collapse of Industrial Livestock Farming” was published in March 2020 which states that we are on the cusp of the deepest, fastest, most consequential disruption in food and agricultural production since the first domestication of plants and animals ten thousand years ago. The book describes the situation thus: “This is primarily a protein disruption driven by economics. The cost of proteins will be five times cheaper by 2030 and 10 times cheaper by 2035 than existing animal proteins, before ultimately approaching the cost of sugar. They will also be superior in every key attribute – more nutritious, healthier, better tasting, and more convenient, with almost unimaginable variety. This means that, by 2030, modern food products will be higher quality and cost less than half as much to produce as the animal derived products they replace. The impact of this disruption on industrial animal farming will be profound. By 2030, the number of cows in the U.S. will have fallen by 50% and the cattle farming industry will be all but bankrupt. All other livestock industries will suffer a similar fate, while the knock-on effects for crop farmers and businesses throughout the value chain will be severe.” This is clearly a situation which needs concerted action to ensure that the (inevitable) transition is indeed “just”.<sup>776</sup>

## Annex 1.5. Wildlife Trade

***A ban on the commercial use and trade in wild animals is the only way to effectively prevent future pandemics (with the potential to become even more virulent and contagious than COVID-19), biodiversity loss and inhumane treatment of animals. If rapid action is not politically feasible, then a staged Just Transition should be supported, with actions including progressive bans starting with the most harmful and inessential uses. Supportive actions should include increased regulation and supervision of all stages of the supply chain, economic and financial transition measures, capacity building, education and awareness, with consumer education to target end-users/markets to stem demand.***

This is an overview of the sort of changes needed:

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<sup>775</sup> Koller, Katharina (Summary). Original study McCarty, T & Faber, G. (15 July 2022). Nudging Our Way To A Healthier Environment. <https://faunalytics.org/nudging-our-way-to-a-healthier-environment/>

<sup>776</sup> Seba, Tony and Tubb, Catherine. Rethinking Food and Agriculture 2020-2030: The Second Domestication of Plants and Animals, the Disruption of the Cow, and the Collapse of Industrial Livestock Farming (RethinkX Sector Disruption) Paperback – 20 March 2020. <https://www.amazon.com/Rethinking-Food-Agriculture-2020-2030-Domestication/dp/0997047178>



- Support a phase-out starting with the most inessential or egregious uses. For example, wild animals for the pet trade, entertainment or tourism, the fashion industry, fur, luxury food products, animal experimentation etc. The most harmful in terms of high-disease risk, animal suffering or biodiversity impacts.
- Rather than creating standards for inessential uses of natural resources, there should be an end to the commercial wildlife trade and other practices that abuse the idea of sustainability.
- Support the phase-out of the sale of wild animal meat and live animals in unhygienic markets. Phasing out unhygienic urban markets in wild meat and live animals is imperative. The priority should be places where markets are not the source of basic subsistence and protein access, and where the risks are greatest. Such bans need to be diligently enforced even though it will affect the livelihoods of traders. Poor traders should be compensated for their losses.

*Markets selling wild animal meat and live animals without proper hygienic and veterinary measures pose very high risks of disease emergence and spread.*

- Support an end to the transport of live wild animals, unless a case can be made for vital need (e.g., for specialist veterinary treatment or breeding programmes for reintroduction of endangered species).
- Commercial wildlife farms that exacerbate the decline of wild populations or fail to halt it, and that rely on stocking from the wild or laundering poached animals, such as commercial farms in tigers and lions, should be shut down. So should farms that fail veterinary inspections, which need to be frequent. Providing compensation for shutdowns may be considered appropriate for poor farmers and/or support for retraining and alternative employment opportunities.
- Support for country bans on the import, export and sale of wildlife for human consumption.  
*As was proposed by WHO, OIE and UNEP in 2021, when they called on national competent authorities to suspend the trade in live caught wild animals of mammalian species for food or breeding purposes and close sections of food markets selling live caught wild animals of mammalian species<sup>777</sup>; and as was proposed in a US bill - the Preventing Future Pandemics Act of 2020 — which called for banning the import, export, and sale of live wildlife for human consumption.*
- Any remaining trade in live animals, should be determined through risk evaluation, assessment and mitigation, adopting a highly precautionary approach. For this, there must be full regulation and enforcement of animal welfare and hygiene standards, ensuring adequate veterinary practices and pathogen monitoring. This must cover all stages of the supply chain, including markets, slaughter/killing and in transport,

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<sup>777</sup> UNEP. Reducing public health risks associated with the sale of live wild animals of mammalian species in traditional food markets. 12 April 2021.  
<https://www.unep.org/resources/publication/reducing-public-health-risks-associated-sale-live-wild-animals-mammalian>

including border checks. *However, it is a “pipe dream” that somehow the wildlife trade can be sanitised and made healthy and humane. This is not even done in most meat and fish production chains, especially in developing countries. Indeed, the conditions in many slaughterhouses and markets in “developed” countries that have regulation on paper remain unhygienic and inhumane. It would be even more difficult to control the wildlife trade (with its many sources, channels and end-uses).*

- Improved regulations and law enforcement are imperative to curb any underground trade, as well as to tackle the commercial wildlife trade. Efforts to tackle poaching and wildlife trafficking must be intensified. This needs inter-agency cooperation, and monitoring.
- UNEP should work with its One Health partners to keep this under review, and promote more progressive bans when it proves to be impossible to achieve the desired sustainable, safe and humane wildlife trade; also, in cases where the currently legal trade is contributing to laundering from the illegal trade.
- Bushmeat hunting in Africa also needs to be tackled, because it threatens public health, animal welfare and biodiversity. Use of Great Apes for bushmeat is threatening Great Ape populations, and carries significant disease risks (greater because they are closely-related species). Efforts to wean marginalised poor communities off wild meat need to be accompanied by broader development efforts, including health and schooling, and the delivery of environmentally-sustainable economic opportunities. There should also be strategies to discourage consumption by urban and diaspora communities, to reduce demand for commercial wild meat trade.
- Support for alternative livelihoods and resources for communities that currently depend on high-risk activities involving wildlife trade and trafficking for subsistence, must be prioritised in order to reduce risks to human and animal health, while meeting vulnerable people’s needs.
- UNEP should work with its One Health partners to spread awareness of the risks of the international wildlife trade, to curtail support for this, and to encourage development organisations and international financial institutions to remove any remaining support for this, and instead to develop alternative livelihoods and healthy food businesses, such as plant-based protein initiatives. Development initiatives could include community education in disease hotspots about the health risks of wildlife trade.
- UNEP should work with UNESCO to develop education and awareness programmes designed to reduce demand of wild animals, including in Traditional Chinese Medicine, particularly where there are actually no medicinal benefits from the wildlife product in question.
- It is crucial to protect wildlife in the wild. In-situ conservation should be the norm. Community-level conservation benefits people, wildlife and the planet. To effectively

protect animals in the wild, habitats need to be protected and restored, including wildlife corridors to support migration ranges (which will be even more-needed with climate change).

- UNEP should consider animal welfare and impacts on animals of all of its wildlife, biodiversity and habitat-related policies and programmes.
- UNEP should strengthen its knowledge and understanding of wild animal welfare, include relevant experts in its reports and assessments, and ensure that all relevant environmental conventions do likewise. Further research on subjects such as animal welfare and animal behaviour and culture in connection with rewilding, restoration etc. Plus, studying the advantages of compassionate conservation.
- Valuing Indigenous Peoples and local communities' engagement and knowledge in pandemic prevention programs, achieving greater food security, and reducing consumption of wildlife.

The goal of a legal, sustainable, safe, humane, and equitable commercial wildlife trade (being distinct from non-commercial trade such as animal rescue, conservation, and subsistence purposes) is misleading and unachievable. If it is deemed politically unacceptable to call for an end to the commercial trade in wildlife, then this question should be considered in phases. However, moving towards an end to the commercial trade in wildlife should be the ultimate goal.

Given that the exploitation of wildlife, including for the pet trade, has been identified as one of the dominant drivers of biodiversity loss, emergence of zoonotic infectious disease, animal suffering, and financial instability, perpetuating the concept of utilising a regulated wildlife trade as the default approach to protect people and planet is in urgent need of re-evaluation.

Another important issue that needs to be addressed is that, given the current deplorable state of wildlife populations and biodiversity, UNEP and the CBD should stop positively promoting use of wildlife (even if termed “sustainable use”, this has turned out to be anything but sustainable in practice). Priority must first and foremost be given to the reduction of exploitation and elimination of threats to wildlife, and to the active conservation and restoration of biodiversity, in order to halt its loss and ensure its long-term recovery.

*In this regard, it is interesting to note the proposed definition of sustainable use in the South African Government's White Paper on Conservation and Sustainable Use 778:*

*"In relation to the use of any component of biodiversity, means the use of such components in a responsible way, and that:*

*(a) does not contribute to its long-term decline in the wild, or disrupt the genetic integrity of the population;*

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<sup>778</sup> South African Government. White Paper on Conservation and Sustainable Use.

<https://www.gov.za/documents/south-africa%E2%80%99s-biodiversity-2022-consultation-draft-white-paper-conservation-and>

- (b) does not disrupt the ecological integrity of the ecosystem in which it occurs;*
- (c) ensures continued benefits to people that are fair, equitable and meet the needs and aspirations of present and future generations; and*
- (d) in the case of animals, is humane and does not compromise their well-being."*

## **Annex 1.6. Finance and Economics**

***Significant changes are needed to financial, economic and trade systems to ensure that the issues raised in this nexus Scoping Study are taken into account. This is the only way to effectively address the multiple environmental crises, and to prevent future pandemics. Ultimately, this must mean changing the primary development paradigm to one that focusses on the thriving of people, animals and nature; and developing a new economic system that supports this – such as Doughnut Economics amended to include animal welfare. It is important that economic systems take into account social, environmental and animal welfare aspects – but care must be taken to ensure that any system of valuation does not become encultured, leading to the enduring predominance of monetary values. Most urgently, governments must remove any perverse subsidies and incentives which could damage the environment or harm animal welfare; and these must be repurposed towards humane, healthy, environmentally-friendly and sustainable alternatives.***

This is an overview of the sort of changes needed:

- Firstly, there is an urgent moral imperative for countries to identify and remove all perverse subsidies and incentives – in the context of this Scoping Study, that is any that could damage the environment or adversely affect the welfare and lives of animals. This should include all subsidies/incentives for production systems, methods and products which are not healthy, humane, sustainable and environmentally-friendly. UNEP could support this move by starting a database of perverse subsidies/incentives, and regularly updating and publishing the results. *GEO 6 provides examples of integrated policies for achieving sustainability goals, which include providing economic incentives, including the removal of environmentally harmful subsidies, improving price structures and introducing taxes to internalise social and environmental costs.*<sup>779</sup>  
*Government subsidies greatly fuel and exacerbate problematic business-as-usual practices, such as animal food production patterns, while ignoring external socioeconomic, health, environmental and climate costs. These subsidies support a broken system of intensive, industrial-scale animal agriculture that is controlled by a small number of large corporations, and leaves smallholder farmers and food producers behind.*<sup>780</sup>

<sup>779</sup> UNEP. Global Environment Outlook (GEO) 6. 2019. <https://www.unep.org/resources/global-environment-outlook-6> & UNEP. Global Environment Outlook 6 Summary for Policymakers. 6 August 2019. [https://www.unep.org/resources/assessment/global-environment-outlook-6-summary-policy-makers?\\_ga=2.58831021.1679832863.1648133604-1602352062.1634737523](https://www.unep.org/resources/assessment/global-environment-outlook-6-summary-policy-makers?_ga=2.58831021.1679832863.1648133604-1602352062.1634737523)

<sup>780</sup> Submission from organizations as part of the 50by40 UNFCCC Action Group Coalition. Submission to the Koronivia Joint Work on Agriculture. May 2022  
[https://proveg.com/wp-content/uploads/2022/05/50by40KJWA\\_May2022.pdf](https://proveg.com/wp-content/uploads/2022/05/50by40KJWA_May2022.pdf)

*According to the FAO, UNDP and UNEP: “At a time when many countries’ public finances are constrained, particularly in the developing world, global agricultural support to producers currently accounts for almost USD 540 billion a year. Over two-thirds of this support is considered price-distorting and largely harmful to the environment.”<sup>781</sup>*

*A new World Trade Organisation (WTO) agreement has been forged which bans government subsidies that support the fishing of already-overfished stocks and curbs those that contribute to illegal, unregulated and unreported (IUU) fishing. But in the interest of reaching a deal, the WTO’s 164 Member States put off dealing with certain subsidies where agreement proved elusive: those that contribute to building fleets with capacity to fish unsustainably and other forms of overfishing.<sup>782</sup>*

The Biodiversity Finance Initiative is also of interest.<sup>783</sup>

- The money from all removed perverse subsidies/incentives should be repurposed towards the “Just Transitions” needed for transformative change, supporting humane, healthy, environmentally friendly and sustainable alternatives. UNEP could maintain a database of member societies’ support for “Just Transitions”, with amounts and direction of support, and any “best practice” projects. Redirected subsidies should further recognise the needs and vulnerabilities of different communities and stakeholders within food systems, and tailor local solutions to local needs.<sup>784</sup>

*The UNEP, UNDP, FAO report “A Multi-Billion-Dollar Opportunity: Repurposing agricultural support to transform food systems” makes a convincing case for repurposing support, rather than eliminating it altogether. It also presents six steps that governments can consider to develop and implement agricultural support repurposing strategies.<sup>785</sup>*

- As this Scoping Study shows, the most urgent need is to end subsidies/incentives and policy support for environmentally destructive, inhumane, unhealthy and unjust industrial livestock systems and industrial fisheries. In this case, funding and subsidies should be directed to support humane, healthy and sustainable alternatives. For instance, on the supply side, governments could subsidise plant-based food production and meat/dairy/seafood alternatives, including by giving tax incentives, and consider investing in research and development of plant-based or cellular-based meat, dairy, eggs and seafood alternatives (as economies such as Canada, China, Denmark, the EU, the Netherlands, Singapore and the UK have

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<sup>781</sup> FAO, UNDP and UNEP. A multi-billion-dollar opportunity: *Repurposing agricultural support to transform food systems*. 2021. <https://www.fao.org/3/cb6562en/cb6562en.pdf>

<sup>782</sup> Fitt, Elizabeth. WTO finally nets deal curbing fisheries subsidies, but tables key bits for later. Mongabay. 17 June 2022. <https://news.mongabay.com/2022/06/wto-finally-nets-deal-curbing-fisheries-subsidies-but-tables-key-bits-for-later/>

<sup>783</sup> Biodiversity Finance Initiative (BioFin) <https://www.biofin.org/>

<sup>784</sup> Submission from organizations as part of the 50by40 UNFCCC Action Group Coalition. Submission to the Koronivia Joint Work on Agriculture. May 2022 [https://proveg.com/wp-content/uploads/2022/05/50by40KJWA\\_May2022.pdf](https://proveg.com/wp-content/uploads/2022/05/50by40KJWA_May2022.pdf)

<sup>785</sup> UNEP, UNDP, FAO. A Multi-Billion-Dollar Opportunity: Repurposing agricultural support to transform food systems. 14 September 2021. <https://www.unep.org/resources/repurposing-agricultural-support-transform-food-systems>

started to do).<sup>786</sup> Also, support could be redirected to farmers for regenerative, agroecological and pastoralist systems that deliver better human, animal, and planetary health outcomes.

*Another useful resource in this regard is the 2021 CIWF study on “Hidden Costs of Industrial Agriculture. Use of fiscal measures to encourage moves to regenerative agriculture and healthy, humane, sustainable diets”.*<sup>787</sup>

*Back in 2006, FAOs “livestock’s Long Shadow” report already stated that damaging subsidies should be removed, and economic and environmental externalities should be built into prices by selective taxing of and/or fees for resource use, inputs and wastes. In some cases, direct incentives may be needed. Payment for environmental services is an important framework, especially in relation to extensive grazing systems: herders, producers and landowners can be paid for specific environmental services such as regulation of water flows, soil conservation, conservation of natural landscape and wildlife habitats, or carbon sequestration.*<sup>788</sup>

*The 2022 WTO agreement on fishing subsidies.*<sup>789</sup> *must be implemented and enforced.*

*This includes:*

- *Prohibition on subsidies contributing to Illegal, Unreported, Unregulated (IUU) fishing.*
  - *Prohibition on subsidies regarding stocks that are overfished.*
  - *Prohibition on subsidies for fishing in the unregulated high seas.*
- This Scoping Study has also showed the value of developing incentives to support enhanced animal welfare in agriculture, wildlife consumption and trade, etc. This should also be promoted.
  - Notwithstanding the need for decisive action to end subsidies for practices that impose significant costs on the health and wellbeing of humans, animals and the environment, where the impacts of the immediate removal of other subsidies could harm vulnerable communities, then governments could make clear plans to phase these down incrementally.
  - Governments across the world need to be held accountable for divesting all state-controlled funds from harmful activities, and ensuring that future investments

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<sup>786</sup> Stockholm Environment Institute (SEI). Stockholm+50: Unlocking a Better Future.

<https://www.stockholm50.report/unlocking-a-better-future.pdf>

<sup>787</sup> Stevenson, Peter. Hidden Costs of Industrial Agriculture. Use of fiscal measures to encourage moves to regenerative agriculture and healthy, humane, sustainable diets. CIWF. 2021.

[https://www.ciwf.org/media/7448741/hidden-costs-of-industrial-agriculture-2021\\_new-template-ep-updated-2.pdf](https://www.ciwf.org/media/7448741/hidden-costs-of-industrial-agriculture-2021_new-template-ep-updated-2.pdf)

<sup>788</sup> FAO. Livestock’s Long Shadow: Environmental Issues and Options 2006.

<https://www.fao.org/3/a0701e/a0701e.pdf>

<sup>789</sup> WTO. Implementing the WTO Agreement on Fisheries Subsidies. Challenges and Opportunities for Developing and Least-Developed Country Members. 2022.

[https://www.wto.org/english/res\\_e/booksp\\_e/implementfishagreement22\\_e.pdf](https://www.wto.org/english/res_e/booksp_e/implementfishagreement22_e.pdf)



protect wildlife, nature and animals; as well as reducing poverty and increasing sustainable livelihoods and food security.

- In particular, governments should ensure that public procurement is repurposed to support humane, healthy, environmentally friendly and sustainable products and practices. Many cities and regions have already committed to reducing or eliminating meat consumption in public facilities, improving vegan/vegetarian options, and to implementing meatless days in public schools. UNEP could build influence and pressure in this regard by maintaining a regularly-updated database of countries' progress in this regard, and information on "best practices".
- UNEP should also ensure that its own public procurement policies and practices reflect this need, and persuade other UN organisations and conventions to do likewise.
- Governments could also support the "Just Transitions" needed by facilitating the affordability and access to healthy and sustainable diets for poorer households through social protection programmes such as vouchers, cash, school feeding, or supporting school or community vegetable gardens. Creating a healthy food environment is also critical to support a dietary shift – so planning policy and urban design for example, play a vital role in shaping these environments and ultimately access to healthy and nutritious foods, such as fresh fruit and vegetables, for the most vulnerable.<sup>790</sup>
- UNEP could also use its influence to persuade public development banks (and maybe private development banks too) to stop funding industrial animal agriculture and investing in other environmentally damaging activities, for the many reasons indicated; and to include animal welfare in their safeguards – screening for detrimental animal welfare impacts, as well as environmental and social impacts.
  - *There is already an active "Stop Financing Factory Farming Campaign" which is a coalition of development, environmental and animal protection groups that works in partnership with locally affected communities and organisations to shift development finance away from industrial livestock production.*<sup>791</sup>
  - *Food Tank, the "think tank for food" has written about the need for the International Finance Corporation (IFC) to stop bankrolling destructive agriculture, citing land use change, ecosystem destruction, deforestation, disenfranchisement of local and indigenous communities, impact of pesticide and fertiliser use on climate and air, soil and water resources. They also pointed to the social impacts of these operations, including pesticide-related illness and death, including among children, as well as the potential for land-grabbing, local community conflicts and the displacement of smallholder farmers.*<sup>792</sup>

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<sup>790</sup> World Animal Protection. The Hidden Health Impacts of Industrial Livestock Systems.

<https://www.worldanimalprotection.ca/news/hidden-health-impacts-factory-farming>

<sup>791</sup> Friends of the Earth. Ending Factory Farm Finance. <https://foe.org/projects/factory-farm-finance/>

<sup>792</sup> Food Tank. International Finance Corporation Should Stop Bankrolling Destructive Agribusiness. <https://foodtank.com/news/2022/08/international-finance-corporation-should-stop-bankrolling-destructive-agribusiness/>

- *Even multinational development banks that have pledged to align their lending with the Paris Agreement continue to pump masses of public money into industrial animal agriculture - ignoring warnings from the International Panel on Climate Change (IPCC) and the U.N. Convention to Combat Desertification that we must dramatically transform and scale back greenhouse gas (GHG) emissions from these high emitting operations in order to build resiliency and reach Paris climate goals.*<sup>793</sup>
- UNEP should also use its influence to ensure that all “Green New Deals” and pandemic recovery programmes include animal welfare and the nexus issues identified in this Scoping Study.
- UNEP could also use its influence to persuade governments to require corporations to disclose welfare, health or environmental risks associated with their practices to investors. For example, the FAIRR Initiative is currently working with investors to assess food companies according to risk factors such as greenhouse gas emissions, deforestation and biodiversity, water use and scarcity, waste and pollution, antibiotics, animal welfare, working conditions, and food safety.<sup>794</sup> <sup>795</sup>
- There also needs to be effective and well-enforced regulation to support implementation of these changes/“Just Transitions”, including full producer liability, the internalising of any external costs, and well-targeted fiscal tools such as taxation (for example on environmentally and animal welfare harmful - and emission-intensive - foods such as meat and dairy). Taxes should be adjusted to make prices reflect hidden environmental and animal welfare (and social) costs, and to encourage efficient and appropriate use of resources.
- Internalising externalities should ensure that businesses are held fully accountable for harmful practices. There should be full-cost pricing, including the economic cost of pandemics being factored into industry costs.
- Investment should be increased in knowledge, capacity building and international cooperation to improve animal welfare, as well as in the institutional representation of animals in policymaking.
- Investment should also be increased for systemic research into the indirect drivers, demographic changes and large-scale social and economic processes – including macro-economic policies and structures and public policies – that themselves provide perverse incentives to inhumane and unsustainable consumption and production. Plus, modelling and consideration of alternatives for transformational change.

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<sup>793</sup> Foodtank. Public Development Banks Must Stop Financing Factory Farming. June 2022. <https://foodtank.com/news/2022/06/public-banks-are-breaking-their-climate-pledges/>

<sup>794</sup> Stockholm Environment Institute (SEI). Stockholm+50: Unlocking a Better Future. <https://www.stockholm50.report/unlocking-a-better-future.pdf>

<sup>795</sup> FAIRR. <https://www.fairr.org>

There has been considerable research and debate about the need for a new economic system – moving Beyond GDP - which reflects costs beyond the purely monetary. As was stated in Para 4.2. which considered policy change, any economic system should reflect and support the overall development paradigm, which should focus on the wellbeing of people, animals and nature.

Conversely, the current trend appears to be to try to incorporate other concerns (environmental, social, animal) into the economic paradigm. Although this is understandable given the likely long-term nature of any change to the primary development paradigm – economic growth, as measured by GDP – and the urgent need for environmental matters to be addressed, this approach needs very careful consideration. It is widely accepted that society needs to move away from GDP as the main measure of development, and there is a danger that tapping other concerns into this will further establish and ingrain this model.

One option to explore here is the introduction of the Valuation of Nature concept, which was covered in the Dasgupta Review which was commissioned by the UK Treasury.<sup>796</sup> This includes important consideration of this concept, and is based on the premise that “we need a financial system that channels financial investments – public and private – towards economic activities that enhance our stock of natural assets and encourage sustainable consumption and production activities. Governments, central banks, international financial institutions and private financial institutions all have a role to play.” Some major points that emerge from the Dasgupta Review are:

- Current human activities are hugely damaging to the planet.
- Advocates regenerative agriculture and states “Diets rich in animal products have much higher footprints than those based on plant products”.
- Stresses the need for a rethink of our ways of measuring economic success – move away from GDP to a form of true cost accounting.
- Stresses the need for a rethink of human production and consumption.
- Highlights that taxation can be used to reduce environmentally damaging behaviour.

Like the Stern report on climate, Dasgupta makes it clear that the cost of action to tackle biodiversity loss will be considerably lower than the cost of inaction leading to further biodiversity loss.

However, as the IPBES report on the “Methodological Assessment of the Diverse Values and Valuation of Nature” shows, it is dangerous to inform policy-making only on the instrumental values of nature, without fully assessing and considering non-market instrumental, relational and intrinsic values (including cultural and spiritual values).<sup>797</sup>

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<sup>796</sup> Dasgupta, P. for HM Treasury. Final Report - The Economics of Biodiversity: The Dasgupta Review

Final Report of the Independent Review on the Economics of Biodiversity led by Professor Sir Partha Dasgupta. Published 2 February 2021. Last updated 20 August 2021.

<https://www.gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-dasgupta-review> &

[https://www.wellbeingintlstudiesrepository.org/cgi/viewcontent.cgi?article=1000&context=es\\_gen](https://www.wellbeingintlstudiesrepository.org/cgi/viewcontent.cgi?article=1000&context=es_gen)

<sup>797</sup> IPBES (2022): Summary for policymakers of the methodological assessment of the diverse values and valuation of nature of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. U. Pascual, P. Balvanera, M. Christie, B. Baptiste, D. González-Jiménez, C.B.

Scientists have now even proposed a 'species stock market' (SSM) to protect biodiversity. While species wouldn't be traded like in normal transactions, the idea is that a cost could be placed on actions which put them at risk (including deforestation and pollution), including processes that would erase them from specific areas. Researchers behind the SSM have suggested it be managed by the international associations of taxonomists and economists.<sup>798</sup> This is another indication of how our current financial and economic systems have driven society to the point where only extrinsic value is deemed to have any impact.

The Guardian article "How much is an elephant worth? Meet the ecologists doing the sums" explored this concept. As it said, the idea of being able to put a price on nature is dividing opinion, but the financial value of "ecosystem services" is increasingly guiding policy. In 1996, Prof Shahid Naeem was part of a team of researchers who set out to value the Earth. Specifically, they were trying to establish the dollar value of all of the "ecosystem services" the planet provides to humans every year. Around \$33tn, they concluded, nearly double global GDP at the time. "The team was half ecologists and half economists. The ecologists found the exercise really scary but understood the utility of it. The economists felt nature could be valued but they disagreed about how it could be done". In 2014, researchers led by the ecological economist Robert Costanza updated the 1997 valuation of the Earth's ecosystem services. It was estimated they were now worth \$125tn a year. But the study found that land change use had resulted in an annual loss of between \$4.3tn and \$20.2tn between 1997 and 2011. The team also said that giving nature an economic value did not mean it should be treated as a private commodity but should rather help to communicate its value to society.<sup>799</sup>

However, many environmentalists wince at the financial characterisation of the natural world, disputing an anthropocentric understanding of ecosystems and organisms as capital that derive value from how well they "serve" humanity. Guardian writer George Monbiot calls the approach "morally wrong, intellectually vacuous, emotionally alienating and self-defeating". The key point is could this be a pathway to valuing nature and animals, or would it lead to further embedding the culture of money being God, with all other considerations subservient? And would the present broken system become further entrenched, and human enculturation mean there never is much-needed transformative change?

Other useful advances are wellbeing budgets, and support for Wellbeing Economies. New Zealand has been praised for having a wellbeing budget. But this has also been criticised as

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Anderson, S. Athayde, R. Chaplin-Kramer, S. Jacobs, E. Kelemen, R. Kumar, E. Lazos, A. Martin, T.H. Mwampamba, B. Nakangu, P. O'Farrell, C.M. Raymond, S.M. Subramanian, M. Termansen, M. Van Noordwijk, A. Vatn (eds.). IPBES secretariat, Bonn, Germany. 37 pages.

<https://doi.org/10.5281/zenodo.6522392>

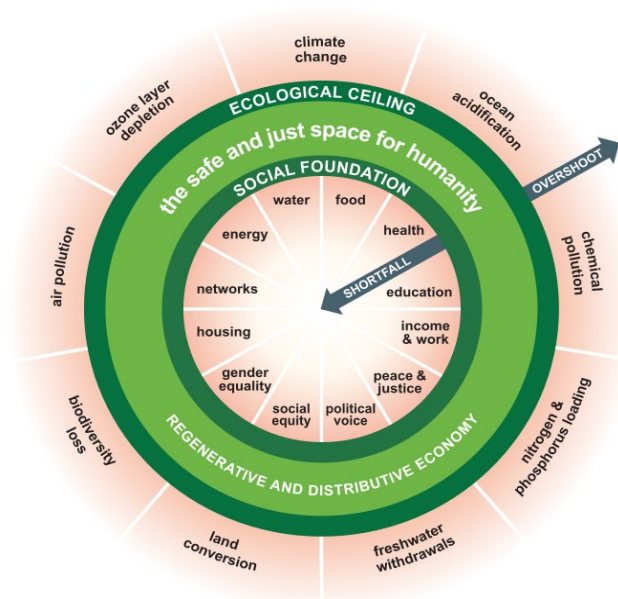
[https://ipbes.net/media\\_release/Values\\_Assessment\\_Published#:~:text=Living%20from%20nature%20emphasizes%20nature's,thrive%20independently%20of%20human%20needs.](https://ipbes.net/media_release/Values_Assessment_Published#:~:text=Living%20from%20nature%20emphasizes%20nature's,thrive%20independently%20of%20human%20needs.)

<sup>798</sup> Hughes, Georgie. Scientists propose 'species stock market' to protect biodiversity. Environment Journal. 20 June 2022. <https://environmentjournal.online/articles/scientists-propose-species-stock-market-to-protect-biodiversity/>

<sup>799</sup> Greenfield, Patrick. How much is an elephant worth? Meet the ecologists doing the sums. The Guardian. 28 Jan 2021. <https://www.theguardian.com/environment/2021/jan/28/how-much-is-an-elephant-worth-meet-the-ecologists-doing-the-sums-aoe>

being too incremental in nature, and does not address the root causes of social and environmental failure and building a Wellbeing Economy. A Wellbeing Economy is structured so that the economy serves people and planet, rather than being geared to maximise profit only through economic growth at the expense of the planet. It is designed to deliver quality of life with dignity, purpose, fairness and participation whilst caring for nature..<sup>800</sup>

One of the best-developed alternative economic models is “Doughnut Economics” developed by economist Kate Raworth. The Doughnut consists of two concentric rings: a social foundation, to ensure that no one is left falling short of life’s essentials, and an ecological ceiling, to ensure that humanity does not collectively overshoot the planetary boundaries that protect Earth's life-supporting systems. Between these two sets of boundaries lies a doughnut-shaped space that is both ecologically safe and socially just: a space in which humanity can thrive..<sup>801</sup>



This includes planetary boundaries and the social foundations for achieving the SDGs. This is good in that it includes both planetary boundaries and social foundations. However, a 2021 study entitled “Doughnut Economics: Incorporating Animal Welfare”<sup>802</sup> considered that Doughnut Economics would provide an excellent model for charting a post-COVID-19 economics future – with one exception, that there was currently no consideration of animal welfare amongst its 21 planetary boundaries and societal objectives. COVID-19 has taught us that ignoring how we treat animals is dangerous (as well as unethical). The paper made the case for the addition of animal welfare/animal issues to Doughnut Economics. When the author was contacted, she agreed in principle, stating that “the Doughnut is based on

<sup>800</sup> Wellbeing Economy Alliance. New Zealand’s Fourth Wellbeing Budget. <https://weall.org/new-zealands-fourth-wellbeing-budget>

<sup>801</sup> Doughnut Economics Action Lab. About Doughnut Economics. Meet the Doughnut and the concepts at the heart of Doughnut Economics. <https://doughnuteconomics.org/about-doughnut-economics>

<sup>802</sup> Cox, Janice and Stevenson, Pater. Doughnut Economics: Incorporating Animal Welfare. January 2021. [https://www.wellbeingintlstudiesrepository.org/es\\_ee/4/](https://www.wellbeingintlstudiesrepository.org/es_ee/4/)

anthropocentrically rooted concepts and so does not explicitly articulate the need for ensuring animal welfare, which I agree with you is an important issue”<sup>803</sup>

## **Annex 1.7. Science and Research**

***UNEP must expand its knowledge base on the animal welfare – environment nexus, and use this research to reassess their policies or programmes where there is a causal relationship between animal welfare and the environment (and pandemics). It should also ensure that animal welfare researchers, ethologists and social scientists are used in all relevant studies, and that studies are informed by Indigenous, traditional and local knowledge systems, and practical experience. This will enable UNEP to synthesise efforts on cross-cutting issues with a strong environmental focus, such as food system transformation.***

This is an overview of the sort of changes needed:

- UNEP must expand its knowledge base on the animal welfare – environment nexus, and use this science to reassess any policies or programmes which may on reflection be detrimental to its mission and strategy, and/or adversely impact the welfare of animals.
- UNEP should use its influence to ensure that animal welfare researchers and ethologists are included in all relevant research and flagship reports. These should be included as essential disciplines for the preparation of all environmental flagship reports, so the nexus can be effectively included. *[For example, the Sixth Assessment Report of the IPCC - Climate Change 2022: Mitigation of Climate Change - included multiple references to animal welfare, particularly with regard to co-benefit of animal welfare in relation to dietary change as a mitigation strategy. This aspect could have been further analysed with the support of animal welfare experts.]*
- UNEP should carry out or commission more social science research. In particular, where positive behavioural change/consumer change could support the achievement of its mission and strategy.
- UNEP must develop its science capacity to undertake more inter-disciplinary research, so it can effectively take into account and model systemic impacts. This should include the nexus issues identified in this Scoping Study, which would necessitate the inclusion of animal welfare/animal behavioural scientists.
- UNEP and Member States should examine current research funding, and ensure that it is repurposed to support humane and sustainable transformation, as opposed to “business as usual”.

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<sup>803</sup> Raworth, Kate. Operationalising Economics Action Lab. Personal communication. 1 December 2020.



*[For example, this paper on “Closing Research Investment Gaps for a Global Food Transformation”<sup>804</sup> shows how a small number of commodity crops receive disproportionate funding, as opposed to investment into research for the diversification of cropping systems needed to transform consumption and production patterns towards nutritious and environmentally friendly plant-based diets with greater variety. This leads to the direction of research funding being a barrier to food system transformation. Whereas public R&D funding is especially important for ensuring that investments can be directed to serve planetary health goals and the public good more broadly; and it has been shown that R&D investment plays an important role in agricultural systems change.]*

- UNEP and its One Health partners should develop joint research programmes on priority One Health issues – moving further than reaction towards transformative change based on root causes and drivers.

In an opinion piece entitled “At 50, the UN Environment Programme must lead again”, Maria Ivanova suggests that UNEP could synthesise efforts on cross-cutting issues with a strong environmental focus. For example, it could set up a hub on food security across agencies working on biodiversity, climate change and land degradation. As Maria stated: “If UNEP can be the convener, catalyst and the champion of Earth that it was created to be, the planet and its inhabitants will be better off”.<sup>805</sup>

UNEP could create a science-based consensus on food system transformation, including agroecology and dietary change. This could be used to inform their policy work and networks, thereby strengthening linkages between food systems, nature and natural resources, and encouraging and building capacities of countries to deliver environmental actions that support food systems transformation.

To achieve this, UNEP needs to broaden its own understanding of science, technology and knowledge, which currently seems to lean more towards institutional science and proprietary technology often promoted by the private sector. It must ensure that science does not leave behind the social sciences, Indigenous, traditional and local knowledge systems and innovations that evolved from practical experiences and observations of communities where the role of women is central, across generations.

## **Annex 1.8. Capacity Building**

***Capacity building on the nexus would be vital, including not only understanding the nexus, but also how to take account of this in policy-making and implementation.***

Maria Ivanova made some interesting comments about capacity building during a Stockholm+50 side event on “50 Years of Environmental Policy”. She said that when they

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<sup>804</sup> Bollington, Alex et al. Closing Research Investment Gaps for a Global Food Transformation. Front. Sustain. Food Syst., 30 November 2021 <https://doi.org/10.3389/fsufs.2021.794594> <https://www.frontiersin.org/articles/10.3389/fsufs.2021.794594/full#B24>

<sup>805</sup> Ivanova, Maria. At 50, the UN Environment Programme must lead again. Nature. 16 February 2021. <https://www.nature.com/articles/d41586-021-00393-5>

had been grading countries on how they were performing on environmental implementation, it had been interesting to see that developing countries are performing well, and some are even out-performing developed countries. When countries were asked about the top factors which influence their ability to implement, the answers were surprising. You would expect financing to be first on the list. But instead, it was third, with technical issues - capacity and training coming first and second. The point was also made that we need to educate policy makers..<sup>806</sup>

This is an overview of the sort of changes needed:

- There would need to be capacity building on the nexus and animal welfare within UNEP. Also, on the nexus for UNEP's One Health partners.
- There would also need to be capacity building and training for governments and implementation/enforcement authorities.
- Capacity Building would also be helpful for UNEP Major Groups and Stakeholders, in order to support increased understanding of the animal welfare-environment-sustainable development nexus, enabling them to include animal welfare where this impacted in their work (or vice versa).
- Capacity building could be supported by readily available online resources, including "best practice" information and case studies.

## **Annex 1.9. Society and Consumers**

***It is vital to inform and educate consumers to do their part in supporting "Just Transitions" by only buying products which are humane, healthy and environmentally-friendly. Education and awareness campaigns need to be informed by social science, and supported by clear and transparent labelling.***

This is an overview of the sort of changes needed:

- There needs to be an effective public/consumer awareness strategy on the nexus, using methods and tactics informed by social science research. This should also address what the public/consumers could do to support beneficial change, including through product choices which are humane, healthy and environmentally friendly.
- More work is needed to persuade consumers to shift to more plant-rich diets. *Replacing just 20% of global beef consumption with a meat substitute could halve deforestation and the carbon emissions associated with it. Incorporating novel foods into diets can reduce global warming potential, water use and land use by over 80%. These conclusions mirror the IPCC's finding that a shift towards plant-based diets is*

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<sup>806</sup> Ivanova, Maria. Comments during Stockholm+50 side event on 50 Years of Environmental Policy. <https://www.facebook.com/ForumNorway/videos/2819259775046665/>  
[Stockholm+50 Side Event: 50 years of environmental policy](#)

*associated with lower emissions and could therefore “lead to substantial decreases in GHG emissions”. The Panel agreed on the mitigation potential of emerging food technologies, such as cellular fermentation, cultured meat, plant-based alternatives to animal-based food products, and controlled environment agriculture.*<sup>807</sup>

- Public awareness needs to be backed up by improved and credible certification, and clear and transparent labelling. This should include animal welfare labelling, as well as environmental labelling. Such labelling could cover goods and services such as food, furniture, clothing, machinery, energy, cleaning products, and cosmetics, which often affect animals through their direct use or through habitat destruction or pollution.<sup>808</sup>

*Every product produced and sold in Germany will soon have to indicate the conditions under which animals were kept, according to plans presented by German Agriculture Minister Cem Özdemir on 7 June 2022.*<sup>809</sup>

*As regards environmental labelling, Pro Veg International reports that there are three main options for environmental-impact labelling on food products: meta-scores, emissions labelling, and carbon-neutral certification.*<sup>810</sup> *This should, of course, be true carbon-neutral, rather than offsetting.*

- Jurisdictions should consider banning advertising for products which harm the environment or adversely impact animal (or human) health and welfare. An example of this is the ban imposed on meat advertising by the Dutch city of Haarlem.<sup>811</sup>
- UNEP should study and promote a useful new innovation: the use of QR codes for sustainability labelling. This technology will enable consumers to determine the impact of the purchases on the environmental, animal and social wellbeing. This is a helpful way to include a variety of criteria on labels, without confusing consumers.

The One Health alliance could proactively work together on major aspects which need to be included on such labelling, and then push for this to be introduced voluntarily in the first instance, and then compulsorily on all relevant products (once it has been proved that it can be done). This will have a major impact on consumer awareness, and positively influence

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<sup>807</sup> Mantilla, Silvia and Bridgers, Jessica. Accelerating Sustainable Development through Animal Welfare. 12 May 2022. <https://thegreenforum.org/blog/accelerating-sustainable-development-through-animal-welfare>

<sup>808</sup> Verkuijl, Cleo, Stockholm Environment Institute; Sebo, Jeff, New York University; and Green, Jonathan Stockholm Environment Institute. IISD. Animal Welfare Matters for Sustainable Development: UNEA 5.2 is an Opportunity for Governments to Recognize That <https://sdg.iisd.org/commentary/guest-articles/animal-welfare-matters-for-sustainable-development-unea-5-2-is-an-opportunity-for-governments-to-recognize-that/>

<sup>809</sup> Dahm, Julia. German minister presents plans for mandatory animal welfare label. Euractiv. 8 June 2022. <https://www.euractiv.com/section/agriculture-food/news/german-minister-presents-plans-for-mandatory-animal-welfare-label/>

<sup>810</sup> Pro Veg International. Environmental-impact labelling: options and impacts for retailers and brands. <https://corporate.proveg.com/article/environmental-impact-labelling-options-and-impacts-for-retailers-and-brands/>

<sup>811</sup> Boffey, Daniel. Dutch city becomes world's first to ban meat adverts in public. The Guardian. 22 September 2022. <https://www.theguardian.com/world/2022/sep/06/haarlem-netherlands-bans-meat-adverts-public-spaces-climate-crisis>

consumer buying habits. Once it is compulsory, it will also impact the way in which products are acquired and produced. Carbon labelling is being widely discussed.<sup>812</sup> But it is important that this goes wider than just carbon, to include other major environmental and animal welfare criteria (as well as social criteria). Whilst food labelling is the definite priority, this should go wider, to cover all relevant products. There are already cases where companies are highlighting their sustainability criteria through the use of QR codes.<sup>813</sup>

Marketing and advertising legislation and standards should be stringently upholding the consumers' right to marketing/advertising and labelling which is accurate and transparent, including with regard to production systems and environmental and animal welfare impacts.

Improved information and transparency in product labelling can help consumers and investors to make informed choices, but they should not hold sole responsibility for making the right choices.<sup>814</sup> More is needed, including financial and economic incentives, as we saw above.

However, any actions aimed at behavioural change should take into account that different countries have different perceptions of animals and their welfare, including the worthiness of various species of welfare consideration. A recent paper on "International' perceptions of animals and the importance of their welfare"<sup>815</sup> shows that this should be well-informed by research, rather than impressions. For example, the notion that care for animals and their welfare is a concern of highly developed nations alone is challenged as welfare of some species was rated as more important in lesser developed nations. In some nations the welfare of farmed animals was placed above that of companion animals, and at times rivalled that of human welfare (partly because they live more closely with farmed animals, and partly because of their instrumental value).

## **Annex 1.10. Education**

***Educational programmes are needed in order to take account of the animal welfare – environment nexus and to take forward necessary changes. This should include all levels of education, from school to further and higher education, and vocational training.***

This is an overview of the sort of changes needed:

- Effective educational programmes should be developed and introduced into all schools (for learners of all ages). UNEP could work with UNESCO and One Health

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<sup>812</sup> David Silverberg, Business reporter, BBC News. Should firms have to put carbon labels on all products? 10 November 2021. <https://www.bbc.com/news/business-59150008>

<sup>813</sup> Beaconstac. Best of QR Codes on Product Packaging: The Sustainability Edition. <https://blog.beaconstac.com/2021/03/best-qr-codes-packaging-sustainability/>

<sup>814</sup> Stockholm Environment Institute (SEI). Stockholm+50: Unlocking a Better Future. <https://www.stockholm50.report/unlocking-a-better-future.pdf>

<sup>815</sup> Sinclair, Michelle et al. International' perceptions of animals and the importance of their welfare. Frontiers in Animal Science. 18 August 2022. <https://doi.org/10.3389/fanim.2022.960379> & <https://www.frontiersin.org/articles/10.3389/fanim.2022.960379/full>

partners on this, in conjunction with NGOs who already carry out similar educational programmes.

*It should be stressed that more is needed than traditional environmental education lessons, many of which merely teach learners about environmental problems.*

*Methodology is important (to generate personal research, in-depth thinking/analysis and problem-solving, as opposed to using didactic teaching methods), as is covering interlinkages between human, animal and environmental issues.*

- Humane education should be considered as an existing educational approach which meets nexus needs. The definition of humane education has been defined as follows: “Humane Education can be defined as “a process that encourages an understanding of the need for compassion and respect for people, animals and the environment and recognises the interdependence of all living things.”<sup>816</sup> Humane Education is important because it develops empathy, which underlies peaceful and caring societies.

Animal protection organisations have long been aware of “The Link” between cruelty to animals and subsequent violence against other humans. There is now a large and well-documented body of evidence of these links. Over the past 35 years, researchers and professionals in a variety of human services and animal welfare disciplines have established significant correlations between animal abuse, child abuse and neglect, domestic violence, elder abuse and other forms of violence.<sup>817</sup> A 2001-2004 study by the Chicago Police Department “revealed a startling propensity for offenders charged with crimes against animals to commit other violent offenses toward human victims”. Of those arrested for animal crimes, 65 percent had been arrested for battery against another person. Other examples include: of 36 convicted multiple murderers questioned in one study, 46 percent admitted committing acts of animal torture as adolescents. And of seven school shootings that took place across the USA between 1997 and 2001, all involved boys who had previously committed acts of animal cruelty.<sup>818</sup> Animal abuse and child abuse were historically dealt with by different agencies, in separate silos. But now there should be cooperation between agencies. Not only is it accepted that reporting, investigating and prosecuting animal cruelty can help take dangerous criminals off the streets, but also that humane education can help to prevent this at source, by awakening empathy and care for animals and other humans. Enforcement agencies take this seriously in many countries and include this in their training programmes. For example, the US FBI includes “The Link” in training and their law enforcement bulletin.<sup>819</sup>

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<sup>816</sup> World Animal Net. Humane Education. <https://worldanimal.net/our-programs/humane-education>

<sup>817</sup> National Link Coalition. <https://nationallinkcoalition.org/>

<sup>818</sup> Humane Society of the United States. Animal cruelty and human violence FAQ. <https://www.humanesociety.org/resources/animal-cruelty-and-human-violence-faq>

<sup>819</sup> Robinson, Charlie M.A., M.S., and Clausen, Victoria M.A. The Link Between Animal Cruelty and Human Violence. FBI Law Enforcement Bulletin. 10 August 2021. <https://leb.fbi.gov/articles/featured-articles/the-link-between-animal-cruelty-and-human-violence#:~:text=Historically%2C%20animal%20cruelty%20has%20been,other%20types%20of%20violent%20offenses>

*There are further resources on humane education on these websites: World Animal Net Humane Education<sup>820</sup>, Humane Education Coalition<sup>821</sup> and Humane Education Institute<sup>822</sup>. Humane education can play an important role in creating a compassionate and caring society which takes benign responsibility for ourselves, each other, our fellow animals and the planet. It also has the potential to turn the next generation into earth activists! The Institute for Humane Education has given a new name to these new humanely educated citizens – “Solutionaries”. They explain that a ‘Solutionary’ is someone who identifies inhumane, unsustainable, and exploitative systems and then develops practical, effective, and visionary solutions, both large and small, to replace them with those that are restorative, healthy, and just.*

- Educational programmes should also be used to support the achievement of dietary change to healthy, humane and sustainable food systems.  
*A recent paper entitled “The Development of Speciesism: Age-Related Differences in the Moral View of Animals”<sup>823</sup> examined the question of “moral acrobatics” in humans, which enables them to (self-)justify contradictions in their relationship with different species and categories of animals. Very interestingly, the research showed rich evidence that from an early age, children are concerned with moral concepts including harm aversion, and that they rated eating animals as significantly less permissible than both young adults and adults. This has implications for the achievement for dietary change, as it indicates that education and/or upbringing is currently suppressing moral concern for animals. Thus, a key contributor to dietary change could be changing educational and family/cultural messaging to explore and enhance moral concerns, rather than suppressing and filtering these.*
- It is also important to teach the content of a more sustainable food and nutrition system more generally. This must include environmentally friendly, healthy, safe and nutritious local and Indigenous food/agriculture in educational curricula and medical training and practice.
- Educational programmes should be included in further and higher education. For example, teaching about the animal welfare – environment nexus in agricultural and veterinary training, and in environmental sciences.
- Relevant vocational training should also include the nexus and connected issues – for example, agricultural extension services to train farmers and producers in more agroecological, humane and sustainable practices, as well as recognised traditional production systems which also meet these criteria.

## **Annex 1.11. Other Just Transition Support**

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<sup>820</sup> World Animal Net. Humane Education. <https://worldanimal.net/our-programs/humane-education>

<sup>821</sup> Humane Education Coalition <https://www.hecoalition.org/>

<sup>822</sup> Humane Education Institute <https://humaneeducation.org/>

<sup>823</sup> McGuire, Luke et al. The Development of Speciesism: Age-Related Differences in the Moral View of Animals. 11 April 2022. <https://doi.org/10.1177/19485506221086182>



***To make these changes acceptable and sustainable, wider social aspects need to be considered and included. They also need to be included across the board, not just in policy silos. This should include international development and trade policies.***

This is an overview of the sort of changes needed:

- Inclusive and participatory planning in the development and implementation of “Just Transitions.
- Compensation for lost incomes and jobs and education and retraining.
- Governments can facilitate and support transitions in many ways as well as compensation for lost incomes and jobs, including investments in regional economies and communities, investments in social safety nets, and funding for education and retraining that prepare people for work in more healthful, compassionate, sustainable sectors. In addition, governments can bring animal welfare into overarching policy frameworks that focus on equitable and sustainable societal transitions, such as support to pursue the necessary policies and measures mentioned above.<sup>824</sup>

The necessary “Just Transitions” must be agreed at a high-level, and not just included in policy silos, but carried out across the board. This should include international development, development financing and trade policies and agreements.

Researchers analysing “Mainstreaming animal welfare in sustainable development - A policy agenda”<sup>825</sup> identified three key pathways through which policymakers can help to mainstream animal welfare into sustainable development policy. The first pathway focusses on avenues to better incorporate animal welfare considerations into international sustainable development policy and activities. The second pathway focuses on actions that policymakers can take at the national and local level. The third pathway identifies measures that can be taken to improve knowledge, capacity, representation of animals and international cooperation towards practices and policy outcomes that safeguard animal welfare. All pathways are mutually supportive, and can be pursued in parallel:

***Mainstream animal welfare into international sustainable development instruments***

- Strengthen and broaden the ‘One Health’ framework. The One Welfare framework provides an opportunity for this.<sup>826</sup>
- Recognise the importance of animal welfare in political declarations.
- Integrate animal welfare into new or existing legal regimes.

***Adopt policies to support healthy, compassionate and sustainable practices***

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<sup>824</sup> Verkuijl, Cleo et al. Mainstreaming animal welfare in sustainable development A policy agenda. SEI & CEEW. May 2022. <https://euagenda.eu/upload/publications/animal-welfare-stockholm50backgroundpaper.pdf>

<sup>825</sup> Verkuijl, Cleo et al. Mainstreaming animal welfare in sustainable development A policy agenda. SEI & CEEW. May 2022. <https://euagenda.eu/upload/publications/animal-welfare-stockholm50backgroundpaper.pdf>

<sup>826</sup> One Welfare. <https://www.onewelfareworld.org/>

- Information and transparency.
- Economic measures.
- Regulatory instruments.
- Just Transition support.

***Pave the way for future action***

- Investing in research and capacity.
- Ensure animals are represented in institutional decision-making.
- International cooperation and support.

## **Annex 2: SDGs**

### **Annex 2.1. Introduction**

This Annex is a record of different authors' research and analysis of the impacts of animal welfare on the SDGs. It is divided into Environmental SDGs, Climate SDGs (although environmental in nature, UNEP has no indicators for SDG 13) and Other SDGs.

### **Annex 2.2. Environmental SDGs**

#### **Annex 2.2.1. SDG 6 Clean Water and Sanitation**

Keeling et al.<sup>827</sup>

Clean water and sanitation are important for both animals and humans, so there are mutual benefits.

In times of shortage, competition for water may be a problem. Animals may also contaminate drinking water.

Isaiah Otieno.<sup>828</sup>

By proper management of waste, we avert plastic plagues in our seas, give aquatic life chance to life and by doing so provide better sanitation for humans as well.

Animal play a role in water conservation and replenishment e.g., as beavers creating wetlands that replenish our freshwater aquifers.

Wolf Clifton.<sup>829</sup>

Animal agriculture has an enormous water footprint. Beef, the least efficient animal food product, requires 20 times as much water per calorie to produce as cereals or root

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<sup>827</sup> Keeling L, Tunón H, Olmos Antillón G, Berg C, Jones M, Stuardo L, Swanson J, Wallenbeck A, Winckler C and Blokhuis H (2019) Animal Welfare and the United Nations Sustainable Development Goals. *Front. Vet. Sci.* 6:336. doi: 10.3389/fvets.2019.00336 *Frontiers in Veterinary Science* - <https://www.frontiersin.org/articles/10.3389/fvets.2019.00336/full>

<sup>828</sup> Otieno, Isaiah. UNEP. UNEP Animal Welfare in the Context of The Sustainable Development Goals (SDGs). PowerPoint presentation to the WOAHP Global Forum on Animal Welfare. April 2020. <https://www.oie.int/app/uploads/2021/08/3-i-otieno-unesd-sdg-apr2021.pdf>

<sup>829</sup> Clifton, Wolf Gordon. Animal People. How Animal Protection Impacts All 17 U.N. Sustainable Development Goals. 1 July 2020. <https://animalpeopleforum.org/2020/07/01/how-animal-protection-impacts-all-17-u-n-sustainable-development-goals/>

vegetables. The waste from livestock, meanwhile, pollutes community reservoirs and can create dead zones in which little if any life is able to survive. In the Gulf of Mexico, dead zones stretch over 14,000 square kilometres on average every summer.

The pollution of waterways, whether by animal agriculture or other causes, is disastrous for ecosystems. Trace amounts of pharmaceuticals and illegal drugs in rivers have been found to be a severe threat to species as diverse as the European eel, salmon in the U.S. Pacific Northwest, and the Australian platypus.

Janice Cox (Good Practices for Agricultural Development)<sup>830</sup>:

Agriculture is the single largest user of freshwater on a global basis and a major cause of degradation of surface and groundwater resources through erosion, chemical runoff, and pollution from other organic and inorganic wastes.

Agriculture uses a global average of 70% of all surface water supplies. While livestock directly use only 1.3% of total water used in agriculture, water for livestock feed requires a significant amount of water. Without addressing animal agriculture, we will not be able to ensure availability of water and sanitation for all.

The global growth of industrial agriculture has fuelled the intensive use of inputs such as pesticides and chemical fertilisers. Livestock waste, including run-offs from these chemical applications and manure, has serious implications for water quality. This includes the creation of oxygen-deprived "dead zones" at the mouths of major waterways.

In the last 20 years, a new class of agricultural pollutants has emerged in the form of veterinary medicines (antibiotics, vaccines and growth promoters), which move from farms through water to drinking-water sources – with serious health implications.

According to the U.S. Environment Protection Agency, the agricultural sector is "the leading contributor to identified water quality impairments in the nation's rivers and streams, lakes, ponds, and reservoirs." In particular, the agency has noted that water quality concerns are most pronounced in areas "where crops are intensively cultivated and where livestock operations are concentrated."

The livestock sector is growing and intensifying faster than crop production in almost all countries. The projected increase in the production and consumption of animal products is likely to put further pressure on the globe's freshwater resources.

Aquaculture is now also recognised as a major problem in freshwater, as well as estuarine and coastal environments, leading to eutrophication and ecosystem damage. Aquaculture is increasing worldwide in order to satisfy the increasing demand for animal protein, due to the limitations of capture fisheries production. However, it has been found to have significant impacts on the environment and natural resources, with water pollution being cited as of most concern.

Experts predict that, because pollution can no longer be remedied by dilution in many countries, freshwater quality will become the principal limitation for sustainable development in these countries early in the next century.

There are increasing calls for food policy and agricultural strategies to be reviewed and strengthened in order to move away from polluting and unsustainable foods, towards healthier and more environmentally-friendly options.

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<sup>830</sup> Cox, Janice H. Good Practices for Animal Welfare in Agriculture Development: Impact on Sustainable Development and the Achievement of the SDGs. World Animal Net. July 2019. [https://www.wellbeingintlstudiesrepository.org/es\\_unsdg/2/](https://www.wellbeingintlstudiesrepository.org/es_unsdg/2/)

CIWF<sup>831</sup>:

Industrial animal agriculture is a key driver of nitrogen pollution.

Unabsorbed nitrogen is washed into rivers & lakes, leaches from soil into ground water and damages marine ecosystems.

Industrial livestock production generally uses and pollutes more surface- and ground-water than grazing systems. This is due to industrial systems' dependence on grain-based feed which is grown with synthetic nitrogen fertilisers. Further intensification of animal production will result in increasing use and pollution of water per unit of animal product. "Intensive livestock production is probably the largest sector-specific source of water pollution".<sup>832</sup>

McQuibban, Jack et al<sup>833</sup>:

To implement SDG 6, we must reduce water pollution and increase water-use efficiency.

The recent Global Land Outlook from UNCCD states that a meat-based diet uses 15 times more water than a plant-based diet. In China, animal agriculture is estimated to produce 40 times the nitrogen pollution of industrial factories, polluting water resources. Without addressing animal agriculture, we will not be able to ensure availability of water and sanitation for all.

Animal interests Thematic Cluster Side Event 2018:

To implement SDG 6, we must reduce water pollution and increase water-use efficiency.

The 2017 Global Land Outlook from UNCCD<sup>834</sup> states that a meat-based diet uses 15 times more water than a plant-based diet. In China, animal agriculture is estimated to produce 40 times the nitrogen pollution of industrial factories, polluting water resources. Without addressing animal agriculture, we will not be able to ensure availability of water and sanitation for all.

Edwin D. Ongley stated in "Control of water pollution from agriculture", a FAO irrigation and drainage paper<sup>835</sup>, that water quality was a barrier to sustainable development. He stated: "Experts predict that because pollution can no longer be remedied by dilution in many countries, freshwater quality will become the principal limitation for sustainable development in these countries."

### ***This Scoping Study – Additional Points:***

Current – industrialised - food systems are responsible for the overexploitation of 20% of the world's aquifers.

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<sup>831</sup> CIWF. Industrial Animal Agriculture will put Several Sustainable Development Goals out of Reach. August 2018. <https://www.ciwf.org.uk/media/7435794/industrial-animal-agriculture-will-put-several-sdgs-out-of-reach-august-2018-final.pdf>

<sup>832</sup> World economic and social survey, 2011. United Nations.

<sup>833</sup> McQuibban, Jack; Bridgers, Jessica and Wyper, Bonnie. Members of the Animal Issues Thematic Cluster of the NGO Major Group. The care, protection and conservation of animals is critical to the successful implementation of the 2030 Agenda. Sustainable Development Goals Knowledge Platform. 23 February 2018. <https://sustainabledevelopment.un.org/hlpf/2018/blog#23feb>

<sup>834</sup> UNCCD. Global Land Outlook 1. 2017. <https://www.unccd.int/resources/global-land-outlook/glo1>

<sup>835</sup> Ongley, Edwin D. Control of water pollution from agriculture - FAO irrigation and drainage paper 55 (1996). Chapter 1: Introduction to agricultural water pollution. <http://www.fao.org/docrep/w2598e/w2598e04.htm>.

By 2050, an expected 40% of the world population will be living in severely water-stressed river basins.

Agriculture and food production are significantly implicated in the extent to which planetary boundaries have been and are likely to be exceeded, including water usage.

Taken together, industrial crop and animal agriculture and aquaculture are responsible for the vast majority of water pollution globally.

The food system globally is the dominant user of fresh water. Worldwide, agriculture uses an average of 70 per cent of all fresh water withdrawals, rising to 90 per cent in many poorer countries.

Animal wastes from farms and slaughterhouses exceed the capacity of the land to absorb the waste, and can leech into waterways and aquifers. These can include pathogens (such as *E-coli*), antibiotic-resistant bacteria, hormones, veterinary pharmaceuticals, excess nutrients, viruses, industrial chemicals, and heavy metals.

### **Annex 2.2.2. SDG 8 Decent Work and Economic Growth**

Keeling et al.<sup>836</sup>:

Sustainable livestock systems can increase the value of animals, leading to additional incentives to increase welfare and vice versa.

Economic growth and incentives in short-term can make it possible for farmers to leave systems where animal welfare is substandard.

Links to animal welfare incentives can improve job satisfaction e.g., in slaughterhouses.

Appropriate animal handling, adapted to animal behaviour can reduce animals' stress as well as occupational risks and hazards for workers.

Working with animals or having pets at work can enhance the working environment.

Working dogs (drug control, dogs for the blind etc.) can work better when their welfare is good.

Isaiah Otieno.<sup>837</sup>:

With reduction of industrial livestock and encouragement of small-scale sustainable livestock production, wealth will be spread across the communities to the poorest in the society who are practicing small-scale livestock farming.

Ecotourism will provide decent jobs to communities around these areas.

Animal Issues Thematic Cluster (AITC).<sup>838</sup>:

600 million of the poorest people in the world rely on animals for their livelihoods.

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<sup>836</sup> Keeling L, Tunón H, Olmos Antillón G, Berg C, Jones M, Stuardo L, Swanson J, Wallenbeck A, Winckler C and Blokhuis H (2019) Animal Welfare and the United Nations Sustainable Development Goals. *Front. Vet. Sci.* 6:336. doi: 10.3389/fvets.2019.00336 *Frontiers in Veterinary Science* - <https://www.frontiersin.org/articles/10.3389/fvets.2019.00336/full>

<sup>837</sup> Otieno, Isaiah. UNEP. UNEP Animal Welfare in the Context of The Sustainable Development Goals (SDGs). PowerPoint presentation to the WOAHP Global Forum on Animal Welfare. April 2020. <https://www.oie.int/app/uploads/2021/08/3-i-otieno-unep--sdg-apr2021.pdf>

<sup>838</sup> Clifton, Wolf Gordon; Bridgers, Jessica; and Bazzi, Maha et al. Animal Interest Thematic Cluster (AITC). Animal Protection and Sustainable Development: An Indivisible relationship. <https://static1.squarespace.com/static/5b2543425cfd79f3074bf90c/t/5d23d461aa03990001fbb109/1562629270666/Animal+Protection+and+Sustainable+Development+-+An+Indivisible+Relationship-compressed.pdf>

Through agriculture and tourism, animals are fundamental to economies around the world. However, trends towards industrialised animal production, dwindling wildlife populations and agro-crime pose a grave risk not only to animals, but to the people and economies that rely on them.

Trade in animal products, for example, the donkey hide trade, have resulted in the decimation of donkey populations across entire regions such as Africa. Communities who rely on these animals for draught, traction and transport for selling goods at market are left without the means of achieving their livelihoods.

Industrial animal agriculture and fast-throughput slaughterhouses result in unsatisfactory working conditions, relatively high levels of occupational hazards, including traumatic injuries and infections, as well as low wages and reduced employment.

Nature-based tourism is a substantial driver of the tourism sector. Eighty percent of all trips to Africa are for wildlife viewing.

Governments must do more to ensure that agricultural production systems make a positive contribution to sustainable livelihoods and decent work. This means disincentives for intensive systems which contribute to poor labour, environmental and animal welfare outcomes, including removing unfair incentives such as subsidies to these forms of production, internalising externalities and by strengthening and enforcing labour policies. Implementing good practices for animal welfare can bring significant benefits to the agricultural sector, including opportunities in market differentiation and segmentation, production, national reputation and trade, as well as livelihoods, sustainability and development.

Continued reliance on economic growth, as measured by GDP, as the key indicator of development is at odds with the achievement of environmental and social well-being needed for sustainable development.

Wolf Clifton<sup>839</sup>:

Worldwide, 650 million people are directly reliant on domestic animals for livelihoods, and 1.6 billion on forest ecosystems.

Wildlife tourism is a major industry worldwide. Meanwhile, the economic role of consumptive tourism, such as hunting and fishing, is commonly exaggerated. In 2016, \$156 billion were spent on wildlife-related activities across the United States, a record high, with more wildlife watching and less hunting than ever before. Wildlife watching accounted for seven times more expenditures than hunting.

Across Africa, wildlife watching tours account for 88% of tourist revenues. Trophy hunting, on the other hand, accounts for no more than 2%. In places where trophy hunting takes place, the practice may in fact deter non-violent tourism, as people who desire to watch or photograph wildlife peacefully may not wish to patronise locations where animals are also killed for sport.

IFAW<sup>840</sup>:

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<sup>839</sup> Clifton, Wolf Gordon. Animal People. How Animal Protection Impacts All 17 U.N. Sustainable Development Goals. 1 July 2020. <https://animalpeopleforum.org/2020/07/01/how-animal-protection-impacts-all-17-u-n-sustainable-development-goals/>

<sup>840</sup> Hofberg, Mark et al. Thriving Together: The Critical Role of Animals in Achieving the SDGs. Second Edition. IFAW. 2022.



The economic benefits of nature tourism are remarkable; this is especially true in the developing world. Eighty percent of trips to Africa are for wildlife viewing. Whale watching is estimated to generate USD\$2 billion annually with 13 million people participating in at least 119 countries.

Animals also support the livelihoods of many of the world's poorest people, often serving as the single biggest store of wealth they own. More than 650 million (of the one billion poorest people on the planet) rely entirely on animals for a living.

Animal welfare measures not only ensure that working animals are treated humanely, they also create more value for the poor who rely on them.

Janice Cox (Good Practices for Agricultural Development)<sup>841</sup>:

78% of the poor live in rural areas, and 500 million are small farmers. Of these, 170 million are women farmers. Globally, 2.5 billion are dependent on small farms as a source of livelihood and employment. Agriculture contributes one third of GDP in Africa and more than 65% of the workforce depends on this sector.

A large proportion of future jobs will be created not only on farms but also in positions connected to food servicing and delivery. Good animal welfare practices for agricultural development project will lead to increased knowledge and management skills for animal health and welfare, which will improve the success, development potential and sustainability of development projects for livestock and aquaculture.

A development path that will create sustainable and broad-based jobs and livelihoods, and reduce poverty, must include the encouragement of more labour-intensive agricultural systems, especially smallholder farming.

Industrial agriculture is a high-input, low-labour system, meaning loss of agricultural jobs, which are the mainstay of developing country economies – whereas small-scale, high welfare, agroecological production provides local food security and labour opportunities.

In most developing countries, milk is produced by smallholders, and milk production contributes to household livelihoods, food security and nutrition. Milk provides relatively quick returns for small-scale producers and is an important source of cash income. However, some dairy development projects have been supported which did not meet good practice in various areas, including unsatisfactory management, husbandry, care, health, hygiene and animal welfare. These attract criticism and adverse publicity; and are not sustainable.

Aquaculture and fish production has reached 158 million tons. However, managing and regulating aquaculture is complicated due to uncertainty and lack of firm knowledge with respect to the externalities of aquaculture production (e.g., diseases, environmental impacts, and conflicts with other user interests). There are a number of decent work deficits associated with the aquaculture industry.

Ethical concerns about certain agricultural industries or practices can affect the nature and sustainability of work, and future prospects for growth.

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[https://d1jyxxz9imt9yb.cloudfront.net/resource/1304/attachment/original/IFAW\\_SDG\\_REPORT\\_RGB\\_FINAL\\_DIGITAL\\_20220627.pdf](https://d1jyxxz9imt9yb.cloudfront.net/resource/1304/attachment/original/IFAW_SDG_REPORT_RGB_FINAL_DIGITAL_20220627.pdf)

<sup>841</sup> Cox, Janice H. Good Practices for Animal Welfare in Agriculture Development: Impact on Sustainable Development and the Achievement of the SDGs. World Animal Net. July 2019. [https://www.wellbeingintlstudiesrepository.org/es\\_unsdg/2/](https://www.wellbeingintlstudiesrepository.org/es_unsdg/2/)

This Guardian article entitled “Nature-led coronavirus recovery could create \$10tn a year”<sup>842</sup> reports on the World Economic Forum report on the Future of Nature and Business (2020).<sup>843</sup> states that “Tackling the global nature crisis could create 400m jobs and \$10tn (£8tn) in business value each year by 2030.” The report warns that when the world recovers from the coronavirus pandemic there can be no business-as-usual, with today’s destruction of the natural world threatening over half of global GDP. It states that a nature-first approach from business and political leaders will be a jobs-first solution.

“There will be no jobs or prosperity on a dead planet,” said Alan Jope, chief executive of Unilever and a WEF partner.

The WEF report adds that better management of wild fish too could boost catches and add 14m jobs and \$170bn in value. It also states that it is vital to end the \$2bn subsidies given daily to agriculture which damage the planet.

There are other reports and resources which mention the costs of not taking full account of human-animal interactions and animal welfare (which will have a heavy impact on both economic growth and jobs). For example, the IPBES Workshop Report on Biodiversity and Pandemics.<sup>844</sup> includes these statistics and facts:

- \$8 trillion to \$16 trillion: estimated cost of the COVID-19 pandemic, including \$5.8 trillion to \$8.8 trillion of 3 to 6 months of social distancing and travel restrictions (6.4% to 9.7% of global GDP).
- >1 trillion dollars: likely annual global economic damages due to pandemics.
- \$53 billion: Economic impact of the 2014 Ebola epidemic in West Africa.
- \$7 billion to \$18 billion: Estimated cost of the Zika virus in South America and the Caribbean (2015 to 2017).
- \$55 billion: Global economic impact of H1N1 on tourism.
- \$78 billion to \$91 billion: total annual financial allocation for global biodiversity conservation.
- \$7 billion to \$23 billion: annual value of the world’s illegal wildlife trade.

The 2022 article entitled “Want to prevent pandemics? Stop spill-overs” pointed out that for around US\$20 billion per year, the likelihood of spill-over could be greatly reduced. This is the amount needed to halve global deforestation in hotspots for emerging infectious diseases; drastically curtail and regulate trade in wildlife; and greatly improve the ability to detect and control infectious diseases in farmed animals. That is a small investment compared with the millions of lives lost and trillions of dollars spent in the COVID-19 pandemic. The cost is also one-twentieth of the statistical value of the lives lost each year to

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<sup>842</sup> Carrington, Damian. Nature-led coronavirus recovery could create \$10tn a year, says WEF. Guardian. 15 July 2020. <https://www.theguardian.com/world/2020/jul/15/nature-led-coronavirus-recovery-could-create-10tn-a-year-says-wef>

<sup>843</sup> New Nature Economy. The Future of Nature and Business. 2020. [https://www3.weforum.org/docs/WEF\\_The\\_Future\\_Of\\_Nature\\_And\\_Business\\_2020.pdf](https://www3.weforum.org/docs/WEF_The_Future_Of_Nature_And_Business_2020.pdf)

<sup>844</sup> Daszak, P et al. IPBES (2020) Workshop Report on Biodiversity and Pandemics of the Intergovernmental Platform on Biodiversity and Ecosystem Services. IPBES secretariat, Bonn, Germany, DOI:10.5281/zenodo.414731

viral diseases that have spilled over from animals since 1918 (US\$212 billion), and less than one-tenth of the economic productivity erased per year.<sup>845</sup>

The 2015 report by UNEP, CBD and WHO entitled “Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review”<sup>846</sup> states the following (Chapter 7): “In addition to the burden of human morbidity and mortality, there are high financial costs associated with infectious diseases. For example, the 2003 SARS outbreak was estimated to cost the global economy over US \$30 billion. Regionally endemic, often “neglected” diseases also inflict economic damages, e.g., control and treatment for the canine tapeworm-transmitted *Echinococcus* – for which ungulates serve as an intermediate host – totals over US \$4 billion annually. Whereas emerging diseases may pose acute health and financial impacts, they may potentially become endemic, posing long-term impacts.”

The FAO, UNDP and UNEP report entitled “A Multi-Billion Dollar Opportunity: Repurposing agricultural support to transform food systems”<sup>847</sup> found that:

“87% of current support to agricultural producers, approximately USD 540 billion per year, include measures that are often inefficient, inequitable, distort food prices, hurt people’s health, and degrade the environment.”

“Under a continuation of current trends, this support could reach USD 1.8 trillion by 2030. There is therefore a clear need for action at country, regional and global levels to phase out the most distortive, environmentally and socially harmful support, such as price incentives and coupled subsidies, and redirecting it towards investments in public goods and services for agriculture, such as research and development and infrastructure, as well as decoupled fiscal subsidies.”

Spreading awareness and knowledge for sustainable agriculture methods from local, traditional and indigenous communities empowers historically marginalised communities. Low-income communities can adopt these techniques and create jobs. A joint report by the International Labour Organisation and the Inter-American Development Bank demonstrated that Latin America and the Caribbean could create 19 million jobs if the region transitioned to plant-based food production.<sup>848</sup>

The joint SEI/CEEW report entitled “Stockholm+50: Unlocking a Better Future”<sup>849</sup> states: “In regions with high levels of animal protein production and consumption, the benefits of a Just Transition may be considerable. According to one study, a global shift towards plant-

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<sup>845</sup> Vora, Neil M et al. Want to prevent pandemics? Stop spillovers. Nature. 12 May 2022. <https://www.nature.com/articles/d41586-022-01312-y>

<sup>846</sup> UNEP, CBD, WHO. Connecting Global Priorities: Biodiversity and Human Health. A State of Knowledge Review. 2015. <https://www.cbd.int/health/SOK-biodiversity-en.pdf>

<sup>847</sup> FAO, UNDP, UNEP. A Multi-Billion Dollar Opportunity: Repurposing agricultural support to transform food systems. <https://www.fao.org/3/cb6562en/cb6562en.pdf>

<sup>848</sup> Saget, Catherine, Vogt-Schilb, Adrien and Luu, Trang. Jobs in a Net-Zero Emissions Future in Latin America and the Caribbean. Inter-American Development Bank and International Labour Organization, Washington D.C. and Geneva. International Labour Organisation and the Inter-American Development Bank. 2020. [https://www.ilo.org/wcmsp5/groups/public/---americas/---ro-lima/documents/publication/wcms\\_752069.pdf](https://www.ilo.org/wcmsp5/groups/public/---americas/---ro-lima/documents/publication/wcms_752069.pdf)

<sup>849</sup> Stockholm Environment Institute (SEI). Stockholm+50: Unlocking a Better Future. <https://www.stockholm50.report/unlocking-a-better-future.pdf>

based diets could avoid 8.1 million human deaths, reduce food-related emissions by 70%, and save USD 1.6 trillion in health and climate change costs by 2050 (Springmann et al., 2020)."

WWF has stated that:

"The accelerating decline in wildlife populations will have long-term negative impacts on local communities as it robs communities of their natural capital and livelihoods - \$70 billion per year is lost due to crimes affecting natural resources<sup>850</sup> - deepens poverty and inequality, and threatens national security by causing instability and fuelling conflicts. In many developing countries, wildlife is a driver for tourism revenues, job creation, and sustainable development."<sup>851</sup>

SDG 8 is somewhat controversial because many question the viability of achieving inclusive and sustainable economic growth in a world of finite resources. Even the originator of GDP, Simon Kuznets, cautioned against equating GDP growth with economic or social well-being. With regard to animal welfare, the commercialisation and globalisation of food production and the wildlife trade has placed considerable pressures on the welfare of farmed animals and wildlife alike, in addition to the detrimental environmental and health impacts.<sup>852</sup>

#### ***This Scoping Study – Additional Points:***

It has been estimated that one dollar invested in One Health approaches can generate five dollars' worth of benefits at the country level through increased GDP and the individual level.

The transmission of diseases, like the Novel Coronavirus COVID-19, between animals and humans (zoonoses) threatens economic development, as well as health.

Before the current pandemic, the World Bank and UNEP estimated that an annual investment of \$1.9 billion to \$3.4 billion in strengthened "One Health" systems would yield an annual global public benefit of over \$30 billion annually. The projected cumulative losses from the COVID-19 pandemic during 2020 and 2021 have been estimated at nearly \$8.5 trillion, with projected cumulative losses at \$22 trillion.

Economists at USDA's Wildlife Services have conducted cost-benefit analyses which showed that eliminating wildlife rabies saves lives and can save taxpayers millions of dollars each year.

The same scenario would be true of the preventative effects of humane dog control.

SDG 8 is controversial because many question the viability of achieving "inclusive and sustainable economic growth" in a world of finite resources. The search for endless economic growth causes pressure on animals, natural resources and the environment, and

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<sup>850</sup> Enforcing environmental laws for strong economies and safe communities (English). Agriculture and environmental services discussion paper; no. 5 Washington, D.C. : World Bank Group. <http://documents.worldbank.org/curated/en/447361468325276787/Enforcing-environmental-laws-for-strong-economies-and-safe-communities>

<sup>851</sup> WWF. Illegal Wildlife Trade. <https://www.thegef.org/what-we-do/topics/illegal-wildlife-trade>

<sup>852</sup> Bellet, Camille and Rushton, Jonathan. World food security, globalisation and animal farming: unlocking dominant paradigms of animal health science. December 2019. [https://www.researchgate.net/publication/341120691\\_World\\_food\\_security\\_globalisation\\_and\\_animal\\_farming\\_unlocking\\_dominant\\_paradigms\\_of\\_animal\\_health\\_science](https://www.researchgate.net/publication/341120691_World_food_security_globalisation_and_animal_farming_unlocking_dominant_paradigms_of_animal_health_science)

the development paradigm needs to be replaced with one which prioritises the wellbeing of people, nature and animals over infinite economic growth (as per the One Health aim of optimising the health of people, animals and ecosystems).

### **Annex 2.2.3. SDG 12 Responsible Consumption and Production**

Keeling et al.<sup>853</sup>:

Responsible and restricted use of antimicrobials requires good animal welfare, and minimises antimicrobial resistance.

Changing consumption patterns in order to use the whole animal will reduce the environmental load and the number of animals used.

Feeding animals only with feed that is unsuitable for humans reduces competition over certain food sources and improves sustainability.

Decreasing consumption of food from animal origin (including fish) and increasing willingness to pay the true cost of animal foods would help farmers to improve welfare and reduce negative environmental consequences.

Isaiah Otieno.<sup>854</sup>:

Committee on the World Food security in its principles for Responsible Investment in Agriculture and Food Systems has principle 8 that states that "human safety and health is promoted by supporting animal health and welfare to sustainable increase productivity, food safety and food quality".

It is important at this point to mention that animal welfare does not by any way mean that humans are not allowed exploit the resources in the environment for sustenance. What animal welfare advocates, is a responsible and sustainable exploitation of these resources with deliberate efforts to protect them. A clear and easy example is overfishing where vessels catch fish faster than stocks can replenish. Catching fish is not inherently bad for the ocean but overfishing is currently threatening a number of fish species in our oceans.

Wolf Clifton.<sup>855</sup>:

The global population is projected to increase to 9.7 billion people by 2050. Using current food systems, this will require increasing global food production by more than 70%. The world human population could more effectively be fed by shifting food systems away from animal agriculture. To produce one kilogram of grain, it takes 99% less water and releases 78-95% fewer emissions than to produce one kilogram of animal protein. Producing meat from cell cultures, rather than by raising and slaughtering an animal, is estimated to require 99% less land and 96% less water, while producing 96% fewer emissions.

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<sup>853</sup> Keeling L, Tunón H, Olmos Antillón G, Berg C, Jones M, Stuardo L, Swanson J, Wallenbeck A, Winckler C and Blokhuis H (2019) Animal Welfare and the United Nations Sustainable Development Goals. *Front. Vet. Sci.* 6:336. doi: 10.3389/fvets.2019.00336 *Frontiers in Veterinary Science* - <https://www.frontiersin.org/articles/10.3389/fvets.2019.00336/full>

<sup>854</sup> Otieno, Isaiah. UNEP. UNEP Animal Welfare in the Context of The Sustainable Development Goals (SDGs). PowerPoint presentation to the WOAHA Global Forum on Animal Welfare. April 2020. <https://www.oie.int/app/uploads/2021/08/3-i-otieno-unep--sdg-apr2021.pdf>

<sup>855</sup> Clifton, Wolf Gordon. Animal People. How Animal Protection Impacts All 17 U.N. Sustainable Development Goals. 1 July 2020. <https://animalpeopleforum.org/2020/07/01/how-animal-protection-impacts-all-17-u-n-sustainable-development-goals/>

That said, plant agriculture can also have negative impacts when practiced using unsustainable methods. Palm oil deforestation imperils wildlife in southeast Asia, South America, and Africa. That said, the harmful impact of plant agriculture could largely be mitigated through the replacement of livestock farming, as more than half of agricultural plant protein is used as animal feed rather than being fed to humans directly. SDG 12 also relates to the goal of “Half Earth,” the concept that half of the Earth’s surface must be returned to nature in order to avert the biodiversity crisis, as first explicated by ecologist E.O. Wilson. This may sound like a utopian fantasy, but given that 22% of the Earth’s surface can be considered wild at present, simply freeing up the 30% of ice-free land currently used for livestock production by transitioning to alternative food systems would make Half Earth achievable.

NGO Major Group HLPF Position Paper (2021)<sup>856</sup>:

Government policies supporting socially and environmentally harmful production and lifestyles must be stopped and reallocated towards incentives for more humane, sustainable and socially-responsible alternatives.

Governments must also regulate the private sector and enforce the provision of accessible information for consumers on the social, environmental and animal welfare impacts of a product and its packaging throughout its lifecycle.

Governments should conduct a review of food systems in the context of sustainable production and consumption, human rights, and protection of living species and their natural habitats. Policies must shift from facilitating excessive meat, dairy, and fish production and consumption towards plant-based and cellular alternatives. Policies must also include agroecological solutions that are humane, sustainable, and interlinked with the principles of food sovereignty and the right to adequate and nutritious food, as well as support traditional, sustainable systems of agricultural production and indigenous practices that improve livelihoods, reduce soil and groundwater pollution, and protect human health while also sequestering and drawing down as much carbon as possible.

Janice Cox (Good Practices for Agricultural Development)<sup>857</sup>:

Transformation toward a sustainable world requires fundamental changes in how our societies produce and consume goods and services. Worldwide, especially in the global North, over-consumption and mass resource waste negatively impact caring for land, wildlife, water, and humanity.

Our current food systems are unsustainable on a number of fronts. In particular, industrial livestock production impacts detrimentally on the environment (through land and water use and water, soil and air pollution), human health (through antimicrobial resistance and emerging zoonotic diseases), social structures (through rural abandonment, poor working conditions and low wages) and causes immense animal suffering. This is increasingly the subject of scrutiny and research, and UN agencies are joining NGOs in calling for food policy and dietary changes.

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<sup>856</sup> NGO Major Group. Official Position Paper for the 2021 High-Level Political Forum

[https://static1.squarespace.com/static/603c11839959d83fcdc14604/t/60e5d113aeb8344c8912c11a/1625674016763/NGOMajorGroupPositionPaper\\_ENGLISH.pdf](https://static1.squarespace.com/static/603c11839959d83fcdc14604/t/60e5d113aeb8344c8912c11a/1625674016763/NGOMajorGroupPositionPaper_ENGLISH.pdf)

<sup>857</sup> Cox, Janice H. Good Practices for Animal Welfare in Agriculture Development: Impact on Sustainable Development and the Achievement of the SDGs. World Animal Net. July 2019. [https://www.wellbeingintlstudiesrepository.org/es\\_unsdg/2/](https://www.wellbeingintlstudiesrepository.org/es_unsdg/2/)



The world wastes or loses around a third of the food it produces, while almost 1 billion people go undernourished and another 1 billion go hungry. Conversely, 2 billion people globally are overweight or obese; with overconsumption of food adding detrimental impacts to both our health and the environment.

To implement SDG 12 we must, at minimum, halve global food waste; and this waste must include the loss incurred through feeding edible crops to animals (which according to the World Economic Forum is the largest loss in the food supply chain is from animal feed, amounting to a net 20% of the calories produced per person per day).

It is becoming more widely recognised that industrial livestock production is a driving force behind virtually every major category of environmental damage now threatening the human future, as well as the spread of disease.

Increased per-capita meat consumption has more than doubled in the past half-century, even as global population has continued to increase. As a result, the overall demand for meat has increased five-fold. That, in turn, has put escalating pressure on the availability of water, land, feed, fertiliser, fuel, waste disposal capacity, and most of the other limited resources of the planet.

The UN Committee on World Food Security report, “Sustainable agricultural development for food security and nutrition: what roles for livestock?” has also recognised that intensive livestock production contributes to negative impacts on the environment (through land and water use and water, soil and air pollution), human health (through antimicrobial resistance and emerging diseases), social structure (through rural abandonment, poor working conditions and low wages) and animal welfare.

Food production using systems, methods and practices which involve animal cruelty and poor animal welfare practices are not sustainable. There are increasing investigations and exposés of these, including extensive coverage in traditional and social media. This builds significant pressure for change away from the consumption and production of such products. One example is the use of cages, crates and other close confinement systems for the rearing of animals.

CIWF<sup>858</sup>:

Governments should develop programmes to increase public awareness of the implications of different livestock farming methods and consumption levels for human health, the environment, food security, climate change and animal welfare.

McQuibban, Jack et al<sup>859</sup>:

To implement SDG 12 we must, at minimum, halve global food waste. According to the World Economic Forum, the largest loss in the food supply chain is from animal feed, amounting to a net 20% of the calories produced per person per day. We must also ensure environmentally sound management of chemicals and wastes. Beyond the food sector, the use of animals in research is a significant source of chemical and biohazardous waste

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<sup>858</sup> CIWF. Industrial Animal Agriculture will put Several Sustainable Development Goals out of Reach. August 2018. <https://www.ciwf.org.uk/media/7435794/industrial-animal-agriculture-will-put-several-sdgs-out-of-reach-august-2018-final.pdf>

<sup>859</sup> McQuibban, Jack; Bridgers, Jessica and Wyper, Bonnie. Members of the Animal Issues Thematic Cluster of the NGO Major Group. The care, protection and conservation of animals is critical to the successful implementation of the 2030 Agenda. Sustainable Development Goals Knowledge Platform. 23 February 2018. <https://sustainabledevelopment.un.org/hlpf/2018/blog#23feb>

resulting in air, water and soil pollution, despite the fact that non-animal alternatives are now often more reliable, cheaper, faster, and less wasteful, as well as offering better models and end results. Without replacing animal tests, meat and dairy production with humane and innovative non-animal alternatives, we will not ensure societies' necessary transformation towards greater sustainable consumption and production patterns.

A 2019 article in UNEP's "Perspectives" entitled "Why is Animal Welfare Important for Sustainable Consumption and Production?" examines the interlinkages between animal welfare and sustainable consumption and production. It charts the impacts of intensive animal production, live transport and slaughter on the wellbeing of humans, animals and the environment. Finally, various suggestions are given for the achievement of SDG 12, including a reduction in the global consumption of animal products and products tested on animals.<sup>860</sup>

#### ***This Scoping Study – Additional Points:***

A third of global food production is lost or wasted annually. This adds substantial pollution to our environment, simply for food that is being thrown into landfills to pollute our environment even further; and in the case of food of animal origin, animals suffer and die to no useful purpose.

High-input, resource-intensive farming systems have caused massive deforestation, water scarcity, soil depletion, the loss of biodiversity, antimicrobial resistance of pests and diseases and high levels of GHG emissions, and cannot guarantee the sustainability of food and agricultural systems.

The people who directly or indirectly manage our food systems are also the largest group of natural resource managers in the world and could become critical agents of change in the transformation of current consumption and production systems.

The achievement of SDG 12 necessitates a reduction in the global consumption of animal products and products tested on animals.

Also, ending the use of animals for inessential purposes, including luxury products, entertainment, and medicinal purposes which are not effective.

Very little has been done to encourage companies to adopt sustainable practices and sustainability reporting.

Governments and inter-governmental organisations – including UNEP - should ensure that public procurement is repurposed to support humane, healthy, environmentally-friendly and sustainable products and practices.

### **Annex 2.2.4. SDG 14 Life Below Water**

Keeling et al.<sup>861</sup>:

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<sup>860</sup> Cox, Janice and Bridgers, Jessica, World Animal Net. Why is Animal Welfare Important for Sustainable Consumption and Production? UNEP. Perspectives. Issue No. 34. March 2019. <https://wedocs.unep.org/bitstream/handle/20.500.11822/28159/Perspective%20No34%20HR.pdf?sequence=1&isAllowed=y>

<sup>861</sup> Keeling L, Tunón H, Olmos Antillón G, Berg C, Jones M, Stuardo L, Swanson J, Wallenbeck A, Winckler C and Blokhuis H (2019) Animal Welfare and the United Nations Sustainable Development Goals. Front. Vet. Sci. 6:336. doi: 10.3389/fvets.2019.00336 Frontiers in Veterinary Science - <https://www.frontiersin.org/articles/10.3389/fvets.2019.00336/full>

Improved welfare of farmed fish leads to reduction in antibiotics in aquaculture. There are synergies e.g., reducing plastics benefits both animal welfare and the environment.

Improved methods of catching wild fish will improve their welfare, the quality of wild fish products and avoid by-catch.

Creating a demand for alternative fish species will reduce the waste associated with by-catch, and may reduce demand for threatened species.

Appropriate selection of fish for aquaculture, better adapted to the environmental conditions, will improve fish welfare and sustainability.

Verkuijl et al.<sup>862</sup>:

Aquaculture is associated with serious animal welfare concerns, as well as many environmental problems, including destruction of natural ecosystems such as mangroves, water pollution and eutrophication, and modification of hydrological patterns.

Industrial fishing has major impacts on marine biodiversity among other environmental issues.

Isaiah Otieno.<sup>863</sup>:

Marine life apart from sustaining humans by providing food and economic activity to earn a living, it helps in regulating the Green House Gases in our environment.

Marine litter in our oceans are at an alarming level with reports of life in the marine getting killed because of this. With the proper animal welfare policies, governments can be able to control fishing to avert overfishing and stop ocean pollution.

Wolf Clifton.<sup>864</sup>:

Up to 2.7 trillion wild fish are caught every year. According to the FAO, 34% of fisheries worldwide are currently overfished (2017), and 60% are already fished at the maximum sustainable rate.

Aquaculture, the rearing of marine animals for food in captivity, is widely touted as a more ecologically sustainable alternative to fishing, and currently accounts for nearly half of the seafood industry. However, its sustainability is questionable. One quarter of wild caught fish are used as feed for fish on farms, with less than 30% efficiency, so that aquaculture is itself a major driver of overfishing. Aquaculture can pose additional threats as well, such as mangrove deforestation caused by offshore shrimp farms, which exposes coastal human communities to disasters such as storms and tsunamis.

One alternative to the ecological destruction caused by fishing and aquaculture is the development of cell-cultured seafood. Cellular methods of growing fish and shrimp meat

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<sup>862</sup> Verkuijl, Cleo et al. Mainstreaming animal welfare in sustainable development A policy agenda. SEI & CEEW. May 2022. <https://euagenda.eu/upload/publications/animal-welfare-stockholm50backgroundpaper.pdf>

<sup>863</sup> Otieno, Isaiah. UNEP. UNEP Animal Welfare in the Context of The Sustainable Development Goals (SDGs). PowerPoint presentation to the WOAHP Global Forum on Animal Welfare. April 2020. <https://www.oie.int/app/uploads/2021/08/3-i-otieno-uneep-sdg-apr2021.pdf>

<sup>864</sup> Clifton, Wolf Gordon. Animal People. How Animal Protection Impacts All 17 U.N. Sustainable Development Goals. 1 July 2020. <https://animalpeopleforum.org/2020/07/01/how-animal-protection-impacts-all-17-u-n-sustainable-development-goals/>

have already been invented, and are currently in development for market release in Singapore, Hong Kong, and the United States.

NGO Major Group HLPF Position Paper (2017).<sup>865</sup>:

A strong environmental policy promoting marine reserves with relevant no-take zones and adherence to the limits for sustainable fishing above maximum sustainable yield is essential, taking into account the precautionary principle and ecosystem approaches. Harmful subsidies to the fishing sector and the widespread practice of illegal, unreported and unregulated fishing must be stemmed.

NGO Major Group HLPF Position Paper (2022).<sup>866</sup>:

We must focus environmental policy on precautionary solutions, such as effective regulation and taxation of unsustainable practices.

To meet SDG 14 targets, governments must reverse the global expansion of industrialised animal farming and agriculture, which results in runoff (nitrogen pollution) and aquaculture, which is also a major contributor of fish waste, food spills, and disease transmission. There must be strong regulation and enforcement at both national and regional levels to protect against overfishing, which jeopardises local food security and sustainability. Replacement (non-animal) products and industries should be explored and supported, such as seaweed farming, plant-based alternatives, and cellular seafood. Harmful subsidies to the fishing sector and the widespread practice of illegal, unreported and unregulated fishing must be stemmed.

Janice Cox (Good Practices for Agricultural Development).<sup>867</sup>:

Oceans, seas and coastal areas provide the world with numerous goods fundamental to human well-being and global food security. Fisheries and aquaculture are used as protein sources to reduce hunger, improve nutrition and alleviate poverty. However, overfishing is threatening livelihoods and the lives of local populations, unmanaged aquaculture expansion can cause pollution, and rising levels of carbon dioxide in the atmosphere contribute to ocean acidification.

Aquaculture is now recognised as a major problem in freshwater, as well as estuarine and coastal environments, leading to eutrophication and ecosystem damage. The most common method of aquaculture uses net pens or cages anchored to the sea floor in the ocean near the coast. Alternative methods use closed systems of tanks or ponds that float on water. Fish waste and leftover food spill out from nets and tanks into the ocean, causing nutrient pollution, eutrophication and hypoxia which can stress or kill aquatic creatures. Also, antibiotics or pesticides used on farmed fish can affect other marine life or human health.

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<sup>865</sup> NGO Major Group. Official Position Paper for the 2017 High-Level Political Forum.

<http://nebula.wsimg.com/47b20fccb88656e5a802c7936cc567cd?AccessKeyId=E3A2183630CD52C7534E&disposition=0&alloworigin=1>

<sup>866</sup> NGO Major Group. Official Position Paper for the 2022 High-Level Political Forum

<https://static1.squarespace.com/static/603c11839959d83fcdc14604/t/62a2e0a6c4f4933172325329/1654841518485/2022+NGO+Major+Group+Position+Paper+%281%29.pdf>

<sup>867</sup> Cox, Janice H. Good Practices for Animal Welfare in Agriculture Development: Impact on Sustainable Development and the Achievement of the SDGs. World Animal Net. July 2019. [https://www.wellbeingintlstudiesrepository.org/es\\_unsdg/2/](https://www.wellbeingintlstudiesrepository.org/es_unsdg/2/)

These nutrients and chemicals impact the biodiversity on the ocean floor when they sink and have made potentially toxic algae even more poisonous.

Water quality issues generated by intensive agriculture include the release of various wastes, such as sediments, pesticides, animal manures, fertilisers and other sources of inorganic and organic matter. The most common cause of water pollution in the U.S. is excess levels of nitrogen and phosphorous, the main source of which is fertiliser runoff that occurs when rain carries fertiliser into waterways.

Many pollutants reach surface and groundwater resources through over-application of manure to available land resulting in nutrient run-off, overflow or leakage of manure storage tanks and lagoons, and aerosolised pollutants which condense into waterways.

Experts predict that, because pollution can no longer be remedied by dilution in many countries, freshwater quality will become the principal limitation for sustainable development in these countries early in the next century.

CIWF<sup>868</sup>:

Intensive livestock production is probably the largest sector-specific source of water pollution.

Unabsorbed nitrogen damages marine ecosystems.

The Aquatic Life Institute (ALI) released a new report entitled “Benefits of Aquatic Animal Welfare for Sustainability” in September 2021,<sup>869</sup> highlighting the intersectionality between improved aquatic animal welfare and sustainable development. This urges all public policy-makers and other relevant stakeholders to start taking aquatic animal welfare into consideration when developing sustainable development policies moving forward.

The report identifies ten priority areas in which aquatic animal welfare considerations go hand in hand with global environmental and sustainability targets. This was a critical year, with the first UN Food Systems Summit and the UN Food and Agriculture Organization developing new guidelines on sustainable aquaculture, so – still as relevant today - the report was produced at an opportune time to stress that aquatic animal welfare should not be left behind in our effort in achieving the SDGs.<sup>870</sup>

### ***This Scoping Study – Additional Points:***

The primary pressures on open ocean biodiversity are overexploitation, pollution from land-based activities and climate change.

Two-thirds of the marine environment has also been changed by fish farms, shipping routes, subsea mines and other projects.

Globally, the over-exploitation of current – industrialised - food systems is responsible for 60% of global terrestrial biodiversity loss (terrestrial and aquatic) and the depletion of 61% of “commercial” fish populations.

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<sup>868</sup> CIWF. Industrial Animal Agriculture will put Several Sustainable Development Goals out of Reach. August 2018. <https://www.ciwf.org.uk/media/7435794/industrial-animal-agriculture-will-put-several-sdgs-out-of-reach-august-2018-final.pdf>

<sup>869</sup> Aquatic Life Institute. The Benefits of Aquatic Animal Welfare for Sustainability. September 2021. <https://ali.fish/aquatic-animal-welfare-sustainability>

<sup>870</sup> Eurogroup for Animals. New Report on the Benefits of Aquatic Animal Welfare for Sustainability Released. 23 September 2021. <https://www.eurogroupforanimals.org/news/new-report-benefits-aquatic-animal-welfare-sustainability-released>

In the oceans, overexploitation of fish stocks is leading to fisheries collapse. More than one third of the world's fish stocks are harvested at biologically unsustainable levels.

34 per cent of freshwater invertebrates and 25 per cent of marine invertebrates are considered at risk of extinction.

Two in five amphibian species are at risk of extinction, and close to one-third of other marine species.

The ocean produces more than 50 per cent of the planet's oxygen, is the main source of sustenance for more than a billion people, and provides work through its industries for some 40 million employees. Yet, more than one third of the world's fish stocks are harvested at biologically unsustainable levels.

Overexploitation of wild fish stocks and intensive aquaculture have detrimental effects on marine and terrestrial ecosystems.

Commercial aquaculture is one of the primary pressures on ocean biodiversity, with significant detrimental impacts on oceans and marine environments.

Capture fisheries – industrial uses include feed for aquaculture: Fishmeal and fish oil are used in aquaculture systems, adding to the pressures on wild fish stocks.

The commercial fishing industry is doing widespread damage to the ocean through taking too many fish for populations to rebuild, using harmful techniques such as bottom trawling – destroying habitats and killing non-target species.

The fishing industry also uses methods such as introducing explosives and poisons into the water, causing enormous loss of animal life and environmental destruction.

Noise pollution in oceans is an enormous animal welfare problem too.

Ghost fishing gear is another impact of the fishing industry - the deadliest form of marine plastic as it unselectively catches wildlife, entangling marine mammals, seabirds, sea turtles, and sharks, subjecting them to a slow and painful death. Ghost fishing gear also damages critical marine habitats such as coral reefs.

Factory farming of livestock and aquaculture are inherently bad for animal welfare, and they contribute to marine pollution and eutrophication, which in turn impacts the habitats and lives of marine animals.

### **Annex 2.2.5. SDG 15 Life on Land**

Keeling et al.<sup>871</sup>:

Modified approaches to grazing can reduce soil loss, improve carbon sequestration, and increase the diversity of soil biota.

A well-balanced grazing on meadows or semi-natural grasslands contributes to biodiversity.

Providing people with farmed sources of protein, produced according to good animal welfare standards, will reduce illegal hunting, illegal trade, and reduce the risk of transmission of zoonoses.

Responsible ownership of animals (farm and pets) can reduce the incidence of detrimental interactions with wildlife.

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<sup>871</sup> Keeling L, Tunón H, Olmos Antillón G, Berg C, Jones M, Stuardo L, Swanson J, Wallenbeck A, Winckler C and Blokhuis H (2019) Animal Welfare and the United Nations Sustainable Development Goals. *Front. Vet. Sci.* 6:336. doi: 10.3389/fvets.2019.00336 *Frontiers in Veterinary Science* - <https://www.frontiersin.org/articles/10.3389/fvets.2019.00336/full>



Verkuijl et al.<sup>872</sup>:

in addition to harming animals, industrial animal agriculture consumes much more land and water than plant-based alternatives, making it a leading driver of deforestation in some regions.

It also produces more waste and pollution than plant-based alternatives.

If we extend practices such as culling or captive breeding, then we might harm many individual animals unnecessarily through violence or control.

Moreover, while farmed and wild animal populations are particularly important in this context, many other populations are important, too. For instance, humans use millions of non-humans per year for research, medicine, companionship, entertainment, and more. And as with farmed and wild animals, our interactions with these animals can contribute to global threats, and global threats can contribute to suffering and death for these animals. During COVID-19, for instance, humans killed many laboratory animals in the search for treatments and vaccines, and humans also culled many captive animals in general to minimise the spread of disease and respond to supply chain breakdowns.

Isaiah Otieno.<sup>873</sup>:

All the life on land is interdependent on each other. The plants depend on the animals for pollination, animals depend on the plants for food and as their habitat. Humans depend on both the plants and the animals.

It's important that the ecosystem described above is maintained to be able to manage climate change, thus increase food security and eradicate poverty. In short by taking care of environment, humans will be assuring our own survival.

Wolf Clifton.<sup>874</sup>:

Only 22% of ice-free land can still be considered wild, in the sense that its ecosystems are not dominated by human activity. The biomass of humans and domestic animals currently outweighs all wild land mammals 35 times over.

Worldwide, up to a million species are at risk of extinction. Wild vertebrate populations have declined by 60% worldwide over the past forty years, with most megafaunal species already extinct everywhere except Africa and South Asia. Over 40% of insect species, which by many measures are even more essential to overall ecological health, are at risk of extinction.

Achieving SDG 15 requires not only acknowledging that wild animals need more habitat, but recognising that they also need connected habitat to survive. Habitat fragmentation can be counteracted through the construction of wildlife overpasses and underpasses across roads and railways, as well as corridors for migration between already protected areas, as the American Prairie Reserve in Montana is working to establish.

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<sup>872</sup> Verkuijl, Cleo et al. Mainstreaming animal welfare in sustainable development A policy agenda. SEI & CEEW. May 2022. <https://euagenda.eu/upload/publications/animal-welfare-stockholm50backgroundpaper.pdf>

<sup>873</sup> Otieno, Isaiah. UNEP. UNEP Animal Welfare in the Context of The Sustainable Development Goals (SDGs). PowerPoint presentation to the WOAHP Global Forum on Animal Welfare. April 2020. <https://www.oie.int/app/uploads/2021/08/3-i-otieno-unep--sdg-apr2021.pdf>

<sup>874</sup> Clifton, Wolf Gordon. Animal People. How Animal Protection Impacts All 17 U.N. Sustainable Development Goals. 1 July 2020. <https://animalpeopleforum.org/2020/07/01/how-animal-protection-impacts-all-17-u-n-sustainable-development-goals/>

NGO Major Group HLPF Position Paper (2022).<sup>875</sup>:

Industrialised agriculture and factory farming are two of the main causes of deforestation, land degradation, climate change, pollution of the natural environment, and biodiversity loss. It is thus essential that humanity transition as rapidly as possible to ecologically-friendly and regenerative agricultural practices, ensuring equitable access to nutritious food and supporting efforts to transition to more healthy and sustainable plant-based diets, and that policies are instituted to make a Just Transition and to support this at all levels of government.

The prioritisation of a just One Health approach, which addresses the interconnected health and well-being of humans, other animals, and the environment.

With regards to wildlife trade, governments and IGOs must work to close those legal trades in wildlife – which may include trophy hunting, wildlife farming, and auctions of confiscated stockpiles – which make illegal trade impossible to enforce. Wildlife trade is a threat not only to biodiversity, but also increases the risk of future zoonotic disease outbreaks and transmission by bringing humans into close contact with animals at all stages along the supply chain. Increasing efforts need to be undertaken to address and eliminate illegal logging and deforestation, along with the illegal hunting and killing of protected and threatened species. A major effort will also have to be made to reverse the loss of insect populations and pollinator species. The precautionary principle is critical. Subsidies supporting activities and practices with detrimental social, environmental or animal welfare impacts must be repealed and/ or repurposed to support humane and sustainable practices, including food system transformation, subsidy reforms, and dietary change. A resolution tasking UNEP to support countries in fulfilling the commitments made on subsidy policies would support states to identify and repeal and/or repurpose subsidies supporting activities and practices with detrimental social, environmental or animal welfare impacts with those supporting humane and sustainable practices, including food system transformation, subsidy reforms, nature conservation, and dietary change.

In light of accelerating climate change, safeguard wetlands, forests, and agricultural lands, prioritising the storage and sequestration of carbon and sustainable practices that do not encourage exploitation of humans, animals, and the environment.

Janice Cox (Good Practices for Agricultural Development).<sup>876</sup>:

Forests support up to 80% of terrestrial biodiversity and play a vital role in safeguarding the climate by naturally sequestering carbon. Yet, each year an average of 13 million hectares of forest disappears, often with devastating impacts on communities and indigenous peoples. Agriculture is widely believed to be one of the main causes of deforestation. Meat production is a major driver of both deforestation and habitat loss – either for direct conversion to pasture or through conversion to agriculture for feed production.

Industrial animal agriculture is also one of the main causes of land degradation, climate change, and biodiversity loss. No matter what methods are used, agriculture always has some

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<sup>875</sup> NGO Major Group. Official Position Paper for the 2022 High-Level Political Forum

<https://static1.squarespace.com/static/603c11839959d83fcdc14604/t/62a2e0a6c4f4933172325329/1654841518485/2022+NGO+Major+Group+Position+Paper+%281%29.pdf>

<sup>876</sup> Cox, Janice H. Good Practices for Animal Welfare in Agriculture Development: Impact on Sustainable Development and the Achievement of the SDGs. World Animal Net. July 2019. [https://www.wellbeingintlstudiesrepository.org/es\\_unsdg/2/](https://www.wellbeingintlstudiesrepository.org/es_unsdg/2/)

impact on the environment. However, industrial agriculture is a special case: it damages the soil, water, and the climate on an unprecedented scale. Further, the production of monoculture crops for animal feed, food, and biofuels is dependent on destructive pesticide and fertiliser chemical inputs which negatively impact all forms of life. Intensive monocultures deplete soil and leave it vulnerable to erosion. Chemical fertiliser runoff and industrial animal agriculture wastes add to global warming emissions and create oxygen-deprived "dead zones" at the mouths of major waterways. Herbicides and insecticides harm wildlife (including insects and pollinators) and can pose human health risks as well. Biodiversity in and near monoculture fields is also decreased, as populations of birds and beneficial insects decline.

The loss of terrestrial ecosystems and biodiversity may interfere with the enjoyment of a wide range of human rights, including the rights to life, health, food, livelihood, water, housing, and culture.

The development of good practice for animal welfare in agricultural development will support producers in low- and middle-income countries to move towards agroecological solutions that are humane and sustainable. An example of this is the use of silvopastoral systems, which use three-levels (or other multi-levels) of edible plants for grazing livestock, using native shrubs and trees. These encourage biodiversity, rather than destroying it as monoculture livestock grazing systems do. They also maintain complex soil structures, which helps worms and other invertebrates to flourish, and support water retention. Such systems will minimise the need for chemical inputs and nutrient overloading, instead moving towards methods which protect both the animals and the environment; including land, soil, forests and biodiversity.

CIWF<sup>877</sup>:

Livestock's huge demand for feed & land drives both the expansion of cropland and pastures and the intensification of crop production.

Increasing demand for land to grow soy and cereals for increasing number of industrially farmed animals, and as pasture for cattle, leads to expansion of farmland into forests and savannahs with massive loss of wildlife habitats and biodiversity.

Overgrazing of marginal lands leads to desertification.

Research clearly shows that the intensification of agriculture is a major factor in the degradation of soils.

Time is running out for our soils. UN FAO has calculated that we have about 60 years of harvests left.

Ever more forests and savannahs are being destroyed to grow soy and cereals for industrially farmed animals. This is eating into wildlife habitats driving many species – including elephants and jaguars – towards extinction.

Chemical-soaked monocultures that have arisen in part to satisfy the industrial sector's growing demand for feed crops have devastated birds, butterflies and pollinators.

Both the numbers and diversity of earthworms are being reduced by intensive agriculture; earthworms are essential to human life as they play a key part in maintaining soil health and fertility.

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<sup>877</sup> CIWF. Industrial Animal Agriculture will put Several Sustainable Development Goals out of Reach. August 2018. <https://www.ciwf.org.uk/media/7435794/industrial-animal-agriculture-will-put-several-sdgs-out-of-reach-august-2018-final.pdf>

Intensive agriculture has also played a major role in the decline in pollinators such as bees through its use of insecticides and herbicides, and its monocultures that lead to loss of floral abundance and diversity.

McQuibban, Jack et al.<sup>878</sup>:

To implement SDG 15, we must halt deforestation, degradation of habitats, and loss of biodiversity. It is widely recognized that cattle production is a leading deforestation driver and a recent international conference co-hosted by Worldwide Fund for Nature and Compassion in World Farming explored the irrefutable link between animal agriculture and biodiversity loss. Without addressing animal agriculture and land use, we will not achieve SDG 15.

***This Scoping Study – Additional Points:***

An estimated one million of the world's eight million or so species of plants and animals, including insects, are threatened with extinction. Insect species are also in decline, with at least one in 10 threatened with extinction and some regions suffering massive declines – 75% vanishing over 25 years. Insects are crucial for pollination, so this impacts food security. Each species threat represents the suffering of thousands of individual sentient beings, and even millions or billions in some cases. Furthermore, their demise will inevitably have “knock-on” effects on other animals, species and habitats.

As has been seen in this Scoping Study, livestock's contribution to environmental problems is on an enormous scale and its potential contribution to their solution is equally large. Industrialisation and ‘supermarketisation’ of food systems increases pressure on natural resources.

Agriculture and food production are significantly implicated in the extent to which planetary boundaries have been and are likely to be exceeded, including land use change.

Land use change is the major driver of biodiversity loss. The livestock sector is by far the single largest anthropogenic user of land.

UNEP found that amongst the key anthropogenic drivers for the emergence of zoonoses were agricultural intensification and land use conversion, fuelled by increased demand for animal protein.

The livestock industry is the major driver of deforestation, as well as one of the leading drivers of land degradation and pollution.

The total area occupied by grazing is equivalent to 26 percent of the ice-free terrestrial surface of the planet. In addition, the total area dedicated to feed-crop production amounts to 33 percent of total arable land. In all, livestock production accounts for 70 percent of all agricultural land.

The livestock sector provides only 17 per cent of dietary energy and 33 per cent of dietary protein demands. Therefore, using about 80 per cent of agricultural land for livestock is inefficient.

Agriculture is also polluting and degrading land, with fertile soil being lost at the rate of 24 billion tons a year. Louise Baker, external relations head of the UN Convention to Combat

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<sup>878</sup> McQuibban, Jack; Bridgers, Jessica and Wyper, Bonnie. Members of the Animal Issues Thematic Cluster of the NGO Major Group. The care, protection and conservation of animals is critical to the successful implementation of the 2030 Agenda. Sustainable Development Goals Knowledge Platform. 23 February 2018. <https://sustainabledevelopment.un.org/hlpf/2018/blog#23feb>

Desertification (UNCCD), likened industrial agriculture to an “extractive industry,” and stressed that it was not sustainable.

Human meat eating is the major driver of the current biodiversity crisis.

Changes in diet are considered an effective measure for reducing land-use impacts of agriculture. In particular, reducing meat consumption would reduce crop use as animal feed, which in turn would reduce demand for land, since direct human consumption of crops requires less land.

A dietary shift from animal-based to plant-based food; and free up a land area as large as the European Union.

Industrial production and monocultures damage land and biodiversity.

Ten out of every fourteen terrestrial habitats have seen a decrease in vegetation productivity and just under half of all terrestrial ecoregions are classified as having an unfavourable status.

Exploitation of wildlife has been identified as the second most significant direct driver of biodiversity loss.

Agriculture is a leading cause of pollution in many countries, particularly industrial animal agriculture. Taken together, industrial crop and animal agriculture and aquaculture are responsible for the vast majority of water pollution globally.

In intensive animal production, animals and their wastes are concentrated and usually exceed the capacity of the land to absorb the waste causing land pollution. This includes undesirable components of animal waste from farms and slaughterhouses such as pathogens (e.g., *E-coli*), antibiotic-resistant bacteria, hormones, veterinary pharmaceuticals, excess nutrients, viruses, industrial chemicals, and heavy metals.

Deforestation and habitat loss also impact the lives and welfare of animals.

Human dietary shifts are essential in order to preserve existing native ecosystems and restore those that have been removed or degraded.

Illegal trade in wildlife, fisheries and forest products is worth between US\$90 billion and US\$270 billion per annum.

Land and biodiversity would reap significant benefits from rewilding, agroecology and regenerative practices, integrated soil and water management, grazing/rangeland management, and agroforestry/silvopastoral systems.

Without addressing animal agriculture and land use, we will not achieve SDG 15. Poaching, hunting, wildlife trafficking and certain legal trade in wildlife are also driving biodiversity loss. In addition, wildlife has an intrinsic and community value and contributes to the ecological, genetic, social, economic, scientific, educational, cultural, recreational and aesthetic aspects of sustainable development, human well-being and resilient communities. Ensure international concern and targets on wildlife and biodiversity recognise individual animals’ intrinsic value, do not presume exploitative relationships and avoid harms to animals before irreversible earlier population declines.

### **Annex 2.2.6. SDG 17 Partnership for the Goals**

Keeling et al.<sup>879</sup>:

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<sup>879</sup> Keeling L, Tunón H, Olmos Antillón G, Berg C, Jones M, Stuardo L, Swanson J, Wallenbeck A, Winckler C and Blokhuis H (2019) Animal Welfare and the United Nations Sustainable Development Goals. *Front. Vet. Sci.* 6:336. doi: 10.3389/fvets.2019.00336 *Frontiers in Veterinary Science* - <https://www.frontiersin.org/articles/10.3389/fvets.2019.00336/full>

Public private partnerships can be effective nationally and globally in initiatives supporting animal welfare.

Trade agreements can support animal welfare developments, providing financial support and incentives to improve animal welfare.

Providing support for countries to reduce their national debt and lift their possibilities to develop their national capacity may indirectly also improve animal welfare according to many of the links identified in earlier goals.

Animal Issues Thematic Cluster (AITC)<sup>880</sup>:

The SDGs are human-centric and thus overlook the central importance of nature and animals to our world and our humanity. However, excluding the care, protection and conservation of animals as an interlinked and cross-cutting issue negatively contributes to the effective and full implementation of the Sustainable Development Agenda.

Target 17.14 aims to “Enhance policy coherence for sustainable development.” Animal welfare standards and guidelines are officially promulgated through international policy streams, such as the OIE animal welfare standards, as well as through national legislation and private standards. Improving animal welfare contributes significantly to improved environmental and human wellbeing outcomes.

Development policies of Parties to the CBD, CMS and CITES must be consistent and mutually reinforcing of existing obligations under these conventions. If care is not taken to ensure that development policies and strategies are coherent with agreed animal welfare standards and MEAs, countries will not reap the benefits to sustainable development that are concomitant with improved animal welfare and conservation practices. In order for the three dimensions of sustainable development to be achieved (economic, social and environmental), there needs to be coherence between animal welfare and conservation policies on international and national levels, as well as effective implementation and enforcement of these policies.

Animal welfare and conservation NGOs possess a wealth of knowledge, expertise, best practice and other resources that are currently underutilised in sustainable development. These NGOs can partner with governments and competent authorities to facilitate the incorporation of animal welfare and conservation into development policies and strategies, in order to fully harness the benefits and synergies of these issues for sustainable development.

Wolf Clifton<sup>881</sup>:

Animal welfare and conservation are increasingly recognised as priorities in international policy, for example in the OIE’s animal welfare standards, the African Union’s animal welfare strategy, and in SDGs 14 and 15 of the U.N.’s 2030 Agenda. However, in practice governments vary widely in legislation, policy, and enforcement, leaving much of the burden to local and international NGOs.

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<sup>880</sup> Clifton, Wolf Gordon; Bridgers, Jessica; and Bazzi, Maha et al. Animal Interest Thematic Cluster (AITC). Animal Protection and Sustainable Development: An Indivisible relationship. <https://static1.squarespace.com/static/5b2543425cfd79f3074bf90c/t/5d23d461aa03990001fbb109/1562629270666/Animal+Protection+and+Sustainable+Development+-+An+Indivisible+Relationship-compressed.pdf>

<sup>881</sup> Clifton, Wolf Gordon. Animal People. How Animal Protection Impacts All 17 U.N. Sustainable Development Goals. 1 July 2020. <https://animalpeopleforum.org/2020/07/01/how-animal-protection-impacts-all-17-u-n-sustainable-development-goals/>



NGOs possess a wealth of expertise, personnel, and other resources necessary to facilitate sustainable development and animal protection. There is also a place for private industry, as in the fields of ecotourism, alternative protein development, low emissions technology, and other advances beneficial to humans and non-human animals alike.

Janice Cox (Good Practices for Agricultural Development)<sup>882</sup>:

Implementation of the SDGs could be significantly supported by the good practices for animal welfare in agricultural development project. The programme will work to harness partnerships for the improvement of animal welfare, because the process of developing good practice resources will be participatory, and subsequent roll-out will involve multiple stakeholders.

Partnerships between governments, intergovernmental institutions, research and academic institutions, and civil society are critical to gaining the comprehensive perspectives, expertise and resources necessary to fully implement the 2030 Agenda, as well as ensure effective monitoring, review, and accountability. Through a participatory and collaborative approach, this project (the Wageningen Process) will succeed in furthering the well-being of humans and animals and ensuring transformation towards sustainable and resilient societies for all.

#### ***This Scoping Study – Additional Points:***

One Health provides a potential platform for partnerships for the goals, in the many cases where SDGs cut across human-animal-environmental wellbeing.

A proactive programme of “Just Transitions” for transformative change is a major exercise, and should harness partnerships across different stakeholder groupings.

Lessons from transitions in other sectors point to the importance of ensuring meaningful, inclusive participation of stakeholders who stand to be affected. These stakeholders may include, for instance, workers, consumers, companies, specially affected communities, and organisations representing the interests of animals.

### **Annex 2.3. Climate Change SDG**

This is a separate section because UNEP is not officially responsible for any of the indicators under SDG 13.

#### **Annex 2.3.1. SDG 13 Climate Action**

Keeling et al:

Climate change increases the risk that animals will be exposed to new diseases. Animal species should be kept and used in the climate in which they evolved or where the breed was selected.

Although there are many uncertainties when calculating the carbon foot print of livestock products, it is generally agreed that there is a link to animal welfare in that production efficiency and longevity are improved in animals with good welfare.

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<sup>882</sup> Cox, Janice H. Good Practices for Animal Welfare in Agriculture Development: Impact on Sustainable Development and the Achievement of the SDGs. World Animal Net. July 2019. [https://www.wellbeingintlstudiesrepository.org/es\\_unsdg/2/](https://www.wellbeingintlstudiesrepository.org/es_unsdg/2/)

Verkuijl et al.<sup>883</sup>:

Industrial animal agriculture is responsible for approximately 14.5% of global greenhouse gas emissions. More than plant-based alternatives.

Intensification of production systems – sometimes put forward as a climate mitigation strategy – also carries risks for animals.

Isaiah Otieno.<sup>884</sup>:

Animals produce greenhouse gas (GHG) emissions as well. They however, help regulate the same by their natural behaviours. The ocean and the tropical forests are the largest carbon sinks. The tropical trees with help in the carbon stock depend on the animals for seed dispersal and regenerations.

“Fish carbon” defines the marine life ability to address climate change and thus prevent global biodiversity loss.

Animal Issues Thematic Cluster (AITC)<sup>885</sup>:

Climate change is already having a negative impact on animals and their habitats.

climate change is one of the major direct drivers of species extinction – third after changes in land and sea use and overexploitation.

Loss of animal species and biodiversity can harm the natural systems that help to mitigate global warming.

Increasing natural disasters caused by climate change are severely affecting both domesticated and wild animals.

Tolerance to environmental changes varies from one species to another, but many are unable to cope with the rapid pace of climate change, through either evolutionary or behavioural processes. Some mammals have very specific climatic adaptations, such as requirements for snow, sea ice, or temperatures within a narrow range for hibernation.

Some have distributions that are dependent on climate. Climate change can also alter a species' food supply or its reproductive timing, thereby affecting its fitness

Human-driven climate change is also a major contributor to insect loss, including vital pollinator species, which will have catastrophic consequences for agriculture.

Agriculture and land-use change (land clearing and fertilisation for crop and livestock production) are responsible for around one quarter of all greenhouse gas emissions, with animal-based food production contributing 75% of that, or 14.5% of all greenhouse gases.

If food-related emissions are to decrease and global temperature rises are to be maintained below 2°C to achieve the Paris Agreement targets, a significant reduction in meat and dairy consumption is key.

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<sup>883</sup> Verkuijl, Cleo et al. Mainstreaming animal welfare in sustainable development A policy agenda. SEI & CEEW. May 2022. <https://euagenda.eu/upload/publications/animal-welfare-stockholm50backgroundpaper.pdf>

<sup>884</sup> Otieno, Isaiah. UNEP. UNEP Animal Welfare in the Context of The Sustainable Development Goals (SDGs). PowerPoint presentation to the WOAHA Global Forum on Animal Welfare. April 2020. <https://www.oie.int/app/uploads/2021/08/3-i-otieno-unep--sdg-apr2021.pdf>

<sup>885</sup> Clifton, Wolf Gordon; Bridgers, Jessica; and Bazzi, Maha et al. Animal Interest Thematic Cluster (AITC). Animal Protection and Sustainable Development: An Indivisible relationship. <https://static1.squarespace.com/static/5b2543425cfd79f3074bf90c/t/5d23d461aa03990001fbb109/1562629270666/Animal+Protection+and+Sustainable+Development+-+An+Indivisible+Relationship-compressed.pdf>

Unless animal agriculture in itself is recognised and dealt with as a major contributor to rising temperatures, climate change and its deleterious effects on humans and animals cannot be mitigated.

There is potential for climate mitigation through improved manure and land management, and by reducing the overall number of animals farmed through reductions in food waste and the adoption of less meat-intensive diets.

Mammals play dominant roles in many ecological contexts. Large herbivores, such as elephants and gorillas, play a particular role in distributing seeds to regenerate forests.

Wolf Clifton.<sup>886</sup>:

Animal agriculture produces 14.5% of emissions, second only to the transportation sector, according to the UN Food and Agriculture Organization (FAO) in 2013. Climate change is a key driver of species extinction, aggravating the biodiversity crisis. Meanwhile, the migration of species into new territories as their ecosystems change affects the distribution and risk of zoonotic diseases transmissible to humans. Ocean acidification, a result of rising sea temperatures, destroys coral, shellfish, and bivalves, devastating marine ecosystems worldwide and the human communities that depend on them.

In many regions, people and their animals are already impacted by climate-related disasters. In Kenya, severe droughts in 2018 and 2019 killed over half of all livestock in some regions, and placed 3.4 million people in severe food insecurity.

NGO Major Group HLPF Position Paper (2021)<sup>887</sup>:

Governments must lead by example through public procurement and sustainable practices. Government must end subsidies and loans to fossil and nuclear energy supply, climate exacerbating agricultural practices and to infrastructure that creates major consumption of fossil fuels.

Food systems must be addressed, enabling a transition back to sustainable models of farming, small-scale, ecologically aligned traditional systems that are more climate friendly.

IFAW<sup>888</sup>:

Climate change will continue to worsen if biodiversity is not protected, especially because animals play a key role in maintaining critical ecosystems that mitigate the damaging effects of CO2 emissions.

About 40% of the world's carbon is stored in tropical rainforests, and effective climate mitigation relies on healthy forest ecosystems to serve as a carbon sink. In order for these ecosystems to be healthy and resilient, the wildlife populations that inhabit them must also be robust. Large mammals in particular are essential to climate change mitigation and adaptation.

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<sup>886</sup> Clifton, Wolf Gordon. Animal People. How Animal Protection Impacts All 17 U.N. Sustainable Development Goals. 1 July 2020. <https://animalpeopleforum.org/2020/07/01/how-animal-protection-impacts-all-17-u-n-sustainable-development-goals/>

<sup>887</sup> NGO Major Group. Official Position Paper for the 2021 High-Level Political Forum [https://static1.squarespace.com/static/603c11839959d83fcdc14604/t/60e5d113aeb8344c8912c11a/1625674016763/NGOMajorGroupPositionPaper\\_ENGLISH.pdf](https://static1.squarespace.com/static/603c11839959d83fcdc14604/t/60e5d113aeb8344c8912c11a/1625674016763/NGOMajorGroupPositionPaper_ENGLISH.pdf)

<sup>888</sup> Hofberg, Mark et al. Thriving Together: The Critical Role of Animals in Achieving the SDGs. Second Edition. IFAW. 2022. [https://d1jyxxz9imt9yb.cloudfront.net/resource/1304/attachment/original/IFAW\\_SDG\\_REPORT\\_RGB\\_FINAL\\_DIGITAL\\_20220627.pdf](https://d1jyxxz9imt9yb.cloudfront.net/resource/1304/attachment/original/IFAW_SDG_REPORT_RGB_FINAL_DIGITAL_20220627.pdf)

Forests depend on large herbivores to propagate seeds and regenerate the forest. Whales are a key part of carbon sequestration in oceans, along with a host of other marine vertebrates.

Climate change is linked closely with animal product production and the care of those animals. Meat and dairy account for around 14.5% of global greenhouse emissions, which could rise precipitously as the world's population grows. Plant-based diets are a major opportunity to mitigating climate change.

One of the most pressing dangers presented by climate change is its escalating effect on natural disasters. Animals need to be part of disaster planning and relief.

From disaster planning, to changes in animal consumption in diets, and the key role of wildlife in climate mitigation, no climate-related action should be undertaken without considering both domestic animals and wildlife populations.

Janice Cox (Good Practices for Agricultural Development)<sup>889</sup>:

It will not be possible to implement SDG 13 without addressing animal agriculture and current levels of meat and dairy consumption, because of the contribution of animal agriculture to greenhouse gases.

CIWF<sup>890</sup>:

Research shows that on a business-as-usual basis emissions from food and agriculture will increase substantially and could make it very difficult to reach the Paris targets.

Supply side measures will not on their own be able to achieve a sufficient reduction in farming's GHG emissions; indeed, they may well not be able to prevent an increase.

Demand side: It is unlikely that global temperature rises can be kept below 2°C without a reduction in meat and dairy consumption. Studies show that a significant reduction in meat consumption is essential if food-related emissions are to decrease.

"The world's current consumption pattern of meat and dairy products is a major driver of climate change and climate change can only be effectively addressed if demand for these products is reduced".<sup>891</sup>

Global investors FAIRR managing \$14 trillion have urged the United Nations to create a global plan to make the agriculture sector sustainable and curb one of the biggest sources of climate-damaging emissions. Food production accounts for around a third of global greenhouse gas emissions.<sup>892</sup>

### ***This Scoping Study – Additional Points:***

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<sup>889</sup> Cox, Janice H. Good Practices for Animal Welfare in Agriculture Development: Impact on Sustainable Development and the Achievement of the SDGs. World Animal Net. July 2019. [https://www.wellbeingintlstudiesrepository.org/es\\_unsdg/2/](https://www.wellbeingintlstudiesrepository.org/es_unsdg/2/)

<sup>890</sup> CIWF. Industrial Animal Agriculture will put Several Sustainable Development Goals out of Reach. August 2018. <https://www.ciwf.org.uk/media/7435794/industrial-animal-agriculture-will-put-several-sdgs-out-of-reach-august-2018-final.pdf>

<sup>891</sup> Hilal Elver, 2015. Interim Report. A/70/287. [www.refworld.org/docid/55f291324.html](http://www.refworld.org/docid/55f291324.html)

<sup>892</sup> Jessop, Simon and Dickie, Gloria. Global investors write to U.N. to urge global plan on farming emissions. Reuters. 9 June 2022. <https://www.reuters.com/business/sustainable-business/exclusive-global-investors-write-un-urge-global-plan-farming-emissions-2022-06-08/>

The global food system as a whole (farming, transportation, packing, etc.) contributes 20 to 30 percent of anthropogenic greenhouse gas emissions and is the leading cause of deforestation.

According to the FAO, global livestock supply chains account for 14.5 percent of anthropogenic greenhouse gas (GHG) emissions, although more recent studies recommend updating this figure to 16.5%.

Feed production and processing, and digestive fermentation from ruminants are the two main sources of emissions, representing 45% and 39% of sector emissions, respectively. Manure storage and processing represent 10%. Livestock manure also contributes to short-lived climate pollutant emissions through the burning of pastureland and the use of dung as a fuel for heating and cooking, which emit black carbon. Whilst there is some potential for mitigation through improved manure management practices, this is far more difficult within confined intensive production systems.

The remainder is attributable to the processing and transportation of animal products.

Included in feed production, the expansion of pasture and feed crops into forests accounts for about 9% of the sector's emissions.

Beef and cattle milk production account for the majority of emissions, respectively contributing 41% and 20% of the sector's emissions.

Global emissions from agriculture increased eight percent from 1990 to 2010, with population growth and dietary change being the greatest drivers.

By 2050, greenhouse gas emissions from agriculture may increase from 24% to 30%.

There is an urgent need to transform food systems.

Adaptation options included agroecological principles and practices, ecosystem-based management in fisheries and aquaculture, and other approaches that work with natural processes support food security, nutrition, health and well-being, livelihoods and biodiversity, sustainability and ecosystem services.

Other adaptation strategies include the reduction of food waste at all stages of production and consumption.

Climate change is one of the key anthropogenic drivers for the emergence of zoonoses.

Climate change will drive more than 15,000 new cases of mammals transmitting viruses to other mammals over the next 50 years, as global warming shifts wildlife habitats causing increased encounters between species that swap pathogens.

Dietary change (towards predominantly plant-based diets) is one of the most promising approaches for addressing climate change and other environmental challenges, and cellular agriculture and cultured meat and seafood could support this transition.

The oceans cover over 70% of the Earth's surface and play a crucial role in taking up CO<sub>2</sub> from the atmosphere.

Increasing CO<sub>2</sub> in the ocean alters the chemistry of seawater – an effect known as ocean acidification – which has negative impacts on marine life. Also, industrial agriculture contributes to dead zones in the ocean, which are like oceanic deserts unable to support marine life.<sup>893</sup> These dead zones are releasing one of the worst greenhouse gases, nitrous oxide (N<sub>2</sub>O).

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<sup>893</sup> Bailey, Anna et al. Agricultural Practices Contributing to Aquatic Dead Zones. Springer Link. 28 June 2020. [https://link.springer.com/chapter/10.1007/978-981-15-3372-3\\_17#:~:text=The%20excessive%20influx%20of%20nitrogen,the%20affected%20body%20of%20water.](https://link.springer.com/chapter/10.1007/978-981-15-3372-3_17#:~:text=The%20excessive%20influx%20of%20nitrogen,the%20affected%20body%20of%20water.)

Marine vertebrates influence the capacity of ecosystems to release, fix, store, or sequester carbon; and also, themselves function as carbon stores and contribute to carbon flux (downward movement of carbon to deeper waters and sediment).<sup>894</sup>

There is now a clear need to include consideration of these functions both in policies on climate change mitigation and adaptation, and in the protection of marine vertebrate populations.

Although 92 governments have included livestock in their Nationally Determined Contributions, few governments have developed strategies for reducing greenhouse gas emissions from the agriculture and land-use sector.

No national government has fully included agriculture in a carbon pricing scheme.

Emissions could be reduced by as much as 70 percent through adopting a vegan diet and 63 percent for a vegetarian diet, which includes cheese, milk, and eggs.

A dietary shift from animal-based foods to plant-based foods in high-income countries alone could lead to a substantial double climate dividend. This would reduce greenhouse gas emissions from direct agricultural production and increase carbon sequestration if the resulting spared land was restored to its antecedent natural vegetation. The adoption of the EAT–Lancet planetary health diet by 54 high-income nations representing 68% of global gross domestic product and 17% of population could reduce annual agricultural production emissions of high-income nations’ diets by 61% while sequestering as much as 98.3 (55.6–143.7) GtCO<sub>2</sub> equivalent, equal to approximately 14 years of current global agricultural emissions until natural vegetation matures.

The main natural carbon sinks are plants, trees, the ocean and the soil.

The oceans cover over 70% of the Earth’s surface and play a crucial role in taking up CO<sub>2</sub> from the atmosphere.

The U.S. government estimates that 90 percent of the world’s global warming has taken place in the oceans. The phenomenon is exacerbated by other factors in the water, including overfishing and destructive fishing practices, seabed mining, and plastic and chemical pollution.

The aquaculture industry also contributes to global warming.

Marine vertebrates influence carbon outcomes in the ocean, including the capacity of ecosystems to release, fix, store, or sequester carbon.

Fish Carbon mechanisms are the natural life processes of marine vertebrates that enable capture of atmospheric carbon, allow carbon storage in benign form in the ocean, and provide a potential buffer against ocean acidification.

The carbon capture potential of whales is significant.

Another often-forgotten interlinkage is that between working Equidae and climate change which stretches across the world with horses, mules and donkeys used in sustainable cities, farming, rewilding or forestry. This helps to reduce carbon footprint.

Climate change will increasingly impact terrestrial animals, marine ecosystems, fisheries and aquaculture alike.

The climate emergency is also a major contributor to insect loss, including essential pollinator species.

SDG 13 will not be achieved unless more is done to persuade consumers to shift to more plant-rich diets.

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<sup>894</sup> Martin, Angela Helen et al. Integral functions of marine vertebrates in the ocean carbon cycle and climate change mitigation, Science Direct. 21 May 2021.  
<https://www.sciencedirect.com/science/article/pii/S2590332221002384>



*Replacing just 20% of global beef consumption with a meat substitute could halve deforestation and the carbon emissions associated with it. Incorporating novel foods into diets can reduce global warming potential, water use and land use by over 80%. These conclusions mirror the IPCC's finding that a shift towards plant-based diets is associated with lower emissions and could therefore "lead to substantial decreases in GHG emissions". The mitigation potential of emerging food technologies, such as cellular fermentation, cultured meat, and plant-based alternatives to animal-based food products are widely agreed.*

## **Annex 2.4. Other SDGs**

### **Annex 2.4.1. SDG 1 No Poverty**

Keeling et al.<sup>895</sup>:

Improved farm animal welfare improved production efficiency, reduced veterinary costs, improved product quality and gave access to new markets.

Allied industries may also provide pathways out of poverty.

Improved welfare of working animals increased transport and carrying capacity, and incomes.

Isaiah Otieno<sup>896</sup>:

Animals are key in poverty eradication by:

Sustaining communities via ecotourism.

Source of income for poor families through trade.

Providing food and thus food stability.

Wolf Clifton<sup>897</sup>:

Poverty is a major driver of wildlife crime, to the extent that in anonymous surveys, 80% of poachers report poverty and/or food insecurity as their primary motivation. Up to 96% of poachers report that they would give up poaching if alternative livelihoods were available to them.

Poverty also relates to the keeping of working animals. 650 million people worldwide, many below the poverty line, are directly reliant on animals for income. Working animals often play a large role in uplifting families and communities from poverty. In Mali, families with donkeys earn up to three times the average monthly income for their country. The theft and illegal slaughter of donkeys for ejiao – a gelatine derived from boiling down donkey hides, used in traditional Chinese medicine – leaves their keepers without livelihood, endangering human communities in addition to the animals slaughtered for the product

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<sup>895</sup> Keeling L, Tunón H, Olmos Antillón G, Berg C, Jones M, Stuardo L, Swanson J, Wallenbeck A, Winckler C and Blokhuis H (2019) Animal Welfare and the United Nations Sustainable Development Goals. *Front. Vet. Sci.* 6:336. doi: 10.3389/fvets.2019.00336 *Frontiers in Veterinary Science* - <https://www.frontiersin.org/articles/10.3389/fvets.2019.00336/full>

<sup>896</sup> Otieno, Isaiah. UNEP. UNEP Animal Welfare in the Context of The Sustainable Development Goals (SDGs). PowerPoint presentation to the WOAHA Global Forum on Animal Welfare. April 2020. <https://www.oie.int/app/uploads/2021/08/3-i-otieno-uneep-sdg-apr2021.pdf>

<sup>897</sup> Clifton, Wolf Gordon. Animal People. How Animal Protection Impacts All 17 U.N. Sustainable Development Goals. 1 July 2020. <https://animalpeopleforum.org/2020/07/01/how-animal-protection-impacts-all-17-u-n-sustainable-development-goals/>

Janice Cox (Good Practices for Agricultural Development)<sup>898</sup>:

The introduction of good animal welfare systems in agriculture supports family and small-scale/emerging farmers in producing sustainable, high quality and healthy food. This enhances their viability and competitiveness against industrial agricultural production. Industrial animal agriculture exacerbates poverty through unfair competition with family and small-scale farmers, and its detrimental impacts on rural communities: In particular, with regard to resource use and pollution in its various forms. Industrial agriculture makes food supplies insecure, as it is often dependent on imports and technology, and concentrated in the hands of a small number of major commercial interests. It is also low labour, resulting in a loss of agricultural jobs, which are the mainstay of developing country economies. In contrast, small-scale, high welfare, agroecological production strengthens local food security and labour opportunities.

Industrial agriculture's rearing of large single-species units, in close-confinement systems, increases vulnerability to disease, health risks and accidents. This imposes numerous environmental and health costs which are borne by the countries involved rather than by the corporations profiting from the goods, (including significantly contributing to greenhouse gas emissions and antibiotic resistance). The "trickle down" effect does not occur in ways that benefit the poor – industrial animal agriculture profits are made by large corporations, and its products go to feed well-off urban populations.

Industrial livestock production contributes to negative impacts on the environment (through land and water use and water, soil and air pollution), human health (through antimicrobial resistance and emerging diseases), social structure (through rural abandonment, poor working conditions and low wages) and animal welfare. These impacts will exacerbate poverty and disadvantage.

The introduction of high welfare, sustainable, agroecological systems will provide a pathway out of poverty, building food-secure and sustainable rural populations for many generations to come.

Working animals play an important role in livelihoods, production efficiency, transport and traction and access to wider markets—permitting families to be economically active. Those who own animals are better off, and those who are able to ensure their animals' health and welfare enjoy further improved outcomes.

In general, healthy, well-cared for animals can make a real difference to raising people out of poverty.

The impacts on poverty of industrial animal agriculture are covered in more detail in the report "Industrial Animal Agriculture: Part of the Poverty Problem".<sup>899</sup> This report shows how in developing countries, industrial animal agriculture devastates the livelihoods of local farmers, destroying rural structures and communities. Its inefficient use of food sources and production, together with its dependence on imports and technology, makes food supplies

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<sup>898</sup> Cox, Janice H. Good Practices for Animal Welfare in Agriculture Development: Impact on Sustainable Development and the Achievement of the SDGs. World Animal Net. July 2019. [https://www.wellbeingintlstudiesrepository.org/es\\_unsdg/2/](https://www.wellbeingintlstudiesrepository.org/es_unsdg/2/)

<sup>899</sup> Janice Cox for the World Society for the Protection of Animals (WSPA). Industrial Animal Agriculture: Part of the Poverty Problem. 2007. [https://www.worldanimalprotection.ca/sites/default/files/media/ca\\_en\\_files/wspa\\_poverty\\_report\\_tcm22-3744.pdf](https://www.worldanimalprotection.ca/sites/default/files/media/ca_en_files/wspa_poverty_report_tcm22-3744.pdf)

insecure; and its significant environmental and health costs are borne by the countries involved, rather than by the often foreign-owned corporations profiting from the goods.

CIWF<sup>900</sup>:

Industrial animal agriculture is associated with reduced employment and hence greater poverty which has cascading harmful effects on rural communities and contributes to rural abandonment.

The FAO recognises that industrial livestock production “may occur at the expense of diminishing the market opportunities and competitiveness of small rural producers”.

The World Bank has recognised that intensification of livestock production carries “a significant danger that the poor are being crowded out.”

Industrial agriculture needs less labour than agroecological systems. As a result, it leads to a loss of jobs for landless workers. In addition, it out-competes previously self-sufficient, small-scale farmers forcing them to leave rural areas to look for work in cities. Concomitant with livestock intensification and the growing of cereals and soy for animal feed are the degradation of soils and land as well as water and air pollution. These result in erosion of the natural resources on which local farmers depend.

Conflicts with industrialised animal operations over land and forest resources threaten the ability of smallholders and indigenous peoples to overcome poverty.

Local people are vulnerable to ‘land grabbing’ by powerful companies who wish to use the land to grow soy and grain for animal feed.

The profits of industrial animal farming do not ‘trickle down’ to local communities; instead, they are concentrated in the hands of a small number of major commercial interests, and its products go to feed well-off urban populations.

“The social benefits of agriculture can be eroded as production becomes more concentrated and intensive. Intensive agricultural systems are associated with negative effects on employment, wealth distribution, ancillary economic activity in rural areas [and] service provision in rural areas (such as schools and health facilities).”<sup>901</sup>

At the 10th Global Forum on Food and Agriculture in 2018 the (then) Director General of the UN Food and Agriculture Organization said “FAO estimates that more than half of the world’s rural poor are livestock farmers and pastoralists ... We need to make sure that smallholders and pastoralists will not be pushed aside by large capital-intensive operations.”<sup>902</sup>

WWF<sup>903</sup>:

Accelerating decline in wildlife populations will have long-term negative impacts on local communities as it robs communities of their natural capital and livelihoods - \$70 billion per

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<sup>900</sup> CIWF. Industrial Animal Agriculture will put Several Sustainable Development Goals out of Reach. August 2018. <https://www.ciwf.org.uk/media/7435794/industrial-animal-agriculture-will-put-several-sdgs-out-of-reach-august-2018-final.pdf>

<sup>901</sup> HLPE. 2016. Sustainable agricultural development for food security and nutrition: what roles for livestock? A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome.

<sup>902</sup> José Graziano da Silva, 2018. 10th Global Forum for Food and Agriculture: Shaping the Future of Livestock – sustainably, responsibly, efficiently <http://www.fao.org/director-general/my-statements/detail/en/c/1098613/>

<sup>903</sup> WWF. Illegal Wildlife Trade. <https://www.thegef.org/what-we-do/topics/illegal-wildlife-trade>

year is lost due to crimes affecting natural resources - deepens poverty and inequality, and threatens national security by causing instability and fuelling conflicts. In many developing countries, wildlife is a driver for tourism revenues, job creation, and sustainable development.

See Para 5.2.2. above which covers “SDG 8 Decent Work and Economic Growth” for statistics from the IPBES Workshop Report on Biodiversity and Pandemics on costs associated with impacts from industrial animal agriculture and the wildlife trade.

***This Scoping Study – Additional Points:***

The transformation of food and agricultural systems has a critical role to play in ending poverty in all its forms, eradicating hunger, achieving food security and improved nutrition, and reducing inequalities.

Overfishing from industrial methods is threatening the livelihoods of local coastal communities and fisher folk.

The accelerated decline in wildlife populations deepens poverty and inequality.

Healthy wildlife populations sustain local communities through ecotourism.

Zoonotic diseases are particularly prevalent among the poorest and most marginalised populations who live in proximity with their animals or who are dependent on livestock for their livelihoods. About 70% of the world’s 1.4 billion people living in extreme poverty live close to livestock or fresh markets where diseases spread easily.

## **Annex 2.4.2. SDG 2 Zero Hunger**

Keeling et al.<sup>904</sup>:

Increased welfare of food animals increased productivity, quality and decreased food losses and wastes.

Working animals contributed to agricultural productivity.

Increasing genetic diversity can contribute to improved animal health and welfare

Biodiversity (e.g., pollinating animals) may improve grazing opportunities and improve nutrient recycling and productivity.

Improved nutritional status of animals may come at cost of increased hunger for humans, because of food-feed competition.

Isaiah Otieno.<sup>905</sup>:

Livestock’s industry over reliance on human-edible food as animal feed has increased food insecurity.

Biodiversity is also affected when human adapt land-use practices that involve clearing huge tracks of lands for industrial livestock.

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<sup>904</sup> Keeling L, Tunón H, Olmos Antillón G, Berg C, Jones M, Stuardo L, Swanson J, Wallenbeck A, Winckler C and Blokhuis H (2019) Animal Welfare and the United Nations Sustainable Development Goals. *Front. Vet. Sci.* 6:336. doi: 10.3389/fvets.2019.00336 *Frontiers in Veterinary Science* - <https://www.frontiersin.org/articles/10.3389/fvets.2019.00336/full>

<sup>905</sup> Otieno, Isaiah. UNEP. UNEP Animal Welfare in the Context of The Sustainable Development Goals (SDGs). PowerPoint presentation to the WOAHA Global Forum on Animal Welfare. April 2020. <https://www.oie.int/app/uploads/2021/08/3-i-otieno-unep--sdg-apr2021.pdf>

With proper animal welfare practices, we can strike a balance between sustainable agricultural practices that reduces biodiversity destruction and over dependence on human edible food items which will in turn enhance food security.

Wolf Clifton.<sup>906</sup>:

Worldwide, more than 820 million people suffer from chronic hunger. This is aggravated by the inherent inefficiency of animal agriculture. A single pound of grain can feed five times more people if it is eaten directly than if it is used to fatten a chicken, and twenty times more people than if used to fatten a cow. Additionally, more than half of all agricultural plant protein grown worldwide is used as animal feed rather than being fed to humans directly.

Besides crop agriculture, which offers one alternative to the farming and slaughter of livestock, food forests can provide up to seven layers of plant foods from the forest floor to the canopy, while also sequestering carbon and providing wildlife habitat. Food forests provide a potential solution to human hunger as well as a solution to deforestation and habitat destruction impacting wild animals.

NGO Major Group HLPF Position Paper (2017).<sup>907</sup>:

Governments must redirect their investments in research and development away from institutions that promote unsustainable, monopolistic agriculture - which contributes to biodiversity decline, pollution, and soil erosion - towards diverse and agroecological alternatives. Food waste should be reduced and available food redistributed, rather than intensifying agricultural production at the expense of biodiversity and animal welfare. Governments must therefore promote programming that develops knowledge to practice sustainable agriculture, and support stakeholders across the food system – primary small and family farm producers, food chain workers, and small and medium enterprises, particularly producer-led enterprises and cooperatives.

NGO Major Group HLPF Position Paper (2020).<sup>908</sup>:

It is important to recognise that rural family farming is responsible for 80% of world's food production and provides a host of economic opportunities. However, economic structures such as harmful subsidies create an unfair playing field in agricultural systems, marginalising workers, environmental and animal welfare concerns. Traditional ways of measuring development direct agricultural development towards industrialised systems which perpetuate inequities, rather than incentivizing investment in sustainable, equitable and humane agricultural development.

Consumers need information to make healthy and sustainable food choices, and they need meaningful product labelling which makes good decision making possible. Training and

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<sup>906</sup> Clifton, Wolf Gordon. Animal People. How Animal Protection Impacts All 17 U.N. Sustainable Development Goals. 1 July 2020. <https://animalpeopleforum.org/2020/07/01/how-animal-protection-impacts-all-17-u-n-sustainable-development-goals/>

<sup>907</sup> NGO Major Group. Official Position Paper for the 2017 High-Level Political Forum. <http://nebula.wsimg.com/47b20fccb88656e5a802c7936cc567cd?AccessKeyId=E3A2183630CD52C7534E&disposition=0&alloworigin=1>

<sup>908</sup> NGO Major Group. Official Position Paper for the 2020 High-Level Political Forum [https://static1.squarespace.com/static/603c11839959d83fcdc14604/t/62617851a5491c2b3f2a6712/1650554961641/HLPF+2020\\_NGOMG+PP\\_formatted\\_v2.pdf](https://static1.squarespace.com/static/603c11839959d83fcdc14604/t/62617851a5491c2b3f2a6712/1650554961641/HLPF+2020_NGOMG+PP_formatted_v2.pdf)

education on best practices are also needed at all levels and stages of production to support the transition to more equitable, sustainable and humane systems.

NGO Major Group HLPF Position Paper (2021).<sup>909</sup>:

Governments can act on the recommendations of the 2020 State of Food Security and Nutrition report, which highlight the hidden environmental and health costs of diets high in animal source foods. It is critical that governments take actions to make healthy, sustainable diets affordable to all by shifting taxes and subsidies. Awareness programs and transparent, effective labelling schemes are needed to encourage healthier and more sustainable consumer choices.

Another important action for governments is to set sustainable public procurement standards and to eliminate food waste. The dominant, intensive form of agriculture must be transformed, as it edges out smallholders, destabilises communities, pollutes ecosystems, and contributes to antimicrobial resistance and zoonotic risk through high stocking densities of animals.

IFAW.<sup>910</sup>:

Healthy and cared-for domestic animals and healthy populations of wild animals support the agricultural and natural processes that promote food security and mitigate global hunger.

Animal agriculture contributes to 40% of the global value of agricultural output and supports the livelihoods of 1.3 billion people.

Currently, poor animal welfare, especially in factory farming conditions, puts unnecessary strain on food production. When animals are healthy and well cared for, they are more productive and provide higher value food.

Animals that are kept in inhumane, crowded enclosures (a characteristic of factory farming) are more likely to get sick and spread disease.

Agriculture systems rely on ecosystem services that are dependent on healthy, robust wildlife populations. Wild birds and bats act as natural enemies to agricultural pests and provide biological control services in agroecosystems.

Janice Cox (Good Practices for Agricultural Development).<sup>911</sup>:

Improving animal welfare in agricultural development can make a significant contribution towards the achievement of food security; and the production of healthy, nutritious food. Furthermore, higher-welfare systems are needed in order to safeguard and develop local production/consumption systems and, as explained above, to ensure future sustainability.

The introduction of industrial animal agriculture systems in developing countries can result in increased food insecurity. This is because such systems are concentrated in the hands of a small number of major commercial interests, which mainly produce for more lucrative export

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<sup>909</sup> NGO Major Group. Official Position Paper for the 2021 High-Level Political Forum  
[https://static1.squarespace.com/static/603c11839959d83fcdc14604/t/60e5d113aeb8344c8912c11a/1625674016763/NGOMajorGroupPositionPaper\\_ENGLISH.pdf](https://static1.squarespace.com/static/603c11839959d83fcdc14604/t/60e5d113aeb8344c8912c11a/1625674016763/NGOMajorGroupPositionPaper_ENGLISH.pdf)

<sup>910</sup> Hofberg, Mark et al. Thriving Together: The Critical Role of Animals in Achieving the SDGs. Second Edition. IFAW. 2022.  
[https://d1jyxxz9imt9yb.cloudfront.net/resource/1304/attachment/original/IFAW\\_SDG\\_REPORT\\_RGB\\_FINAL\\_DIGITAL\\_20220627.pdf](https://d1jyxxz9imt9yb.cloudfront.net/resource/1304/attachment/original/IFAW_SDG_REPORT_RGB_FINAL_DIGITAL_20220627.pdf)

<sup>911</sup> Cox, Janice H. Good Practices for Animal Welfare in Agriculture Development: Impact on Sustainable Development and the Achievement of the SDGs. World Animal Net. July 2019.  
[https://www.wellbeingintlstudiesrepository.org/es\\_unsdg/2/](https://www.wellbeingintlstudiesrepository.org/es_unsdg/2/)



and urban markets. They compete unfairly with local, small-scale producers (particularly due to the externalised costs of their significant detrimental impacts, such as pollution), and often putting such producers out of business or integrating them as contract producers—thus incrementally eliminating sustainable, local production. They are also import and technology dependent, which can increase insecurity, especially due to factors such as: lack of plant maintenance, technical expertise and equipment supplies (especially in cases where there is lack of expertise and experience with modern systems and technologies, and where there is not a culture or tradition of regular maintenance); insecure power supplies; and volatile global trade/market and currency fluctuations.

Industrial animal production systems decouple animals from the land by relying on feed inputs like grains and soy, also grown intensively and which could otherwise be used to directly feed humans, instead of grazing. According to the World Economic Forum, this means that up to 20% of calories produced per person today are lost to feeding animals. More people could be fed, using less land, by reducing the amount of grain fed to animals rather than humans. The sheer scale of the losses entailed in feeding cereals to animals means that this practice is increasingly being recognized as undermining food security. The UN FAO states that further use of cereals as animal feed could threaten food security by reducing the grain available for human consumption.

Furthermore, these close-confinement animal systems and crop monocultures are particularly vulnerable to disease and accidents, increasing food insecurity and health risks. Various pharmaceutical and chemical inputs are used, including antibiotics, to keep such systems functional in the short-term, but these have detrimental impacts over the longer term (in terms of sustainable food security; as well as health, environment and animal welfare).

Animals only contribute to food security when they are converting materials that people cannot consume – such as grass, crop residues, and unavoidable food waste – into food that we can eat. This is what happens in small-scale, high welfare, agroecological production.

Good animal welfare includes the use of agroecological systems, such as raising animals on extensive pastures and rangeland and integrated crop/livestock production, which restore the link between animals and the land, enhance sustainability and contribute to food security. One example is silvopastoral systems for cattle that, alongside pasture also provide shrubs (preferably leguminous) and trees with edible leaves and shoots.

Good animal welfare also includes improved healthcare and nutrition for the animals through better disease prevention and management, which results in increased livestock productivity and quality. This will improve smallholders' purchasing power, making them better able to buy the food that they do not produce, further supporting food security.

CIWF<sup>912</sup> <sup>913</sup>:

Industrial livestock production is dependent on feeding human-edible cereals to livestock who convert them very inefficiently into meat and milk.

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<sup>912</sup> CIWF. Industrial Animal Agriculture will put Several Sustainable Development Goals out of Reach. August 2018. <https://www.ciwf.org.uk/media/7435794/industrial-animal-agriculture-will-put-several-sdgs-out-of-reach-august-2018-final.pdf>

<sup>913</sup> CIWF. Achieving Sustainable Food Systems. 2019. <https://www.ciwf.eu/media/7435795/unea-4-achieving-sustainable-food-systems-january-2019.pdf>

For every 100 calories fed to animals as cereals, just 17-30 calories enter the human food chain as meat.

Globally 36-40% of crop calories are used as animal feed.

If the cereals that will be fed to animals in 2050 on a business-as-usual basis were used instead for direct human consumption, an extra 3.5 billion people could be fed annually.<sup>914</sup>

Further use of cereals as animal feed could threaten food security by reducing the grain available for human consumption.<sup>915</sup>

Better animal health and nutrition result in increased livestock productivity and longevity.

This will improve smallholders' purchasing power, making them better able to buy the food that they do not produce themselves and to have money available for other essentials.

Studies in Africa show that agroecology can more than double crop yields while substantially reducing pesticide use.

With sufficient access to veterinary services and with improved management regarding animal health and animal welfare, global animal production could, according to the OIE, be increased by around 20%. This would enable small-scale producers to increase their productivity without industrialisation.

Industrial animal agriculture undermines the key resources on which long-term productive farming depends.

Several studies argue that the only sustainable, efficient role for livestock is to convert materials we cannot consume – grass, by-products, crop residues and unavoidable food waste – into food that we can eat.

“High-input, resource-intensive farming systems, which have caused massive deforestation, water scarcities, soil depletion and high levels of greenhouse gas emissions, cannot deliver sustainable food and agricultural production. Needed are innovative systems that protect and enhance the natural resource base, while increasing productivity. Needed is a transformative process towards ‘holistic’ approaches, such as agroecology, agro-forestry ... and conservation agriculture, which also build upon indigenous and traditional knowledge.”<sup>916</sup>

Studies highlight the inefficiency of feeding human-edible crops to animals:

“Staggeringly inefficient”: Chatham House<sup>917</sup>

“A very inefficient use of land to produce food”: Bajželj et al, 2014<sup>918</sup>

“Use of highly productive croplands to produce animal feedstuffs ... represents a net drain on the world's potential food supply”: European Commission Joint Research Centre, 2018.<sup>919</sup>

Innovations in dietary patterns: There is increasing recognition of the need for dietary change in the developed world and in many emerging countries - towards healthier, more

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<sup>914</sup> Nellemann et al. (2009) The environmental food crisis – The environment's role in averting future food crises. A UNEP rapid response assessment. United Nations Environment Programme, GRID-Arendal, [www.unep.org/pdf/foodcrisis\\_lores.pdf](http://www.unep.org/pdf/foodcrisis_lores.pdf)

<sup>915</sup> Gerber et al 2013. Tackling climate change through livestock – A global assessment of emissions and mitigation opportunities. Food and Agriculture Organization of the United Nations 10 José Graziano da Silva, 2018. 10th Global Forum for Food and Agriculture: Shaping the Future of Livestock – sustainably, responsibly, efficiently <http://www.fao.org/director-general/mystatements/detail/en/c/1098613/>

<sup>916</sup> UN Food and Agriculture Organization, 2017.

<sup>917</sup> Bailey R et al, 2014. Livestock – Climate Change's Forgotten Sector. Chatham House

<sup>918</sup> Bajželj B. et al, 2014. Importance of food-demand management for climate mitigation. Nature Climate Change <http://www.nature.com/doifinder/10.1038/nclimate2353>

<sup>919</sup> European Commission Joint Research Centre, 2018. Atlas of Desertification

plant-based diets that are in line with the evidence on healthy eating. Reduced meat and dairy consumption would deliver many benefits including improved food security.

The UN's own website says the following about SDG 2 – Zero Hunger<sup>920</sup>:

“It is time to rethink how we grow, share and consume our food. If done right, agriculture, forestry and fisheries can provide nutritious food for all and generate decent incomes, while supporting people-centred rural development and protecting the environment.”

“Right now, our soils, freshwater, oceans, forests and biodiversity are being rapidly degraded. Climate change is putting even more pressure on the resources we depend on, increasing risks associated with disasters, such as droughts and floods. Many rural women and men can no longer make ends meet on their land, forcing them to migrate to cities in search of opportunities. Poor food security is also causing millions of children to be stunted, or too short for the ages, due to severe malnutrition.”

“A profound change of the global food and agriculture system is needed if we are to nourish the 815 million people who are hungry today and the additional 2 billion people expected to be undernourished by 2050. Investments in agriculture are crucial to increasing the capacity for agricultural productivity and sustainable food production systems are necessary to help alleviate the perils of hunger.”

A 2018 study made the case that the opportunity cost of animal-based diets exceeds all food losses.<sup>921</sup> With a third of all food production lost via leaky supply chains or spoilage, food loss is a key contributor to global food insecurity. Demand for resource-intensive animal-based food further limits food availability. Plant-based replacements for each of the major animal categories in the United States (beef, pork, dairy, poultry, and eggs) can produce twofold to 20-fold more nutritionally similar food per unit cropland. Replacing all animal-based items with plant-based replacement diets can add enough food to feed 350 million additional people, more than the expected benefits of eliminating all supply chain food loss.

***This Scoping Study – Additional Points:***

Animal-based foods require more land, water and fossil energy compared to a vegetarian, crop-based diet. Reduction of natural resource use and environmental impacts will support sustainability.

62 per cent of the energy (in terms of kcal) harvested as crops and other biomass, is lost or wasted after accounting for losses from food waste, trophic losses from livestock, and human overconsumption.

36% of calories produced by cropping systems is used for animal feed of which only 12% are ultimately used for human consumption. It has been estimated that if these calories were consumed by people directly, the current global food production system could feed an additional 4 billion meeting estimated population growth forecasts for 2050.

For every kilogram of beef produced, 5kg of feed is needed (not including grass fodder). Ruminants have the lowest feed and protein conversion rates of all livestock.

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<sup>920</sup> UN. Sustainable Development Goals. Goal 2: Zero Hunger.

<https://www.un.org/sustainabledevelopment/hunger/>

<sup>921</sup> Shepon, Alon et al. The opportunity cost of animal-based diets exceeds all food losses. March 26, 2018. <https://doi.org/10.1073/pnas.171382011> & <https://www.pnas.org/doi/10.1073/pnas.1713820115>

Today, the double burden of malnutrition - the prevalence of both undernutrition and obesity - seems to represent the main food and nutrition security challenge. Inequality, not unavailability, is the main driver of food insecurity.

The decline of genetic diversity is threatening food security and the resilience of ecosystems, including agricultural systems and food security.

The COVID-19 pandemic revealed the harsh reality about the fragility and high “costs” associated with intensive, high-throughput, and highly specialised food production systems. The pandemic affected the food supply chain, in particular livestock production. Clusters of COVID cases in slaughterhouses and food processing plants caused log-jams in production, and some animals had to be culled on farms.

There is an urgent need to transform food systems – throughout the food chain – in order to ensure humane and sustainable food supplies. Eating further down the food chain, minimising resources and environmental impacts, severely reducing waste (including the waste of feeding edible crop calories through animals) etc.

Cellular and cultured meat and seafood products also have the potential of supporting food sustainability.

### **Annex 2.4.3. SDG 3 Good Health and Wellbeing**

Keeling et al.<sup>922</sup>:

Good welfare in animals increases their immunity and resistance to zoonoses, which can be transmitted to humans. Good immunity allows a decrease in the use of antibiotics, reducing antibiotic resistance (in humans and animals).

Owning a pet can be good for both physical and psychological health. Animal-assisted therapy can be used for physical and psychological disorders, contributing to human well-being.

Verkuijl et al.<sup>923</sup>:

COVID-19 highlighted the potential roles that habitat destruction, industrial livestock farming and the wildlife trade play in infectious disease emergence.

Indiscriminate use of antibiotics in livestock, especially medically important antibiotics, also raises serious risks from antimicrobial resistance that could set us back to a ‘pre-antibiotic world’ in which infections from simple surgery or minor infections are potentially fatal.

*[Recent estimates suggest that antimicrobial resistance directly caused 1.27 million human deaths in 2019, and was indirectly associated with a further 4.95 million deaths.]*

In many high- and middle-income countries, overconsumption of red and processed meat, often enabled by industrial livestock farming, is associated with a range of adverse health outcomes including increased risk of colorectal cancer, cardiovascular disease and type-2 diabetes.

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<sup>922</sup> Keeling L, Tunón H, Olmos Antillón G, Berg C, Jones M, Stuardo L, Swanson J, Wallenbeck A, Winckler C and Blokhuis H (2019) Animal Welfare and the United Nations Sustainable Development Goals. *Front. Vet. Sci.* 6:336. doi: 10.3389/fvets.2019.00336 [Frontiers in Veterinary Science - <https://www.frontiersin.org/articles/10.3389/fvets.2019.00336/full>](https://www.frontiersin.org/articles/10.3389/fvets.2019.00336/full)

<sup>923</sup> Verkuijl, Cleo et al. Mainstreaming animal welfare in sustainable development A policy agenda. SEI & CEEW. May 2022. <https://euagenda.eu/upload/publications/animal-welfare-stockholm50backgroundpaper.pdf>

Chemicals, including pesticides used in industrial livestock production cause health problems, both for farm workers and consumers, as well as environmental degradation and biodiversity loss.

Isaiah Otieno.<sup>924</sup>:

One Health approach can be defined as the collaborative effort across multiple disciplines to attain optimal health for people, animals and the environment.

The emergence of the very concept of One Health is an acknowledgement that the health and welfare of human, animals and ecosystems are interconnected.

With good animal welfare policies, and enforcement of the same, we will be able to mitigate many of these zoonotic diseases.

Wolf Clifton.<sup>925</sup>:

One Health is a framework recognized by the World Organization for Animal Health (OIE), which highlights the links between human and animal health. 75% of emerging diseases infecting humans are of animal origin, including the novel coronavirus responsible for the COVID-19 pandemic, which has shut down regular operations in countries around the world, as well as Ebola, SARS, and HIV. Emerging zoonotic diseases are becoming an increasing risk to humans due to the wildlife trade, as well as habitat destruction, which increases instances of contact between humans and wildlife.

Factory farms are also breeding grounds for diseases, including mad cow disease and avian and swine flus. The overuse of antibiotics to keep animals alive until reaching slaughter weight selects for antibiotic-resistant strains, while practices such as the feeding of animals on their own species' meat, extreme crowding, and low sanitation increase risks of infection and disease proliferation.

Good health and well-being also relate to animal issues insofar as medical research remains largely reliant on animal experiments. Despite the prevalence of animal research, up to 96% of drugs tested on animals fail in human trials, showing the need to develop non-animal methods more relevant to human health.

Finally, it has been found that people exposed to nature and to animals are less prone to depression, anxiety, and other mental health issues, highlighting the intersection of animal issues not only with physical human health, but psychological health as well.

IFAW.<sup>926</sup>:

Inhumane conditions for livestock contribute to the emergence and spread of communicable diseases due to the overcrowded, hot and unsanitary conditions to which they are often exposed. These conditions can create ideal conditions for pathogens to multiply.

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<sup>924</sup> Otieno, Isaiah. UNEP. UNEP Animal Welfare in the Context of The Sustainable Development Goals (SDGs). PowerPoint presentation to the WOAHP Global Forum on Animal Welfare. April 2020. <https://www.oie.int/app/uploads/2021/08/3-i-otieno-unesp--sdg-apr2021.pdf>

<sup>925</sup> Clifton, Wolf Gordon. Animal People. How Animal Protection Impacts All 17 U.N. Sustainable Development Goals. 1 July 2020. <https://animalpeopleforum.org/2020/07/01/how-animal-protection-impacts-all-17-u-n-sustainable-development-goals/>

<sup>926</sup> Hofberg, Mark et al. Thriving Together: The Critical Role of Animals in Achieving the SDGs. Second Edition. IFAW. 2022. [https://d1jyxxz9imt9yb.cloudfront.net/resource/1304/attachment/original/IFAW\\_SDG\\_REPORT\\_RGB\\_FINAL\\_DIGITAL\\_20220627.pdf](https://d1jyxxz9imt9yb.cloudfront.net/resource/1304/attachment/original/IFAW_SDG_REPORT_RGB_FINAL_DIGITAL_20220627.pdf)

On overcrowded factory farms animals are routinely fed low levels of antibiotics to prevent disease; however, this practice has led to an uptick in antibiotic resistant pathogens and reduced efficacy of antibiotics to combat human diseases.

The spread of zoonotic diseases is exacerbated as wild habitats are destroyed by expanding farming operations and wildlife comes into closer and sustained contact with humans and domesticated animals. Improving conditions for domestic animals and stopping habitat destruction by spreading agricultural practice would reduce disease incidence and improve health and well-being.

Reducing global wildlife trade, particularly in markets where live animals are sold or slaughtered, would have a profound effect on protecting people from zoonotic disease spill-over events.

A significant body of research demonstrates the positive effects of pet ownership on chronic illness recovery and prevention.

Evidence increasingly shows that immersion in nature is beneficial for physical and mental health.

Janice Cox (Good Practices for Agricultural Development)<sup>927</sup>:

Balanced diets and good, nutritious food are vital for health and vigour. We are faced with a burgeoning problem with non-communicable diseases among wealthier segments of the world's population, associated with high intakes of animal source foods, and in particular animal fats and red meat. These include cardio-vascular disease, diabetes, and certain types of cancer. These are increasingly affecting developing countries, as well as developed countries, as consumers move from traditional diets towards increased intake of meat, fats and sugar, paying little attention to balanced and sustainable diets. As more countries develop, this problem will only increase unless food demand is influenced.

The World Health Organisation (WHO) recommends eating a nutritious diet based on a variety of foods originating mainly from plants, rather than animals. This would mean eating smaller quantities of animal products, which could then be produced using higher animal welfare standards, extensively, and according to agroecological principles – as opposed to industrially produced.

The cramped, unhealthy environmental conditions in factory farms and feedlots increase the risk of infectious and non-communicable food-borne diseases. There are many food safety risks from factory farms and feedlots including pathogens and zoonotic diseases, such as Swine Flu and Avian Flu, which run the risk of becoming pandemics. Common bacteria include: salmonella, E. coli, and campylobacter. Food safety risks from industrial farms and feedlots have been well documented – with the OIE estimating that no less than 60% of human pathogens and 75% of recent emerging diseases are zoonotic.

These conditions are also central to the global threat that antimicrobial resistance (AMR) poses to human and animal health. Antibiotics are routinely used non-therapeutically in factory farming, both as growth promoters and prophylactics (and metaphylactics in aquaculture). There are also health implications from other veterinary medicines, such as vaccines and growth promoters, which move from farms through water to drinking-water sources.

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<sup>927</sup> Cox, Janice H. Good Practices for Animal Welfare in Agriculture Development: Impact on Sustainable Development and the Achievement of the SDGs. World Animal Net. July 2019. [https://www.wellbeingintlstudiesrepository.org/es\\_unsdg/2/](https://www.wellbeingintlstudiesrepository.org/es_unsdg/2/)



One Health/One Welfare are concepts gaining traction across human health and veterinary fields, and which assert that human, environmental, and animal health and welfare are interlinked and interdependent. Our current treatment of animals in food production can cause not only suffering to the animals involved, but also have cascading effects on our own health. The development of good animal welfare in agriculture will include improved management, disease prevention, healthcare and nutrition for animals. These animal health and welfare improvements will contribute to healthier, safer food for humans.

Progress for SDG3 also depends on mitigating the effects of climate change and environmental risks with far-reaching implications, including on the health and well-being of all people, food and agriculture production, and sustainable industrialisation. The industrial production of animals causes a significant amount of pollution of air, water and soil, which is largely unregulated in most countries. This pollution can have significant impacts on human health through disease transmission and increased concentrations of certain substances, like nitrates. There are also health risks for those living near factory farms and feedlots, particularly from ammonia, hydrogen sulphide, volatile organic compounds, particulate matter and bacteria from animal excrement which enter the air, and nitrates, pathogens and pharmaceuticals which enter surface water through run-off or leach into groundwater).

There can be a correlation between poor animal welfare and infection of zoonotic pathogens in humans. For example, research has demonstrated that reducing welfare problems by the better management of rearing conditions for broilers would not only improve their welfare, but would also decrease the risks of *Campylobacter* contamination, of carcass condemnations and of economic loss for the poultry industry.

Good practices for animal welfare in development will provide tools and training to assist producers in developing countries to move to higher welfare, agroecological production methods which will produce healthier animals while improving environmental and human health outcomes.

CIWF<sup>928</sup>:

The high levels of consumption of red and processed meat that have been made possible in the West and some emerging economies by industrial animal agriculture contribute to heart disease, obesity, diabetes and certain cancers.

“WHO and other health agencies are advising populations to reduce meat consumption as part of an overall healthy diet.”<sup>929</sup>

Industrial livestock production plays an important part in the emergence, spread and amplification of pathogens, some of which can be transmitted to people.

Industrial livestock production tends to rely on routine use of antimicrobials to prevent the diseases that are inevitable when animals are confined in overcrowded, stressful conditions. Overuse of antimicrobials in industrial animal production contributes significantly to antimicrobial resistance in humans.

See Para 5.2.2. above which covers “SDG 8 Decent Work and Economic Growth” for statistics from the IPBES Workshop Report on Biodiversity and Pandemics on health costs associated with impacts from industrial animal agriculture and the wildlife trade.

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<sup>928</sup> CIWF. Industrial Animal Agriculture will put Several Sustainable Development Goals out of Reach. August 2018. <https://www.ciwf.org.uk/media/7435794/industrial-animal-agriculture-will-put-several-sdgs-out-of-reach-august-2018-final.pdf>

<sup>929</sup> WHO, 2017. Ten years in public health 2007- 2017.

World Animal Protection<sup>930</sup>:

World Animal Protection's report on "The Hidden Health Impacts of Industrial Livestock Systems" includes more SDG 3-related information, including the following figures and costings:

There is a significant potential threat to human health from the transmission of zoonotic diseases from wildlife into livestock populations, with intensive livestock production systems accelerating the spread.

Zoonotic diseases are particularly prevalent among the poorest and most marginalised populations who live in proximity with their animals or who are dependent on livestock for their livelihoods. About 70% of the world's 1.4 billion people living in extreme poverty live close to livestock or fresh markets where diseases spread easily.

Global efforts to manage diseases originating in animals and prevent loss of human life cost an estimated USD 120 billion globally between 1995 and 2008<sup>931</sup>.

The International Monetary Fund (IMF) estimates that the COVID 19 pandemic will cost the global economy USD 9 trillion over the next two years. Recent outbreaks of African Swine Fever have had huge economic cost to key emerging markets in Asia. In 2019 half of China's pig herd (~220 million heads) was lost, while in Vietnam more than 20% of its herd (~6 million) were culled resulting in an estimated economic loss of 0.8% GDP<sup>97</sup> and 0.4%-1.5% GDP<sup>98</sup> in China and Vietnam respectively.

Disease is inevitable when animals are confined in overcrowded stressful conditions.

According to the World Health Organisation (WHO), the high volume of antibiotics in food-producing animals contributes to the development of antimicrobial-resistant bacteria, particularly in settings of intensive animal production. In contrast, higher welfare livestock production systems do not rely on antibiotics as a core input and will therefore reduce the threat of Antimicrobial Resistance (AMR).

Because methane is a key ingredient in the formation of ground-level ozone (smog), a powerful climate forcer and dangerous air pollutant, a 45% reduction in methane emissions would prevent 260,000 premature deaths, 775,000 asthma-related hospital visits, 73 billion hours of lost labour from extreme heat, and 25 million tons of crop losses annually.<sup>931</sup>

World Health Organization, Regional Office for Europe<sup>932</sup>:

Alongside the benefits to human health, the adoption of plant-based diets could translate into savings of billions of euros across Europe in health-care costs. Excessive meat consumption places a burden on health-care systems; for example, it has been estimated that in 2020 there were 2.4 million deaths worldwide, and approximately €240 million in health-care costs, attributable to excessive red and processed meat consumption.

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<sup>930</sup> World Animal Protection. The Hidden Health Impacts of Industrial Livestock Systems.

<https://www.worldanimalprotection.ca/news/hidden-health-impacts-factory-farming>

<sup>931</sup> Climate and Clean Air Coalition, UNEP. 2021. Global Methane Assessment.

<https://www.ccacoalition.org/en/resources/global-methaneassessment-summary-decision-makers>

<sup>932</sup> World Health Organization. Regional Office for Europe. (2021). Plant-based diets and their impact on health, sustainability and the environment: a review of the evidence: WHO European Office for the Prevention and Control of Noncommunicable Diseases. World Health Organization. Regional Office for Europe. <https://apps.who.int/iris/handle/10665/349086>.

In conclusion, considerable evidence supports shifting populations towards healthful plant-based diets that reduce or eliminate intake of animal products and maximise favourable “One Health” impacts on human, animal and environmental health.

Paragraphs 3.6.7. and 4.3. above refer to One Health. The One Health approach is essential to the achievement of SDG 3. As explained in the One Health Joint Plan of Action (2022-2026)<sup>933</sup>, human health cannot be achieved in a silo:

“One Health calls for a holistic and systems approach recognising the interconnection between the health of humans, animals, plants and the environment.”

“Economic development has led to substantial improvements in the well-being of many humans globally, but often at the expense of the ecosystems, a healthy environment and the welfare of animals. With the human global population projected to reach 8 billion in 2023 and unsustainable consumption and production patterns, the pressures on our natural systems are tremendous and will continue to grow. The earth’s natural resources are being used at a faster rate than they can be replenished due to unsustainable and destructive practices and with insufficient consideration for biodiversity or the health of surrounding ecosystems upon which our lives and well-being depend.”

“One Health is an integrated, unifying approach that aims to sustainably balance and optimise the health of humans, animals, plants and ecosystems. It recognises the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and inter dependent.”

#### ***This Scoping Study – Additional Points:***

WHO states overall, a diet that is predominantly plant-based and low in salt, saturated fats and added sugars is recommended as part of a healthy lifestyle.

The EAT-Lancet Commission quantitatively described a universal healthy reference diet, based on an increase in consumption of healthy foods (such as vegetables, fruits, whole grains, legumes, and nuts), and a decrease in consumption of unhealthy foods (such as red meat, sugar, and refined grains) that would provide major health benefits, and also increase the likelihood of attainment of the Sustainable Development Goals.

More than 820 million people have insufficient food and many more consume an unhealthy diet that contributes to premature death and morbidity.

There is a burgeoning problem with non-communicable diseases among wealthier segments of the world’s population, associated with high intakes of animal source foods, and in particular animal fats and red meat. These include cardio-vascular disease, diabetes, and certain types of cancer.

Dietary shifts toward more plant-based foods that maintain protein intake and other nutritional needs could improve human health and reduce agricultural air quality-related mortality by 68 to 83%.

There is a clear nexus between the use and welfare of animals and pandemics. COVID-19 has caused profound damage to human health, societies and economies in every corner of the world. This illness is a zoonotic disease, one which transmits between animals and humans.

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<sup>933</sup> WHO. One Health One Health Joint Plan of Action 4 (2022-2026). Working together for the health of humans, animals, plants and the environment. [https://cdn.who.int/media/docs/default-source/food-safety/public-consultation/online-consultation-one-health-joint-plan-of-action.pdf?sfvrsn=9b7f544d\\_7](https://cdn.who.int/media/docs/default-source/food-safety/public-consultation/online-consultation-one-health-joint-plan-of-action.pdf?sfvrsn=9b7f544d_7)

Zoonotic diseases are commonly spread at the human-animal-environment interface – where people and animals interact with each other in their shared environment. Zoonotic diseases can be foodborne, waterborne, or vector-borne, or transmitted through direct contact with animals, or indirectly by fomites or environmental contamination.

60 per cent of known infectious diseases in humans and 75 per cent of all emerging infectious diseases are zoonotic in nature.

UNEP identified key drivers of zoonoses including: agricultural intensification and increased demand for animal protein to the conversion of land and climate change.

Intensified farming systems and unsustainable exploitation of natural resources, including an increasing trade in wild animals, are fuelling zoonoses.

There are also health and disease risks from bushmeat – handling, consumption and trade. In particular, these include activities associated with unsafe hunting, butchering and transport of some species, especially primates.

Experts forecast more frequent, deadly and costly pandemics than COVID-19 unless there is a transformative change in the global approach to dealing with infectious diseases: importantly, a move from reaction to prevention.

‘One Health’—a holistic, inter-sectoral and interdisciplinary approach that focuses on where the health of people, animals and environments converge—has emerged as the most promising way to prevent and manage zoonotic diseases.

In general, SDG 3 must be approached from a One Health perspective, in order to ensure a systemic understanding of the interdependencies between the health of humans, animals, plants and the environment and how these can manifest as health threats.

The agreed One Health definition includes: *“One Health is an integrated, unifying approach that aims to sustainably balance and optimise the health of people, animals and ecosystems.”* This means developing and using a more thorough understanding of the animal welfare-environment-sustainable development nexus. This will enable better understanding of the root causes and drivers of disease emergence, spread and persistence. Human-animal interactions can enhance or detract from human health and wellbeing. In instances where animal habitats, food and water sources or migratory routes are impacted, this can lead to human-animal conflicts. In turn, these can impact human health and lives. Scientists are increasingly concerned that, if anthropogenic pressures on Biodiversity continue unabated, we risk precipitating a sixth mass extinction event in Earth history, with profound impacts on human health and equity.

There is a risk of disease and physical attacks from feral animals, particularly dogs. This is where humane and effective population control programmes are needed.

There is also a human health risk from the use of wild-caught animals in animal experiments and research (and from the use of animal “models” to test drugs and products intended for humans).

Rabies is not a pandemic, but a viral zoonotic disease. However, it is a disease which is important to the animal welfare-environment nexus. Humane dog population control is an important component of rabies prevention, as is oral vaccination for wildlife at the human-interface.

Pollution threatens the health of ecosystems, animals, and people alike.

The ways in which humans use animals are a leading cause of pollution and, conversely, animals and their welfare are enormously impacted by pollution.

Water, air and soil pollution can cause significant adverse health outcomes in animals, and well as humans; as can non-physical pollution, such as noise pollution.

Air pollution is the largest environmental risk factor for human mortality worldwide. Industrial crop and animal agriculture and aquaculture are amongst the major contributors to air pollution globally.

Of the top 20 sources of industrial pollution in the United States, eight are slaughterhouses. Manure emits ammonia, which combines with other air pollutants, like nitrogen oxides and sulphates, to create tiny (and deadly) solid particles. This air pollution can have moderate to severe health implications for surrounding communities and for farm workers.

Industrial animal agriculture waste contributes to algal blooms in the ocean, which can be dangerous to humans and marine life depending on the species. Species that produce toxins can harm people who come into contact with the bloom or an affected drinking supply.

A wide variety of chemical products are used in agriculture (agricultural chemicals), such as pesticides (including insecticides, herbicides and fungicides), as well as synthetic fertilisers, hormones and antibiotics. Dangerous compounds found in agrichemicals end up as pollutants when wind and rain disperse them into the environment. They pose human health risks, and cause antibiotic resistance. Antibiotic resistance is a “ticking time bomb” for human health.

Heavy metals such as lead or mercury and other toxic chemicals – like pesticides - in aquatic ecosystems can bioaccumulate in the food chain with potential adverse impacts on humans and animals.

Marine litter and plastics break down and end up in seafood which humans then consume. Exposure to mycotoxins, aflatoxins, biotoxins and water-borne pathogens is another problem of concern affecting the health of animals, as well as humans and plants.

Pollution from tanneries and slaughterhouses can also have human health impacts. Unintentional poisonings mainly arising from excessive exposure to, and inappropriate use of, toxic chemicals including pesticides present in occupational and/or domestic environments are heavily affecting human health particularly in low-income countries.

The use of animal experimentation can also impact human health and wellbeing. There is a growing body of scientific literature critically assessing the validity of animal experimentation generally (and animal modelling specifically) raises important concerns about its reliability and predictive value for human outcomes and for understanding human physiology. Animal experimentation often significantly harms humans through misleading safety studies, potential abandonment of effective therapeutics, and direction of resources away from more effective testing methods.

#### **Annex 2.4.4. SDG 4 Quality Education**

Keeling et al.<sup>934</sup>:

Educating children about animals can improve empathy and reduce interpersonal violence. Children are the next generation consumers, who can create a market for higher welfare products.

Education of farmers, and those interacting with animals, can change attitudes towards animal welfare and farmers can share knowledge about animals in community projects.

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<sup>934</sup> Keeling L, Tunón H, Olmos Antillón G, Berg C, Jones M, Stuardo L, Swanson J, Wallenbeck A, Winckler C and Blokhuis H (2019) Animal Welfare and the United Nations Sustainable Development Goals. *Front. Vet. Sci.* 6:336. doi: 10.3389/fvets.2019.00336 *Frontiers in Veterinary Science* - <https://www.frontiersin.org/articles/10.3389/fvets.2019.00336/full>

Provision of information to adults (consumers and citizens) affects societal attitudes, and demand related to animal production, as well as how pets and sport animals are treated.

Isaiah Otieno<sup>935</sup>:

Communities are able to tap into the wildlife and domestic animal potential to realise some income that will enable them to provide better education for their children.

Intact ecosystems provide our children with a vital learning opportunity to the future generations.

Animal Issues Thematic Cluster (AITC) has a full resource of background and recommendations on SDG 3<sup>936</sup>. Its key recommendations are:

- To engender a greater understanding of animal sentience, zoonoses, the interrelationship between humans, animals and the environment and how we can share the same world safely with regard for good health and wellbeing of humans and non-humans. SDG Target 3.3.
- To understand and promote the human-animal bond and how animals can enrich the lives and wellbeing of humans through companionship and therapeutic benefits. SDG Target 3.4.
- To incorporate Caring for Life Education curriculums into schools as part of main stream learning and inspire children from a young age to marvel at the natural world, all species and recognise how all forms of life are interrelated. The aim is to help each student to develop their emotional intelligence and understand that animals and the way in which we treat them, can significantly affect human health and well-being. SDG Targets 3.3 & 3.4.

The paper also includes an overview of problems, potential solutions and institutional responsibilities. Problems include the following (inter alia):

- Peer pressure and bullying within the school environment can severely affect the mental health and wellbeing of the victim and such behaviour is often transferred to abuse of animals. The cycle of abuse is well documented as a social problem.
- Issues relating to animal welfare are largely dis-regarded in many countries, perhaps through ignorance or indifference. Educating students and adults to understand animal sentience and animal welfare will lead to an extension of humanity.

Animal Issues Thematic Cluster (AITC)<sup>937</sup>:

In order to develop peaceful and stable societies and halt environmental degradation, it is important that education is used to ensure positive societal and environmental outcomes. Education is fundamental to the achievement of any form of societal progress. Changing

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<sup>935</sup> Otieno, Isaiah. UNEP. UNEP Animal Welfare in the Context of The Sustainable Development Goals (SDGs). PowerPoint presentation to the WOAHA Global Forum on Animal Welfare. April 2020. <https://www.oie.int/app/uploads/2021/08/3-i-otieno-unesp-sdg-apr2021.pdf>

<sup>936</sup> Animal Issues Thematic Cluster (AITC). Sustainable Development Goal 3 Ensure healthy lives and promote well-being for all at all ages. <https://animalissuesun.org/goal-3>

<sup>937</sup> Clifton, Wolf Gordon; Bridgers, Jessica; and Bazzi, Maha et al. Animal Interest Thematic Cluster (AITC). Animal Protection and Sustainable Development: An Indivisible relationship. <https://static1.squarespace.com/static/5b2543425cfd79f3074bf90c/t/5d23d461aa03990001fbb109/1562629270666/Animal+Protection+and+Sustainable+Development+-+An+Indivisible+Relationship-compressed.pdf>



mindsets is the only way to permanently change behaviour – of individuals, governments, or institutions; toward one another, animals, or the environment.

Humane Education is a tried and tested vehicle for relieving the shortfalls of traditional education and which holds unique potential in contributing to Target 4.7. The Academy of Prosocial Learning defines humane education as follows: “Humane education encourages cognitive, affective, and behavioural growth through personal development of critical thinking, problem solving, perspective taking, and empathy as it relates to people, animals, the planet, and the intersections among them.”

Training veterinary professionals (especially in developing countries) in animal welfare can help them to educate farmers, breeders, and others economically dependent on animals how to properly care for them, minimising financial loss due to preventable health issues, and helping to prevent and contain zoonotic diseases threatening both animal and human lives.

Wolf Clifton<sup>938</sup>:

Education intersects most prominently with animal protection within the field of humane education, which aims to teach compassion, respect, and proper care for animals. Studies of humane education curricula show that children taught kindness to animals are more altruistic toward people as well. Humane education has also been found to improve student learning outcomes generally.

On the flip side, children who are exposed to animal cruelty are significantly more likely to commit violent acts impacting humans, highlighting the consequences of failing to model proper treatment of animals, or counteract harmful modelling, early in life.

Regarding adult education, veterinary professionals without proper animal welfare training are less equipped to treat animals, educate animal keepers, or contain zoonotic disease outbreaks.

NGO Major Group HLPF Position Paper (2022)<sup>939</sup>:

The curricula should complement didactic learning with critical and creative thinking skill development, and the development of “solutionary” approaches, empowering students to become agents of change.

Janice Cox (Good Practices for Agricultural Development)<sup>940</sup>:

Education and training are key to good animal welfare practices for agricultural development. The education and training delivered will build the knowledge, understanding and skills of stakeholders (ranging from agricultural project workers - including those in international organisations, government officials, extension officers, agricultural and veterinary trainers, farmers, slaughterhouse workers and transporters), enabling them to produce higher quality,

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<sup>938</sup> Clifton, Wolf Gordon. Animal People. How Animal Protection Impacts All 17 U.N. Sustainable Development Goals. 1 July 2020. <https://animalpeopleforum.org/2020/07/01/how-animal-protection-impacts-all-17-u-n-sustainable-development-goals/>

<sup>939</sup> NGO Major Group. Official Position Paper for the 2022 High-Level Political Forum <https://static1.squarespace.com/static/603c11839959d83fcdc14604/t/62a2e0a6c4f4933172325329/1654841518485/2022+NGO+Major+Group+Position+Paper+%281%29.pdf>

<sup>940</sup> Cox, Janice H. Good Practices for Animal Welfare in Agriculture Development: Impact on Sustainable Development and the Achievement of the SDGs. World Animal Net. July 2019. [https://www.wellbeingintlstudiesrepository.org/es\\_unsdg/2/](https://www.wellbeingintlstudiesrepository.org/es_unsdg/2/)

more humanely- and environmentally-produced foods, which contribute to local food security and rural development.

In developing countries, agriculture employs between 50 percent and 90 percent of the population. Of this percentage, small farmers are the most prevalent form of producers, making up 70-90 percent of those working in agriculture. Agriculture is viewed as a vital means through which poverty and unemployment can be addressed; and education and training are key long-term strategies to support such development.

#### ***This Scoping Study – Additional Points:***

Humane education can develop an understanding of the need for compassion and respect for people, animals and the environment. It also engenders empathy. This will help to build caring and supportive societies; which will in turn support the attainment of many other SDGs.

Governments should play an important role in education to bring about food systems change, both for food producers and consumers.

Public procurement: plant-based diets for schools would bring educational benefits.

Educational programmes should be included in further and higher education. For example, teaching about the animal welfare – environment nexus in agricultural and veterinary training, and in environmental sciences.

Animal collections can provide unhelpful educational experiences, particularly where they are not kept in natural conditions, exhibiting natural behaviours. Animals used in circuses or entertainment can provide the false impression that it is acceptable for humans to take and use animals simply for human entertainment. Where animal welfare is poor, the experience can also have the effect of lessening empathy and respect for animals.

### **Annex 2.4.5. SDG 5 Gender Equality**

Keeling et al.<sup>941</sup>:

Animals are often cared for by women, and improving the status and welfare of animals enhances their role.

Improving the welfare of animals in a community also improves empathy between different groups within their societies and reduces violence among genders.

Isaiah Otieno.<sup>942</sup>:

Animals come in handy in helping women by taken off duties that are gender differentiated such as fetching of water from their hands. For instance, when women own animals in Africa and Asia, they improve their social and financial capacities and enables them have space for other activities because animals support their work.

Working animals in good welfare hence offer women big a level of freedom from heavy chores like ploughing and fetching water which are ordinarily are done by women.

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<sup>941</sup> Keeling L, Tunón H, Olmos Antillón G, Berg C, Jones M, Stuardo L, Swanson J, Wallenbeck A, Winckler C and Blokhuis H (2019) Animal Welfare and the United Nations Sustainable Development Goals. *Front. Vet. Sci.* 6:336. doi: 10.3389/fvets.2019.00336 *Frontiers in Veterinary Science* - <https://www.frontiersin.org/articles/10.3389/fvets.2019.00336/full>

<sup>942</sup> Otieno, Isaiah. UNEP. UNEP Animal Welfare in the Context of The Sustainable Development Goals (SDGs). PowerPoint presentation to the WOAHA Global Forum on Animal Welfare. April 2020. <https://www.oie.int/app/uploads/2021/08/3-i-otieno-unep--sdg-apr2021.pdf>

Wolf Clifton<sup>943</sup>:

It has been found that there is a strong link between animal abuse and domestic violence, which disproportionately impacts women. Nearly half of U.S. survivors of domestic abuse report staying with their abusers rather than abandoning pets, demonstrating the need to provide for companion animals in order to provide effective relief to human victims of domestic violence.

Many women worldwide are reliant on animals for their livelihood, including two thirds of livestock keepers living in poverty.

On a more abstract level, sexual exploitation of women and the exploitation of non-human animals for food are often linked in popular culture, as shown by Carol Adams in *The Sexual Politics of Meat*. For example, women and animals are both commonly objectified in terms of their body parts, a practice that in both cases subverts respect or empathy for the sake of physical desire.

Finally, the majority of people working in animal protection are themselves women, so the goal of gender equality is a particularly personal one for those working within the animal protection movement.

IFAW<sup>944</sup>:

Improving animal welfare and human well-being requires the participation of all parts of society to ensure everyone's needs are met.

in too many cases, conservation efforts do not ensure that women's needs are addressed or their voices are heard, to the detriment of both people and animals.

Women represent nearly half of those working in fisheries and aquaculture worldwide.

Janice Cox (Good Practices for Agricultural Development)<sup>945</sup>:

Women comprise about 43 percent of the agricultural labour force globally and in developing countries, where it has been confirmed that they make essential contributions to the agricultural and rural economies in all developing countries. In Sub-Saharan Africa in 2015, they represented 40% of the agricultural labour force. In some developing countries, their contributions exceed 50%.

Within pastoralist and mixed farming systems, livestock play an important role in supporting women and in improving their financial situation, and women are heavily engaged in the sector. An estimated two-thirds of poor livestock keepers, totalling approximately 400 million people, are women. They share responsibility with men and children for the care of animals, and particular species and types of activity are more associated with women than men. For example, women often have a prominent role in managing poultry and dairy animals, and in caring for other animals that are housed and fed within the homestead.

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<sup>943</sup> Clifton, Wolf Gordon. *Animal People. How Animal Protection Impacts All 17 U.N. Sustainable Development Goals*. 1 July 2020. <https://animalpeopleforum.org/2020/07/01/how-animal-protection-impacts-all-17-u-n-sustainable-development-goals/>

<sup>944</sup> Hofberg, Mark et al. *Thriving Together: The Critical Role of Animals in Achieving the SDGs*. Second Edition. IFAW. 2022. [https://d1jyxz9imt9yb.cloudfront.net/resource/1304/attachment/original/IFAW\\_SDG\\_REPORT\\_RGB\\_FINAL\\_DIGITAL\\_20220627.pdf](https://d1jyxz9imt9yb.cloudfront.net/resource/1304/attachment/original/IFAW_SDG_REPORT_RGB_FINAL_DIGITAL_20220627.pdf)

<sup>945</sup> Cox, Janice H. *Good Practices for Animal Welfare in Agriculture Development: Impact on Sustainable Development and the Achievement of the SDGs*. World Animal Net. July 2019. [https://www.wellbeingintlstudiesrepository.org/es\\_unsdg/2/](https://www.wellbeingintlstudiesrepository.org/es_unsdg/2/)

These occupations provide them with gainful employment and sometimes their own income and a degree of independence and self-worth.

However, women often face constraints that reduce their agricultural skills and productivity. Thus, improving rural women's access to training and information, and extension services, is critical. The introduction of good animal welfare practices for agricultural development project will include education and training which will benefit women directly; and help to build the skills of extension services which serve their communities on an ongoing basis. Improving the health and welfare of their animals will improve the productivity, development and sustainability of their agricultural work.

Working equines also play a significant role in the lives of the women who keep them, as they help with activities such as daily chores, paid work, and transportation. Safeguarding the health and welfare of working animals is imperative for the poor women who keep them, as they enable these women to spend more time with their children and families, improve food security and access to education, and increase integration in their communities. All of these factors reduce the barriers to equality that women often face.

It is noted that women's groups also support organic agriculture. Conversely, industrial animal agriculture competes with their small-scale and subsistence farming, and support for this can adversely impact their food security, incomes and business viability.

***This Scoping Study – Additional Points:***

78% of the poor live in rural areas, and 500 million are small farmers. Of these, 170 million are women farmers, and this is the main source of their livelihood.

Perverse subsidies and incentives paid to commercial agriculture are disadvantaging women and other smallholder farmers in the sector.

Women, who are the main fieldworkers in many regions, and at greater risk of pesticide poisoning.

Land or resource tenure insecurity, as well as declines in nature, have greater impacts on women and girls, who are most often negatively impacted.

Animals come in handy in helping women by taking off duties that are gender differentiated such as fetching of water. For instance, when women own animals in Africa and Asia, they improve their social and financial capacities and enables them have space for other activities because animals support their work.

Working animals in good welfare hence offer women big a level of freedom from heavy Transformation to humane and sustainable food systems must include indigenous, traditional and local knowledge systems and innovations that evolved from practical experiences and observations of communities where the role of women is central, across generations.

## **Annex 2.4.6. SDG 7 Affordable and Clean Energy**

Keeling et al.

Animals or their waste products can be used to create renewable energy, increasing their importance and value to the community.

Increasing the welfare of draft animals improves their importance, so providing an improved energy source, and simultaneously increasing animal welfare.

Wolf Clifton.<sup>946</sup>:

It is particularly important to recognise the relationship between animal protection and SDG 7, because energy production methods that are relatively sustainable on a global scale can still be harmful to ecosystems locally. For example, some solar power stations actually cause more direct wildlife casualties than do coal plants. This harmful impact can be mitigated by accounting for animals in the design of sustainable energy production methods, as for example in the incorporation of fish ladders and development of fish-friendly turbines in hydroelectric dams.

SDG 7 also relates to the use of working animals such as horses, donkeys, oxen, camels, and others, as the use of working animals can potentially be less energy intensive than using machines powered by fossil fuels. However, the relative efficiency of using working animals depends on high standards of animal welfare and care, to reduce mortality and increase work output. Furthermore, more advanced machinery, powered by alternative energy sources such as biofuels or hydrogen, may be more efficient and less ecologically destructive than either.

Janice Cox (Good Practices for Agricultural Development).<sup>947</sup>:

There is a large and wasted energy use in industrial agriculture. Animal production is a poor converter of energy because it is based on a double energy transformation. First, solar energy and soil nutrients are converted into biomass by green plants. Then, when the plants are fed to animals, for which a major share of energy intake is spent on maintaining body metabolism and only a small portion is used to produce meat, milk or eggs. Other relevant factors are:

- Animals can convert only 17-30% of the feed input energy (GE) to usable product (milk and meat energy).
- Fossil energy is a major input of industrial livestock production systems, used mainly for the production, transport, storage and processing of feed.
- Depending on location (climate), season of the year and building facilities, energy is also needed for control of the thermal environment (cooling, heating or ventilation) and for animal waste collection and treatment.

Good animal welfare practices for agricultural development will promote, educate and train in animal-welfare-friendly and agroecological methods which are respecting of natural resource use, including energy. Many of these high welfare systems will be local production for local markets, as part of international development programmes; and these are also energy efficient food solutions, as opposed to agricultural systems which are largely based on exported commodities (such as feed) for inputs.

### ***This Scoping Study – Additional Points:***

A dietary pattern that is higher in plant-based foods, such as vegetables, fruits, whole grains, legumes, nuts, and seeds, and lower in animal-based foods, is not only more health-promoting, but is also associated with lower energy use.

Working animals save energy, and are most productive with good welfare.

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<sup>946</sup> Clifton, Wolf Gordon. Animal People. How Animal Protection Impacts All 17 U.N. Sustainable Development Goals. 1 July 2020. <https://animalpeopleforum.org/2020/07/01/how-animal-protection-impacts-all-17-u-n-sustainable-development-goals/>

<sup>947</sup> Cox, Janice H. Good Practices for Animal Welfare in Agriculture Development: Impact on Sustainable Development and the Achievement of the SDGs. World Animal Net. July 2019. [https://www.wellbeingintlstudiesrepository.org/es\\_unsdg/2/](https://www.wellbeingintlstudiesrepository.org/es_unsdg/2/)

## **Annex 2.4.7. SDG 9 Industry, Innovation and Infrastructure**

Keeling et al.

There are business opportunities to develop new systems and technologies that enhance animal welfare. Interest in the welfare of farm, companion, laboratory animals etc. can lead to new industries to supply demand and innovation.

Wolf Clifton.<sup>948</sup>:

One promising area of technological innovation is in alternatives to animal use. For example, compared to animal research, tests using human volunteers, cell cultures, chemistry, or computer models often yield more accurate results. There is a particular incentive to develop alternative research methods as more jurisdictions restrict animal testing, as the European Union and Taiwan did for cosmetics testing in 2013 and 2019 respectively. The alternative protein industry, which develops plant-based and cellular replacements for meat, dairy, and eggs as food sources, has an estimated value of \$2.2 billion USD as of 2019, and could grow to as much as \$140 billion (10% the current value of the meat industry) within ten years.

In the area of infrastructure development, there is a need to mitigate the impact of new building projects on wildlife and their habitats, for example by routing highways and train lines around wilderness areas instead of through them, and restricting the size of surrounding buffer zones. Also important is the installation of overpasses and underpasses for wildlife to safely cross, reducing roadkill and fragmentation of habitat.

Janice Cox (Good Practices for Agricultural Development).<sup>949</sup>:

Industry and infrastructure development that ignores economic, environmental and social costs can impact long-term economic viability and undermine the environmental foundation on which people's livelihoods, well-being, and cultural life depend. The same is true of industry and infrastructure development which does not meet the health and welfare needs of animals.

Good animal welfare practices for agricultural development identify good practice which will guide the development of animal industries, and associated infrastructure, into the future. This will help to safeguard sustainability and ensure that investments in related industries and infrastructure are not put at risk through regulatory or societal changes due to future unacceptability. Over time, the project will include good practice in areas such as transport and slaughter, as well as livestock and fish farming systems.

As regards innovation in animal industries, the project will help to ensure that this is able to take full account of the health and welfare needs of animals. This will also support sustainability and thus protect against loss of investment.

### ***This Scoping Study – Additional Points:***

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<sup>948</sup> Clifton, Wolf Gordon. Animal People. How Animal Protection Impacts All 17 U.N. Sustainable Development Goals. 1 July 2020. <https://animalpeopleforum.org/2020/07/01/how-animal-protection-impacts-all-17-u-n-sustainable-development-goals/>

<sup>949</sup> Cox, Janice H. Good Practices for Animal Welfare in Agriculture Development: Impact on Sustainable Development and the Achievement of the SDGs. World Animal Net. July 2019. [https://www.wellbeingintlstudiesrepository.org/es\\_unsdg/2/](https://www.wellbeingintlstudiesrepository.org/es_unsdg/2/)



There is a need to transform food and agricultural industries so they are humane and sustainable.

Perverse subsidies must be removed, and repurposed towards transformation, including support for small-scale producers using regenerative and agroecological methods.

There should be more support for new technologies that will increase sustainability (and protect the environment and animals), including cellular and cultured meat and seafood alternatives.

#### **Annex 2.4.8. SDG 10 Reduced Inequalities**

Keeling et al.

Harmonisation of animal welfare standards globally reduces inequality and provides increased trade opportunities for high welfare products and prevents trade inequalities leaving some countries behind

Financial loans to industries and farmers can be conditional upon improved animal welfare. Sharing of veterinary services can reduce inequalities in animal disease control.

Isaiah Otieno.<sup>950</sup>:

With better animal welfare that will advocate for less industrial livestock and more of small-scale livestock, wealth will be distributed in the communities. This will improve the livelihood of the majority of the population and thus reduce economic inequality within the country and globally among countries.

Globally countries that are developing depend on ecotourism as a way of economic development via foreign exchange and a sector that's creates employment for its citizen and thus an asset. This helps in creation of jobs and elevation from poverty hence reducing inequalities among countries.

Animal Issues Thematic Cluster (AITC).<sup>951</sup>:

Oppression of human populations and exploitation of non-human animals have often been closely linked. For example, economic desperation may drive marginalised people to adopt livelihoods that exploit animals, such as wildlife poaching and trafficking and low-wage, high-risk employment such as slaughterhouse work.

industrialised agriculture has resulted in lower relative incomes for farm workers and greater income inequality and poverty.

Reliance on vulnerable populations, especially migrants, is common to the animal agriculture industries of many countries, and perpetuates abuses in the sector.

Exploitation of wildlife is also closely tied to economic inequality. A 2017 survey of poachers in Tanzania found that nearly 80% cited shortage of food and/or income as their major

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<sup>950</sup> Otieno, Isaiah. UNEP. UNEP Animal Welfare in the Context of The Sustainable Development Goals (SDGs). PowerPoint presentation to the WOAHA Global Forum on Animal Welfare. April 2020. <https://www.oie.int/app/uploads/2021/08/3-i-otieno-unep--sdg-apr2021.pdf>

<sup>951</sup> Clifton, Wolf Gordon; Bridgers, Jessica; and Bazzi, Maha et al. Animal Interest Thematic Cluster (AITC). Animal Protection and Sustainable Development: An Indivisible relationship. <https://static1.squarespace.com/static/5b2543425cfd79f3074bf90c/t/5d23d461aa03990001fbb109/1562629270666/Animal+Protection+and+Sustainable+Development+-+An+Indivisible+Relationship-compressed.pdf>

reasons for poaching, while 96% stated they would give up poaching if alternative livelihoods were available.

Various policies force family and small-scale farmers to face vulnerable futures due to the rise in industrial agriculture. Corporate concentration of agricultural inputs, production, processing and distribution, known as vertical integration, has increased substantially in recent decades, giving these corporations a major advantage over small to medium-sized farmers.

Many agricultural subsidies provide further unfair price advantages to large-scale enterprises, with producers not held responsible for external costs such as social and environmental impacts.

Certain wildlife “sustainable use” policies rely upon and exacerbate existing inequalities. For example, the benefits of trophy hunting for local economies are commonly exaggerated. The hunter advocacy group Safari Club International’s own statistics show that trophy hunters account for less than 2% of tourist expenditures in the countries they visit, and around 0.03% of total GDP. Legal trophy hunting upholds a de facto system which rewards wealthy trophy hunters who kill wildlife for sport, while punishing poor local communities who hunt for food or economic survival.

Governments, regulators and corporations must provide adequate training for people working in animal farming, transport and slaughter. This will help increase their competence and skills, make their jobs more rewarding and ensure animals are treated humanely, benefiting both humans and the animals under their care. The implementation of good animal welfare agricultural practices will also increase the competitiveness of smallholders in the market.

Policies which promote sustainable local livelihoods and food security can play a role in stemming wildlife poaching and crime. Furthermore, policies which alienate local communities from their land and resources and privilege use to wealthy, foreign interests should be lifted.

Wolf Clifton.<sup>952</sup>:

Economic inequality is a major driver of wildlife crime, and wildlife crime can be successfully combated by addressing the root cause. By providing alternative livelihood training and other community development for the Kalandar tribe, Wildlife SOS ended the practice of bear dancing in India within seven years while also doubling the average salary for Kalandar men and employing some 2,000 Kalandar women.

Exploitative practices in the meat industry disproportionately affect racial minorities and migrants. In the United States, 2.6 times more migrant non-citizens work as meat and poultry workers than in the manufacturing sector.

In some cases, harm of animals is directly linked to histories of oppression against human groups. For example, in the 19th century, the U.S. government encouraged settlers and the military to exterminate bison as a means of starving Native American people into submission. In the present day, Amazonian rainforest fires have in many cases been deliberately set by ranchers – with the tacit support of the Brazilian government – as a method of displacing Indigenous people from land desired for agricultural purposes.

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<sup>952</sup> Clifton, Wolf Gordon. Animal People. How Animal Protection Impacts All 17 U.N. Sustainable Development Goals. 1 July 2020. <https://animalpeopleforum.org/2020/07/01/how-animal-protection-impacts-all-17-u-n-sustainable-development-goals/>

Janice Cox (Good Practices for Agricultural Development).<sup>953</sup>:

Inequality is an important issue in animal production, slaughter and processing. Family and small-scale farmers face vulnerable futures – with increased competition from industrial agriculture, and many unable to make a profit some years. In contrast, agri-businesses are able to make money more consistently, and continue to grow. Corporate concentration of agricultural inputs, production, processing and distribution has increased substantially over the last 20 years. The system is structured in a way that allows farmers to operate at a loss, which maximises profits further downstream for agribusiness and leaves the public covering the farmers' losses. When looking at the cost of production and the movement to ports and then to export, there are profits and losses at various stages. However, many of these losses are hidden behind vertically integrated supply chains (for example, when grain traders also own feedlots, or when poultry producers contract with farmers to control the breeding and raising of chickens while also controlling the processing and marketing).

The current food and farming system leads to unfair competition and inequalities in other ways too. For example, agricultural subsidies provide unfair price advantages, and producers are not charged for external costs such as social and environmental impacts (including massive pollution, which is suffered by local communities and often uses taxpayers' resources if/when addressed).

Poor and marginalised people are often driven to work in industries which exploit animals. For example, in the United States, slaughterhouse and meat processing workers are predominantly people of colour living in low-income communities.

Like all agricultural workers, slaughterhouse and meat processing workers struggle to live above the poverty level and provide a decent quality of life for their family. Their jobs are often associated with high rates of physical injury and psychological trauma.

Many of the improved agricultural practices will need to be implemented by smallholder farmers, which will build their competitiveness with industrial agriculture.

WWF.<sup>954</sup>:

The accelerating decline in wildlife populations will have long-term negative impacts on local communities as it robs communities of their natural capital and livelihoods - \$70 billion per year is lost due to crimes affecting natural resources - deepens poverty and inequality.

***This Scoping Study – Additional Points:***

More than 820 million people have insufficient food and many more consume an unhealthy diet that contributes to premature death and morbidity.

Inequality, not unavailability, is the main driver of food insecurity.

Scientists are increasingly concerned that, if anthropogenic pressures on Biodiversity continue unabated, we risk precipitating a sixth mass extinction event in Earth history, with profound impacts on human health and equity.

## **Annex 2.4.9. SDG 11 Sustainable Cities and Communities**

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<sup>953</sup> Cox, Janice H. Good Practices for Animal Welfare in Agriculture Development: Impact on Sustainable Development and the Achievement of the SDGs. World Animal Net. July 2019. [https://www.wellbeingintlstudiesrepository.org/es\\_unsdg/2/](https://www.wellbeingintlstudiesrepository.org/es_unsdg/2/)

<sup>954</sup> WWF. Illegal Wildlife Trade. <https://www.thegef.org/what-we-do/topics/illegal-wildlife-trade>

Keeling et al.<sup>955</sup>:

Having farm animals near cities can improve possibilities for education about animals, improve food security and reduce live transport distances.

Cities can be designed to be pet-friendly (e.g., dog parks) and responsible ownership reduces stray dogs with associated health problems.

Urban wildlife management and reducing habitat loss improves biodiversity and sustainability, but also requires that waste from cities is managed appropriately.

Isaiah Otieno.<sup>956</sup>:

Human reliance on animals may be less obvious due to technological advancements, industrialisation and urbanisation, but it is still there. The reliance has just evolved. Sustainable cities need sustainable supply of food which can only be achieved by better animal welfare. They need fresh air free which can only be achieved by ensuring thriving biodiversity.

Wolf Clifton.<sup>957</sup>:

Cities can be made safer for human residents through spay/neuter and vaccination programmes, which control populations of free-roaming dogs and cats (and more rarely other species such as monkeys and rodents), reducing incidents of bites and other direct conflict, and controlling the spread of rabies and other zoonotic diseases transmissible to humans. Spay/neuter and vaccination is more effective than culling, as lethal methods target animals friendly to humans while selecting for the survival of more aggressive or antisocial individuals, and create an immediate void in the habitat, which can be quickly filled by animals from surrounding areas.

On a broader level, as discussed previously, reducing violence toward animals creates safer communities for people as well. Abuse of women and children in the United States is often discovered during animal cruelty investigations, and communities with slaughterhouses suffer higher rates of violent crime than those without.

Janice Cox (Good Practices for Agricultural Development).<sup>958</sup>:

Human communities are intrinsically linked to the ecosystems surrounding them and the ecosystems that human settlements replace. One factor that is systematically destroying nature and biodiversity, and pushing wildlife to the brink of extinction, is the expansion of industrial livestock farming. Urban and peri-urban agriculture is often introduced as a

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<sup>955</sup> Keeling L, Tunón H, Olmos Antillón G, Berg C, Jones M, Stuardo L, Swanson J, Wallenbeck A, Winckler C and Blokhuis H (2019) Animal Welfare and the United Nations Sustainable Development Goals. *Front. Vet. Sci.* 6:336. doi: 10.3389/fvets.2019.00336 *Frontiers in Veterinary Science* - <https://www.frontiersin.org/articles/10.3389/fvets.2019.00336/full>

<sup>956</sup> Otieno, Isaiah. UNEP. UNEP Animal Welfare in the Context of The Sustainable Development Goals (SDGs). PowerPoint presentation to the WOAHP Global Forum on Animal Welfare. April 2020. <https://www.oie.int/app/uploads/2021/08/3-i-otieno-unesp-sdg-apr2021.pdf>

<sup>957</sup> Clifton, Wolf Gordon. Animal People. How Animal Protection Impacts All 17 U.N. Sustainable Development Goals. 1 July 2020. <https://animalpeopleforum.org/2020/07/01/how-animal-protection-impacts-all-17-u-n-sustainable-development-goals/>

<sup>958</sup> Cox, Janice H. Good Practices for Animal Welfare in Agriculture Development: Impact on Sustainable Development and the Achievement of the SDGs. *World Animal Net*. July 2019. [https://www.wellbeingintlstudiesrepository.org/es\\_unsdg/2/](https://www.wellbeingintlstudiesrepository.org/es_unsdg/2/)

development and poverty alleviation scheme. However, where livestock projects are concerned, these can bring negative impacts for communities through the over-use of pesticides and human exposure to contaminants and pathogens. Zoonotic diseases (disease of animals that can be transmitted to humans and vice versa) can also be a risk of urban livestock raising. Building new slaughterhouses in cities, necessitating greater transport/movement of animals, can further exacerbate these risks. Research has shown that these impacts are more likely to affect marginal groups (who may have to make use of the most contaminated lands, or work in animal industries) and women (who are the main fieldworkers in many regions, and so at greater risk of pesticide poisoning).

Municipal ordinances to remove farm animals from city limits have played a central part in defining city planning's role in urban ecosystems, economies, and public health for decades. This has aligned the field with the field of public health in creating a hygienic city. In the efforts to untangle animal agriculture from waste management, public space, and urban food supply, urban authorities employed some of the first land-use regulations in countries such as the United States. Ordinances were introduced which banned slaughterhouses, piggeries, and dairies; and zoning became important to planning. These regulations allowed planners to transform cities and their food environments. Now planners are seeking to reweave animal agriculture into cities, but the same problems that previously led to its extraction from cities continue to exist.

International Companion Animal Management Coalition.<sup>959</sup> believes that you cannot achieve SDG 11 of a safe and sustainable city or human settlement without including a humane dog population management system in your city/settlement:

Asia and Africa already have high numbers of unmanaged dogs, the highest prevalence of dog-mediated zoonotic diseases and experience continuous disturbance to dog-human harmonious coexistence. The predicted rapid increase in urban populations means we can expect increasing human and dog density and undoubtedly exacerbation of these issues. Contributing to making cities unsafe, non-inclusive and unsustainable.

Local governments must consider the management of other species that coexist with humans in order to create safe and sustainable cities. Dogs are one such species that has lived alongside humans for over 14000 years and it is imperative that cities across the world adopt humane approaches to managing our oldest companion animal.

Some of the ways in which DPM approaches can help in creating sustainable cities are as follows:

Effective design and implementation of DPM programs will reduce unmanaged dogs, reduce unwanted breeding of dogs, reduce dog bites and support the elimination of dog-mediated zoonotic diseases like rabies.

- One of the key outcomes of DPM is responsible ownership of dogs, this is critical to reducing abandonment of dogs to already crowded urban streets.
- Responsible ownership and care of community dogs also includes ensuring dogs are appropriately fed, avoiding the need to forage in waste for their nutrition.

These programs will create better cities for both humans and dogs.

### ***This Scoping Study – Additional Points:***

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<sup>959</sup> International Companion Animal Management Coalition (ICAM). <https://www.icam-coalition.org/topics/>

Humane and effective dog population control programmes are needed (and in some cases for cats too) to guard against feral animals causing injury and disease in the streets.

#### **Annex 2.4.10. SDG 16 Peace, Justice and Strong Institutions**

Keeling et al.

Improved governance of veterinary services and competent authorities can guide and enforce good animal welfare policies.

Increased participatory and representative decision-making, such as by stakeholder involvement, will help ensure that animal welfare regulations are appropriate and enforceable.

Animal welfare is at risk when countries are performing poorly or in countries at war.

Animal Issues Thematic Cluster (AITC).<sup>960</sup>:

Strong institutions, effective governance frameworks, and peaceful and inclusive societies are all instrumental to addressing environmental challenges, including the degradation of ecosystems and climate change, which both drive and are driven by the dramatic loss of wildlife.

Animals are negatively affected by injustice, trafficking, and corruption. Wildlife crime, and particularly the illegal wildlife trade (IWT), is increasingly recognised as transnational organized crime, worth an estimated USD 23 billion each year. Driven by rising demand, wildlife crime is often facilitated by corruption and weak governance.

The most immediate critical threat to African elephants, rhinos, apes and other endangered wildlife is large-scale poaching, coordinated by organised criminal networks which traffic these animals or parts and products derived from them, whether for jewellery, traditional medicines, trophies, pets or wild meat.

Every year, millions of wild animals are brutally shot, trapped, poisoned and mutilated, or kept in appalling conditions and traded by criminal networks often relying on connections with corrupt political, military and border point agents and other facilitating networks to get their 'product' from source to market.

Many countries continue to fail to recognise wildlife crime as a serious crime. Challenges include a deficiency in legislation, insufficient law enforcement, weak prosecutorial and judiciary capacities, lack of expertise and capacity to effectively investigate and prosecute wildlife offences, low-level penalties that fail to deter wildlife criminals, lack of coordination between relevant competent authorities, and a lack of adequate intelligence-sharing between countries.

Another contributing factor to international wildlife trade-related corruption is the complex legal status of many wildlife "products", resulting in legal and illegal products being mixed freely and creating loopholes by which illegally traded animal products can be laundered into the trade.

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<sup>960</sup> Clifton, Wolf Gordon; Bridgers, Jessica; and Bazzi, Maha et al. Animal Interest Thematic Cluster (AITC). Animal Protection and Sustainable Development: An Indivisible relationship. <https://static1.squarespace.com/static/5b2543425cfd79f3074bf90c/t/5d23d461aa03990001fbb109/1562629270666/Animal+Protection+and+Sustainable+Development+-+An+Indivisible+Relationship-compressed.pdf>



Demand for ejiao, a gelatine produced from boiling donkey hides which is popular in Chinese medicine, has created a crisis in Africa where thousands of donkeys are being stolen, smuggled and slaughtered to meet the increasing demand for their hides.

Wolf Clifton.<sup>961</sup>:

Wildlife crime is the fourth largest illegal global trade, worth up to \$23 billion USD. Wildlife crime is enabled by corruption and weak governance, and poses an immediate threat to human life as well. Worldwide, up to a thousand rangers have been murdered by poachers in the last decade. Meanwhile, zoonotic disease outbreaks such as the COVID-19 pandemic are facilitated by the trade in captured wildlife (illegal and legal), claiming thousands or even millions more human lives.

As discussed previously, violence toward animals and violence toward people are strongly interlinked. Domestic violence correlates strongly with animal abuse within the same household. Communities with slaughterhouses suffer higher rates of violent crime than those without. On a psychological level, the dehumanisation of people by likening them to animals is a tactic often used deliberately to justify warfare, police brutality, and other forms of violence and oppression against people.

Janice Cox (Good Practices for Agricultural Development).<sup>962</sup>:

Food security and a healthy agricultural sector can play a critical role in preventing conflict and distress migration, and in building peace. In many countries, disasters or political instability have resulted in protracted crises and food shortages. Rural populations continue to be the most affected in conflicts, as attacks on farming communities undermine livelihoods and force people from their homes. Peace and food security are often mutually reinforcing. There is also a demonstrated connection between cruelty and violence towards animals and violence towards other humans. This is borne out by an increasing body of research by psychologists, sociologists and criminologists. There are also coalitions addressing the link between animal and human violence across the world.

Slaughterhouse workers tasked with killing animals for a living frequently experience severe psychological trauma, which carries over into their communities with increased rates of crime and domestic abuse. Sometimes slaughterhouse workers become desensitised to animal suffering, largely as a self-protection mechanism, and this can spill over to their relationships with other humans.

Desensitisation can also be deliberately harnessed to promote or rationalise violence against perceived human enemies. One devastatingly effective tactic is dehumanisation, whereby victims or enemies are likened to non-human animals in order to lessen their perceived moral value. Increasing the moral status of animals in society helps to undermine dehumanisation's power in justifying inter-human violence. Encouraging compassion for non-human animals establishes a sort of sociological buffer, ensuring that people cannot be robbed of their human rights merely by likening them to other species.

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<sup>961</sup> Clifton, Wolf Gordon. Animal People. How Animal Protection Impacts All 17 U.N. Sustainable Development Goals. 1 July 2020. <https://animalpeopleforum.org/2020/07/01/how-animal-protection-impacts-all-17-u-n-sustainable-development-goals/>

<sup>962</sup> Cox, Janice H. Good Practices for Animal Welfare in Agriculture Development: Impact on Sustainable Development and the Achievement of the SDGs. World Animal Net. July 2019. [https://www.wellbeingintlstudiesrepository.org/es\\_unsdg/2/](https://www.wellbeingintlstudiesrepository.org/es_unsdg/2/)

Good practices for animal welfare in agricultural development will provide training and resources to build animal care and compassion in relationships with animals, including working animals, farmed animals, and animals in transport and at slaughter. This will help to develop compassionate relationships with animals, building empathy and consideration, which will also impact relationships with other humans. This work will help to give animal handlers, transporters, users and slaughterers a greater sense of responsibility and pride in their role of caring for, and dealing with, animals; and help guard against desensitisation and brutalisation. The work will also help small-scale producers to overcome social, political and economic barriers, helping to overcome the marginalisation and disempowerment which can lead to violence and aggression.

A Chatham House report entitled “Global Impacts of the Illegal Wildlife Trade: The Costs of Crime, Insecurity and Institutional Erosion”<sup>963</sup> analysed the global impacts of the illegal wildlife trade, investigating links between the illicit trade in wildlife products and the erosion of national institutions in affected countries, national and transnational security threats and the role of armed non-state actors in civil conflict.

Effectively tackling illegal wildlife crime saves animal and human lives, reduces illicit financial and arms flows, tackles corruption and helps combat all forms of organised crime.

A 2020 UN report on World Wildlife Crime<sup>964</sup> acknowledged the links between illegal wildlife trade and professional criminal groups involved in other transnational offences, such as drug trafficking, human trafficking and terrorism. In the report’s foreword, the Executive Director of the UN Office for Drugs and Crime, noted that “There is increasing recognition of the dangers wildlife and forest crime pose not only to the environment but to the rule of law and stability, and of the potential for the criminal proceeds to fuel conflict and terrorism”.

### ***This Scoping Study – Additional Points:***

Current understanding of animal welfare is underpinned by a strong body of science, and backed by international and local strategies, policies, principles, standards and legislation. The 182 member countries of the World Organisation for Animal Health (WOAH, previously known as OIE) have all accepted the WOAH’s body of animal welfare work. Yet many countries have not yet enshrined this in law, and some who have do not enforce this effectively.

There is a strong body of science supporting animal sentience, and this is already recognised in the EU’s Lisbon Treaty, the Animal Welfare Strategy for Africa (under the African Union), and the WOAH’s Global Animal Welfare Strategy. Yet animals are still not included in the SDGs, which infers lack of justice. Also, weak institutions, because as this Scoping Study shows, their inclusion is essential to the achievement of all of the SDGs.

This is despite the statement from the UN Secretary-General in his Report on Harmony with Nature (A/75/266, paragraph 42), that “*non-human animals are sentient beings, not mere property, and must be afforded respect and legal recognition*”.

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<sup>963</sup> Lawson, Katherine and Vines, Alex. Global Impacts of the Illegal Wildlife Trade: The Costs of Crime, Insecurity and Institutional Erosion. February 2014.

<https://www.chathamhouse.org/sites/default/files/public/Research/Africa/0214Wildlife.pdf>

<sup>964</sup> UN Office on Drugs and Crime (UNODC). World Wildlife Crime Report. 2022.

<https://www.unodc.org/unodc/en/data-and-analysis/wildlife.html>

Despite pledges, SDGs and Aichi target, many governments have not taken measures to ensure that the environmental costs (externalities) of the food system are included in food prices. The pricing of environmental externalities, reinforcement of legislation to prevent pollution and other forms of environmental degradation, and the removal of harmful subsidies (e.g., fossil fuels) could provide important incentives to improve resource efficiency. This is borne out by GEO 5 which speaks of the “highly entrenched nature” of food systems making it extremely difficult to modify – with constraints mentioned including high levels of producer subsidies, dietary preferences, and a large industrialised food processing economy. However, with strong and effective institutions working to achieve the SDGs – instead of working against them, as with perverse subsidies - these could be tackled.

With a value of between \$7 billion and \$23 billion each year, illegal wildlife trafficking is the fourth most lucrative global crime after drugs, humans and arms. This needs more effective regulation, enforcement and international cooperation.

A May 2022 UN Resolution on tackling wildlife crime called on the United Nations Office on Drugs and Crime (UNODC) and its Member States to examine the challenges and gaps in the current international legal framework for preventing and combating wildlife trafficking. It also asks them to consider developing an additional protocol on wildlife crime under the UN Convention Against Transnational Organised Crime, in order to strengthen international cooperation in tackling the problem.

Including animals in disaster response and risk reduction programmes improves survival and recovery outcomes for the entire community and can help reduce poverty, hunger and conflict.

Awareness and proactive action to take account of “The Link” between cruelty to animals and violence against other humans can help to create peaceful and less violent societies. This will include cooperation between different enforcement agencies and animal protection organisations, and training on “The Link” and its implications. Reporting, investigating and prosecuting animal cruelty can help take dangerous criminals off the streets. Humane education can help to prevent this at source, by awakening empathy and care for animals and other humans.

Action is needed to support and enable countries and communities to develop effective laws and enforcement mechanisms to protect animals and the environment.

Institutions need to work more effectively to ensure policy coherence, dismantling policy silos. The internationally-accepted WOA animal welfare standards need to be included across organisations, including UNEP work and programmes. There should be no question of different conventions taking different approaches. There is a need for coherence, and ethical, critical approaches.

This Scoping Study shows the major transformative changes needed to prevent environmental catastrophe and failure to achieve SDGs. “Just Transitions” of this complexity and magnitude must begin with action by policy makers – as changes are needed to public and economic policies, programmes and structures before there can be enduring societal change. This will take strong institutions, and political will.

There needs to be greater understanding of causal systems. Grasp of complexity is vital to dealing with interconnected earth systems.