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OVERVIEW ARTICLE

# Embedding animals within a definition of sustainability

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## Abstract

Current definitions of sustainability and sustainable development are problematic. They reinforce the dominant capitalist paradigm of economic growth as a goal—a system which has contributed in no uncertain terms to the current state of the planet—and they exclude animals as moral entities. We propose that sustainability is primarily an ethical issue which connects people, the planet on which we live, and the animals and other organisms which inhabit it. Our definition of sustainability states that in all decisions and actions on any scale, from the individual to the institutional, we should minimise our immediate and future negative impact on humans, other animals, and the planet, while simultaneously maximising our positive impacts on these domains. We take an interdisciplinary approach in discussing trade-offs between these three broad interests, providing a rationale for adopting this more inclusive definition at every level of society. Our definition calls for a normative shift in discussions around sustainability, one of which is more inclusive of the animals and other organisms with which we share the planet. We believe that the paper forms a strong and coherent foundation for policy and communication about sustainability going forward.

**Keywords** Sentience studies · Systems thinking · Environmental ethics · Positive and negative sustainability · Planetary boundaries · Doughnut economics

## Introduction

Usage of the term sustainability has increased dramatically in recent years; the number of Google searches peaked in 2022, with previous years containing around half the number (Google Trends 2023). Today, multiple definitions are used to capture different aspects of the word (Johnston et al.

2007; Ramsey 2015). *Sustainability* has become a flexible construct that can be employed by a variety of stakeholders to suit a number of different purposes. Among the different definitions, *sustainable development*, under the guise of the three pillars of people, planet, and profit, predominates, and has formed the basis for the UN's Sustainable Development Goals (SDGs). However, the concept of sustainability coexisting with development as captured in a single definition has drawn much criticism; *sustain* means maintain, while *develop* implies change (Caldwell 1994).

There have been calls to redefine sustainability, switching from a human-centric extractionist position, to one of living in harmony with nature (Horton and Horton 2019). A fundamental basis of this switch would be to start understanding sustainability as primarily an ethical issue which positively or negatively affects both humans and animals—both subjects of ethical consideration (Humphreys 2020). This paper sets out the current neoliberal economic landscape within which current definitions of sustainability reside. We then critically examine the concept of ‘sustainable development’ and introduce and explain our own decision-making framework on sustainability.

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We contribute to the discussion on sustainability by explicitly including non-human animals, giving them salience. We also distinguish between negative and positive sustainability, which could be a useful tool by which to calibrate and shape our decisions regarding a host of decisions at a range of scales. The trade-offs that arise from our framework, particularly those concerning animals, and recommendations on how to proceed are discussed. Our aim is for this paper to contribute to the philosophical, theoretical, and scientific discussion around our current understanding of sustainability and to provide a universal (i.e., not western) instrument by which to compare systems and situations. The adoption of our definition by societal stakeholders, such as institutions (e.g., universities, municipalities), but also public figures may engender a change in societal norms, so that the interests of animals are fully included in the design and evaluation of systems and policies.

## Sustainability and neoliberal capitalism

Sustainability reflects the organization of our society and concerns both the impact of the current economic and political system as a whole, as well as the impact of our behaviour within this system. To critically evaluate sustainability in today's societies, it is first important to discuss the current dominant economic paradigm—that of neoliberal capitalism. Under neoliberalism, capital, rather than labour, is the driving factor (Steadman Jones 2014; Davies 2014). Individuals, through the accumulation of private wealth and assets, should maximise their own good at the expense of others; 'the market' thus dictates the best outcome in achieving the goal of the system: economic growth (Monbiot 2017). This system is predicated on the values of privatisation, "self-interest, competition, economic growth, and high levels of consumption" (Kasser et al. 2007, p. 6). The concept of 'development' under a neoliberal system is associated with higher levels of inequality and reduced social mobility whose effects are not equally distributed among and within states (Carroll and Jarvis 2015).

Neoliberal capitalism and its entrenched values are irreconcilable with current mainstream models of environmental sustainability: it is impossible to have infinite economic growth on a finite planet. Costs in the neoliberal system are constantly minimised at the expense of the environment (Flynn and Hacking 2019). Although these environmental 'externalities' are increasingly recognized [see Pearce (2002) for a review], nature is still viewed as a commodity which can be polluted, conserved, and extracted from (Arsel and Büscher 2012). Commodification produces linguistic terms such as 'ecosystem services' and 'nature-based solutions' which entrench a mindset of exploitation (Drury et al. 2022; Dempsey and Robertson 2012; Stibbe 2021).

Additionally, this commodification has brought about new avenues for development (e.g., carbon offsetting) which are prone to 'green-grabbing' and other forms of exploitation (Corson et al. 2013). Another aspect of neoliberalism is the promotion of consumerism as a way of life (Pérez and Esposito 2010). The desire to buy and own more leads to a considerable strain on the environment which serves as the source of raw materials and the final destination of both production-related pollution and the products themselves at the end of their lives. While people have basic needs for survival, when 're-branded' as consumers, they have many more and different 'needs'.

Some scholars argue that humanity has changed the geological state of the earth system, bringing about the so-called Anthropocene (Crutzen 2002; Ellis et al. 2016). However, this concept attributes responsibility for environmental degradation to humanity-as-a-whole and fails to encompass the historic accountability of certain members of humanity (Moore 2017). The term 'Capitalocene' places responsibility for the current planetary crises on capitalism, with the post-Columbus colonisation of the Americas as its starting point (Moore 2017, 2018). After all, this was the moment when some humans began the mass exploitation of other humans, above and beyond the use of animals and other 'natural resources'. This commodification of human life by European capitalists can be argued to have started the global embrace of capitalism which has, in turn, led to the spread of neoliberal and neo-colonial policies (Williamson 2009).

Current sustainability definitions accept the neoliberal market-based system as a given. The consistent message is that we must stop destroying the environment through extractive industry *while at the same time* increasing economic growth, especially in poorer countries. Ward et al. (2016) find that growth in Gross Domestic Product (GDP) is incommensurate with a decrease in energy use or in material consumption. As Adelman (2018) notes:

'...the point of departure for the goals should surely have been ecological sustainability rather than development. Starting with development as growth precludes ecological sustainability; starting with sustainability opens up a range of alternatives more likely to reduce poverty and promote social justice.' (Adelman 2018, p. 21)

## Sustainability and the SDGs

The concept of sustainability has existed for centuries, but different meanings have been ascribed to it over time. One specific interpretation is expressed by the term *sustainable development*, a concept which has been influential in the last few decades. It is defined as 'development that meets

the needs of the present without compromising the ability of future generations to meet their own needs’ (WCED 1987). However, the focus on ‘needs’ was rather general and did not specify *whose needs* and what they were, and did not acknowledge that needs themselves may change between generations (Redclift 2005). As discussed above, the neoliberal shift to a consumer society also redefines and stretches what many people consider to be ‘needs’. *Sustainable development* saw development as key to reducing poverty primarily in the unwallied world,<sup>1</sup> and, by extension, to reducing environmental degradation. However, more recent research has shown that many countries in the unwallied world are actually more *sustainable* than the EU countries (Lautensach and Lautensach 2013). This research found that many of the poorest African countries have sustainability quotients of under 1, whereas EU countries have sustainability quotients of up to 6. (> 1 is unsustainable in that a country’s ecological footprint exceeds the ability of the ecosystems within the country to regenerate what has been exploited and to absorb the pollution produced). It is clear, however, that unwallied countries are unable to ‘catch up’ with walled countries by relying on the current economic paradigm of neoliberal capitalism (Herr 2018). Indeed, catching ‘up’ is likely to exacerbate the problem as those with the highest incomes continue to disregard biodiversity (Kopnina et al. 2018).

However, the idea of sustainable development can actually be seen as an oxymoron, *sustainable* implying ‘maintenance of the current situation’, and *development* implying growth (Caldwell 1994, p. 193). Indeed, ‘development’ by any definition can be reduced to ‘external interventions aiming to exploit natural resources for the benefit of the economy’ (Germond-Duret 2022, p. 317). Although growth needs not to be purely material and can include growth in well-being or quality of life, the underlying capitalist ideology of economic growth as a part of development was not critiqued as destructive early on, and was actually adopted and reproduced by mainstream actors such as the UN (Tulloch 2013). As such, in many past and current discourses, *sustainability* and *sustainable development* are synonymous, and both terms have come to be conceptualised by the ‘three pillars’ (or overlapping or concentric circles) of ‘people, planet, and profit’ (Purvis et al. 2019). For an action to be deemed sustainable, it should consider the social, environmental, and economic aspects. This description has endured

until today and forms the basis for economic and environmental discourse and policy on sustainability. Most recently, the UN SDGs have formulated a ‘shared blueprint for peace and prosperity for people and the planet, now and into the future’ (UN 2015). While the economic aspect is no longer explicit in this definition, ‘prosperity’ is defined as ensuring ‘that all human beings can enjoy prosperous and fulfilling lives and that *economic, social and technological progress* occurs in harmony with nature’ (UN 2015; emphasis added). Kumi et al. (2014) argue that this economic progress enacted through neoliberal policies, such as privatisation and commodification, may actually obstruct attainment of the SDGs by increasing inequality, leading to adverse environmental outcomes (e.g., deforestation). Similarly, GDP-focussed neoliberal policies are written into some of the SDGs (Salleh 2016).

Many other aspects of the SDGs have received criticism. The most important point of critique, in our opinion at least, is that they are *anthropocentric* in nature (Adelman 2018), a fact which represents the predominant embedded worldview (Torpman and Röcklinsberg 2021). Anthropocentrism in this sense is the ‘idea that human interests, human goods and/or human values are the focal point of any moral evaluation of environmental policy and the idea that these human interests, goods and values are the basis of any justification of an environmental ethic’ (Katz 1999, pp. 377–8). The SDGs emphasise the distinction between people on the one hand, and nature and animals on the other. They also reinforce the views that nature is a commodity for human use and that humans have the right to exploit and dominate the natural world (Williams and Millington 2004); we should care about the environment for what it can do for us rather than for its intrinsic value (McCauley 2006). This anthropocentric view of sustainability is also problematic in that it assumes that we can rely on human ingenuity to solve environmental problems. In such a case, the focus then remains on technological development and maintenance of the status quo rather than transformational change. By refusing to acknowledge that “we live in a multi-species world of co-dependencies” (Cudworth et al. 2020, p. 268), we continue to exploit animals and other organisms. This increases the chances of the world approaching one of the tipping points that could lead to collapse of the earth system as we know it, for example with runaway global heating and ecosystem collapse (Lenton et al. 2019).

Recently, there have been calls for non-human animals to be included in the SDGs, by focussing on goals which are based on sentience in general rather than on being human only (Torpman and Röcklinsberg 2021). Sentience is defined here as “the ability of animals to feel and experience emotions such as joy, pleasure, pain and fear” (Proctor et al. 2013, p. 883). However, as we will argue below, sentience

<sup>1</sup> The dichotomy ‘developed–developing’ world is problematic as it suggests that the ‘developing’ world is in some way inferior; it also erases the role that the exploitation of some countries has had on the development of others (Khan et al. 2022). Instead of framing countries in terms of development or income, we will use the terms ‘walled’ and ‘unwalled’ world (Jacobs 2019) here as these incorporate an indicator of income, but also an indication that this income has been to some degree built on the back of exploitation.

itself is a contested term, and simply inserting it into the existing SDGs is likely to create as many issues as it solves.

## A sustainable decision-making framework

The argument that sustainability should be defined from an ethical perspective is not new. For example, Bañón Gomis et al. (2011) argue that sustainability should put the burden of responsibility on individuals and groups to ‘avoid deleterious effects on the environmental, social, and economic domains’ (Bañón Gomis et al. 2011, p. 176). This definition focuses on the relationship between the three domains but maintains the three pillars discussed above. As such, avoiding deleterious effects on the economic domain could be used as a rationale for continuing fossil fuel or mineral extraction. Missing from this definition is also the intergenerational perspective that was present in the original concept of sustainable development. Rawls (1999) considers how we would make ethical decisions if we were behind a ‘veil of ignorance’ from which we did not know our position or inherent characteristics. He argues that our decision-making would be more ethical if we did not know, for example, what colour our skin was, whether we were rich or poor, or from which country or generation we came (present or future). This veil could be extended to include the species to which such a hypothetical individual belongs, i.e., the non-human animal. This position is clearly distinct from how decisions are made today, with those in governmental power prioritising their own countries or alliances, and those in financial power focussing on maximising profit. Furthermore, most decisions in political spheres are made with the next election in mind, rather than focussing on potential voters that are not yet born.

Another important approach to defining sustainability involves humans eliminating their contribution to (1) emitting, polluting, and degrading nature, and (2) conditions that systematically undermine people's capacity to meet their needs (Johnston et al. 2007, p. 62). This definition approaches what we consider to be important in a definition of sustainability, namely, ethical considerations governing how we interact with nature (and fellow human beings). However, it does not capture the ethical treatment of the many animals which humans use to benefit their own lives on a daily basis. This definition also focuses on the negative aspects of an action and does not appear to include room for positive impacts.

Other knowledges, particularly those from some indigenous communities, can also provide an ethical basis for a definition. The so-called protocols by which many indigenous communities live are holistic attitudes which govern how an individual should act in a given situation (Whyte et al. 2016). For example, the Anishinaabek community

understands a complex moral relationship between people and living entities, non-living entities, other generations, and other aspects of their communities (Whyte 2017). Central to this relationship is the concept of *Baamaadziwin*—living in a good and respectful way—which connects the Anishinaabek to their place and community through generations (Mitchell 2013). While it is not possible or desirable to appropriate indigenous insight into our own definition, elements of indigenous knowledge and attitudes overlap with the concept of sustainability presented here.

We propose that rather than focussing on human needs and the traditional three pillars of people, planet, and profit, a definition of sustainability should embed all animals, both human and non-human, as a key factor. As such, our definition entails that in all decisions and actions on any scale, from the individual to the institutional, we should minimise our immediate and future negative impact on humans, other animals, and the planet, while maximising our positive impacts on these domains.

## Positive and negative sustainability

Our definition distinguishes between and encompasses two different aspects of sustainability. The first, negative sustainability, seeks to minimise impact on the three domains (humans, other animals, and the planet) in our decision-making. However, the position in which we find ourselves calls for more than merely minimising our current and future negative impact as many of the baselines which we accept have changed dramatically over the past years (Jones et al. 2020). *Shifting baseline syndrome* is the phenomenon by which previous conditions and states of a given ecosystem are ‘forgotten’, and the current state is taken as the baseline by the current generation (Jones et al. 2020; Pauly 1995). Given the widespread decline in the states of many ecosystems, this ‘generational amnesia’ can result in restoration efforts working towards what is perceived by the restorers as a natural state (notwithstanding that this state may in itself represent a degraded state). As such, we emphasise a second aspect of sustainability, positive sustainability, which seeks to maximise the positive outcomes for the three domains. For example, both positive and negative aspects are important to consider together when making decisions on land-use. Avoiding negative impacts on animals and the planet could involve ceasing intensive, chemical-based agriculture; positive sustainability would provide the rationale for preservation and large-scale rewilding projects which would improve living conditions for people and other animals, and also have a positive impact on the planet.

Positive sustainability in this sense is akin to the concept of reciprocity—that a reliance on nature for nutrition is compensated by safeguarding and giving back to nature (Maz-zocchi 2020). This concept is based on the idea that while

people are affected by their surroundings, they also have the ability to influence the ecosystems around them, and this interaction strengthens these natural systems (Salmón 2000). Many indigenous people practice versions of this concept, for example, *buen vivir* in Central and South America, *kaitiakitanga* in Māori culture, and *mino-pimatisiwin* for the Anishinaabek in North America (Mazzocchi 2020). Reciprocity of this sort is a concept that is missing from mainstream western thought; we hope that the emphasis on *positive sustainability* here facilitates the uptake of the concept in western society.

Some western scholars have also recognized the need for a form of positive sustainability. Reed (2007) illustrates three levels by which such positive sustainability can be enacted: restoration—restoring ecosystems to a healthy state, reconciliation—viewing humans as an intrinsic part of nature, and regeneration—participating in conservation as a part of nature. This final level moves far beyond how western cultures view and interact with nature, and its adoption would require drastic changes in mindset. In addition, the concept of positive sustainability has been introduced in the business literature in terms of life cycle analysis (LCA) (Kühnen et al. 2022); however, it was found that participants had trouble conceptualising positive sustainability. This suggests that a change from a conventional to a systemic mindset, as suggested in our framework, is necessary.

In contemporary western societies, negative and positive sustainability are qualitatively different: the first is *necessary* from an animal-ethics standpoint (see Korsgaard 2018), and the second is *highly desirable*. It is our position that freedom from suffering should be prioritised over increases in happiness. However, it seems likely that transformation to a stronger, more inclusive version of sustainability as presented here would require both positive and negative aspects of sustainability to be addressed.

## Humans

Society is a key word in most definitions of sustainability. Significant inequality exists between people, both within and between countries (WIR 2022). Raworth (2017a) suggests a doughnut economic model whereby in addition to the external planetary boundaries—the ‘ecological ceiling’—there exists an internal, lowest permissible standard of living that all people have the right to experience (see Fig. 1). This internal ‘social foundation’ includes access to food, water, education, and healthcare among its 12 categories. While it might be possible for humanity to obtain its physical needs without exceeding the ecological ceiling, meeting all aspects of the social foundation based on current consumption patterns would require resource use which is considerably

above ‘sustainable’ levels (O’Neill et al. 2018). O’Neill et al. (2018) conclude that:

If all people are to lead a good life within planetary boundaries, then ... provisioning systems must be fundamentally restructured to enable basic needs to be met at a much lower level of resource use. (p. 92)

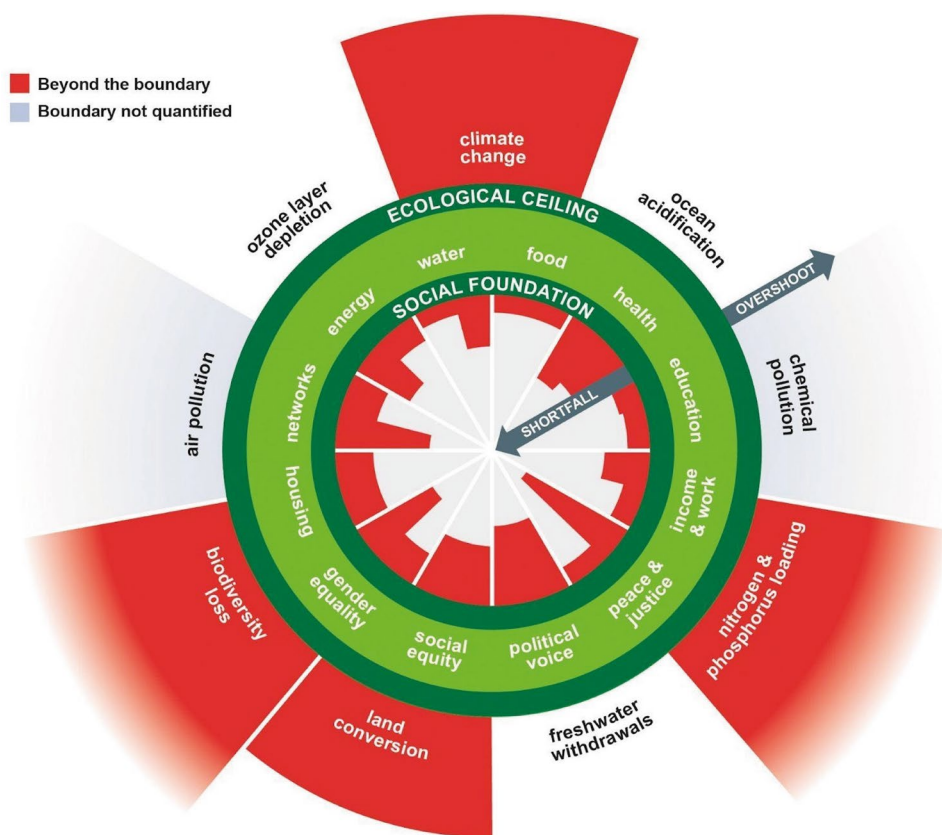
Such a restructuring clearly has significant implications for how our economic systems are designed. While shifting to a regenerative and distributive economy is suggested as a method by which to live ‘within the doughnut’ (Raworth 2017a), change needs to happen with more urgency than our current inflexible systems allow. As such, the immediate implementation of the decision-making framework introduced here could enable us to orient towards true sustainability within the current limits of the predominantly neoliberal capitalist system in which we live, while working towards a wider transformation.

## Other animals

Most definitions of sustainability do not explicitly include animals as self-standing moral entities that have their own interests. Instead, such definitions either see animals as wild and therefore a part of the natural world, or domesticated, and part of human society (Vinnari and Vinnari 2022). The SDGs are similarly anthropocentric in nature (Adelman 2018), with animals featuring only in goals 14 and 15, *Life below water* and *Life on land*, respectively, and animals used in agriculture implicitly featuring in goal 2, *Zero hunger* (UN 2015). Animals are frequently reduced to the abstraction *biodiversity*, and their connection to humans is discussed in terms of the *ecosystem services* they provide (Drury et al. 2022). Although animals play an intrinsic part (both directly and indirectly) in human lives (Harrison et al. 2014), they have been minimised to partial mentions within the SDGs.

In the ‘wild’ and domestic contexts, it is clear that humans influence animals to a great extent by destroying their habitats in the first case, and imprisoning and subjugating them to human will in the latter. The consequences of this domination are not only negative for the animals themselves, as discussed below, but increasingly also for humans. For example, habitat destruction entails a reduction in biodiversity (Díaz et al. 2019) and also leads to animals encountering humans in more contexts, leading to the spread of zoonoses (McMahon et al. 2018). Similarly, animal agriculture is estimated to be responsible for at least 13% of global greenhouse gas emissions (IPCC 2019; Xu et al. 2021), which is harmful for both human and non-human animals.

**Fig. 1** The doughnut economic model proposed by Raworth (2017a). The green portion of the model represents the safe space within which humanity should live. The inner 'ring' represents the social foundation—the minimum conditions in which all of humanity has the right to live. The outside of the doughnut represents the planetary boundaries that must not be exceeded in order that the earth system remains within its current set of conditions (Steffen et al. 2015). Image from Raworth (2017b)



It also leads to other types of pollution which impact the human health of those living near farms (Smit et al. 2014).

In addition to these human-centred ethical arguments, there are also animal-centred ethical arguments as to why animals should be included within a definition of sustainability. While most humans are *moral agents*—they “can be held morally responsible for their actions” (Brey 2014, p. 126), animals can be seen as *moral patients*—entities “that moral agents should take into direct consideration when they act” (Torpman and Röcklinsberg 2021, p. 4). As such, many animals can be considered to have *moral standing* in that they are sentient beings whose welfare we should consider for their sake as opposed to for some benefit which we can derive from them (Morris 2012; Schönfeld 1992). We agree with Korsgaard (2018) that what is good for humans is not good ‘absolutely’. For this to be the case, all other animals would have to also subscribe to this view of human exceptionalism. Korsgaard takes the view that what is important to an organism is tethered to the organism for whom a given action is important. This view is in line with that of the indigenous Mi’kmaq people who ‘frame animals as self-aware rational beings whose existence is for themselves rather than for us’ (Robinson 2014, p. 674). It is with the predominantly western concept of animal agriculture that we have distanced ourselves from such personhood of animals.

## The planet

While most definitions of sustainability do explicitly include the planet (e.g., people, planet, and profit), they tend to focus on *the environment*. This term in itself is problematic as it draws on the metaphor IMPORTANT=CENTRAL, which positions nature in relation to a human-centred position (Goatly 1996). In other words, the environment is the part of the planet which influences us (and other animals) rather than the planet as a whole (Bañón Gomis et al. 2011). Similarly, the term *ecology/ecological* refers to living systems but might not include other elements and minerals which make up the physical world. *Planet*, as in the whole of physical and non-animal subsystems that influence the life of humans and animals, reconciles these points and provides an inclusive term against which to measure our behaviour. *Planet* is also the term used by scholars when referring to the planetary boundaries which we must avoid exceeding in order for humanity to continue to ‘safely operate’ (Steffen et al. 2015). The fact that human actions have caused the planet to exceed at least three of these boundaries to date (Fig. 1) suggests that we need to minimise our negative impact with urgency, and also take actions which benefit the planet (i.e., the positive impact).

## The economy

A key difference between our framework and other definitions of sustainability is the absence of any overt mention of *the economy*. While economic factors play a key role in determining whether people can meet the social foundation (Fig. 1) and are central to transforming most of the systems in which we operate to move away from reliance on fossil fuels, the economy, as a non-living entity, does not have a stake in the decisions we make. While the planet is also a non-living entity, it is included in our framework for several reasons: (1) the planet contains living beings in the ecosystems and biodiversity it harbours. (2) There is only one planet, whereas many economic models exist. We can switch to a different form of economy, but not to a different planet. (3) The planet is a concrete object, while the economy is an abstract construct. The economy in most definitions is a haphazard sum of current economic activities, consisting of the trading of commodities and services that is undertaken for the benefit of the human stakeholders involved, especially benefiting a small minority of economic agents. The economy serves to benefit only a specific part of humankind in its current form while the planet provides the conditions for survival of all known organisms. Rather, economies should be viewed as mechanisms through which we enact change with our decisions. Another issue with using *the economy* as a term with the definite article ‘the’ implies that there is only one economy possible. While it may feel as though this is indeed the case, the market-driven neoliberal capitalist model that has become so pervasive in western societies (and increasingly globally) is merely one version of an economy. For instance, the post-war consensus in Britain that the state should be responsible for its population is another version (Gilroy-Ware 2020). The doughnut economic model (Raworth 2017a) and circular economies (Stahel 2016) are others. These other economic models are more conducive to long-term survival and prosperity for all who inhabit the planet than the infinite growth model that is prevalent today.

## Trade-offs between interests

An issue to be considered when working with our framework is what to prioritise when there is a conflict between choices. These trade-offs emerge both inter- and intra-generationally between the three key aspects of the framework: people, other animals, and the planet. For example, there is a conflict between current and future human population size and land use. As human populations have increased, natural (wild) animal populations have decreased because of human pressure on the land to produce food and to accommodate people and industry (Verdade et al. 2012; Krief et al. 2017). As such, it

is important to examine the ethics which underlie decisions surrounding our relationship with the land, which are important in determining how we produce food. Leopold (1949) argued that we should consider the natural world as an intrinsic part of our community as our outcomes are interlinked. His ‘land ethic’ “changes the role of *Homo sapiens* from conqueror of the land-community to plain member and citizen of it” (Leopold 1949, p. 240). This echoes indigenous concepts of caregiving and interconnectedness with nature (Mazzocchi 2020). Such eco-consciousness is mostly absent from our daily interactions in western societies; if anything, our current lifestyles are distancing us further from any real connection with nature (Kesebir and Kesebir 2017). Fostering empathy with the natural world at different scales can help to instil more of a ‘land ethic’ in everyone, which could also have benefits for human well-being (Jax et al. 2018). Promoting eco-consciousness over anthropocentrism would help make more salient the impact that our choices have on the planet. A land ethic could be employed by a variety of stakeholders, from farmers who produce our food, to individual consumers.

Other key trade-offs occur between people and other people. Humans rely on belonging to a community to survive; however, the market-driven economy has to some extent changed how we interact with the concept of community, frequently positioning us as individuals who must compete with everyone else to ‘succeed’ (success here taken as accumulation of wealth). This competition in turn reinforces the idea that we are alone in the world and, as individuals, solely responsible for our own outcomes (Monbiot 2017). The view of humans as rational decision-makers that forms the core of the neoliberal ideal suggests that we will prioritise our own gain over that of others. This view is illustrated by the prisoner’s dilemma (Box 1), whereby the optimal individual response is suboptimal for both parties. This can lead to a *Tragedy of the Commons* effect (Hardin 1968), such that certain individuals reap the benefits of an action with environmentally destructive consequences, whereas the costs are shared between the whole population. In other words, the utility to the individual is maximised, but the negative externalities are shared. Current examples of the Tragedy of the Commons include overfishing (Hsu 2005) and air pollution from private transportation (Spiliakos 2019).

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Box 1: The Prisoner’s dilemma (Gardiner 2001)

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Two bank robbers have been arrested and are kept separate during their questioning by police and do not have a chance to consult about their decision. Each robber has two options: to keep quiet or to testify against the other robber. The prison time for one of the robbers is determined as follows:

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**Box 1: The Prisoner's dilemma (Gardiner 2001)**


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- Robber 1 testifies and Robber 2 doesn't; Robber 1 goes free (Robber 2 gets ten years)
- They both remain silent and do not testify: they both get 1 year
- They both testify: They both get 5 years
- Robber 1 remains silent and Robber 2 testifies: Robber 1 gets 10 years (Robber 2 goes free)

For every response of Robber 2, the optimal response of Robber 1 is to testify (i.e., Robber 1 gets 5 years in the event that Robber 2 testifies and goes free in the event that robber 2 remains silent). As such, acting as a rational individual agent does not bring the most beneficial outcome for both parties that would have been achieved with a collective rationality (i.e., they both remain silent and both get 1 year).

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Two approaches are possible to overcome the Tragedy of the Commons. The first entails that regulation from the top down is more effective than individual action; policy and regulation ensure that both companies and individuals work to limit their impact (Johnson 2003). This view assumes that companies will not voluntarily reduce their emissions or polluting as to do so puts them at a competitive disadvantage, and that individuals under some version of the tragedy of the commons will not do so either. This view also assumes that the political and economic systems within which we are embedded remain as they are now. The second suggestion is that of transformational reform to these systems, from a growth and commodity-based economy to a commons-based social model, supplemented with group action in everyday life (Hansen et al. 2016). The key to this transformation would be to avoid founding the society on separate forms of wealth (as in the current system).

Another trade-off that would need to be reconciled is the conflict between current and future generations of people. Both Rawls (1999) and Kibert et al. (2011) advocate for inclusion of future generations within our current decision-making. By doing so, we are less likely to overexploit non-renewable resources, which could contribute to the well-being (or indeed survival) of future generations. In addition to resources being drained, the consequences of our current extractionist paradigm leave substances, in the form of pollution, novel entities, and greenhouse gas emissions, for the future generations to deal with. Indeed, it could be argued that these by-products of our consumption will place a greater burden on future generations than on our own. This takes the Tragedy of the Commons a step further, as future generations have absolutely no control over the degradation of the commons which precedes them (Gardiner 2001).

As the focus of this paper is the inclusion of animals into a definition of sustainability, the trade-off between people and another animals is discussed in detail below.

## People and other animals

The interests of people and other animals frequently clash, as is the case with animal agriculture. Drawing on Torpman and Röcklinsberg (2021), one could use the concept of sentience in deciding how to act in a given situation; sentient animals would hold preference over (plausibly) non-sentient ones when deciding to minimise our impact. The greatest challenge the inclusion of sentience brings, however, is how to determine whether an organism is sentient or not. While criteria exist to determine beyond doubt whether a given animal experiences pain (e.g., Sneddon et al. 2014), collating all this information for every species is not practical or realistically achievable. As such, we propose using a version of the precautionary principle in which, unless proven otherwise, animals are assumed to be sentient. As our framework would also principally preclude invasive testing to prove (or disprove) sentience, it then holds that the vast majority of creatures, including invertebrates such as insects, many of whom for which sentience has been shown but whom are not traditionally considered sentient (Lambert et al. 2021), would be subject to our moral consideration as sentient beings as discussed above.

The inclusion of sentience does not entail that (plausibly) non-sentient organisms are excluded from our decision-making. We propose a hierarchy in which sentient creatures sit at the top, followed by (plausibly) non-sentient creatures, then living non-creatures (such as plants), to non-living entities at the bottom. Non-sentient creatures, but also living non-creatures do have interests, such as continued existence (Humphreys 2020; Schönfeld 1992); and many humans agree on that as evidenced by the *Last Man* and *Planet Flora* thought experiments (Box 2; Attfield 2020; Routley 1973; Scherer 2017). It may be important to note that more abstract assemblages such as *species* or *ecosystems* would not fall under the category of 'animals' as understood here, as they do not directly have moral standing (introduced above) (Attfield 2020). Instead, ecosystems and species would fall under the 'planet' category under the planetary boundaries of biodiversity loss and deforestation. Inclusion in this category nevertheless implies the necessity for their conservation as both species and ecosystems more widely are essential in the functioning of our biosphere which ultimately houses all life on earth (Reichstein et al. 2014; Enquist et al. 2020).

Box 2: Two thought experiments (Attfield 2020; Routley 1973; Scherer 2017)

#### The Last Man

The Last Man thought experiment supposes that all humans except one have died. That remaining human then painlessly kills all remaining life on earth. As these actions have no impact on any human (other than the doer), there is no explanation in the traditional ethics for why this action is wrong. However, the fact that it feels intuitively as though these actions are wrong indicates the presence of an environmental ethic, and that there is an intrinsic value to living non-creatures.

#### Planet Flora

Planet Lifeless and Planet Flora are two planets which lie out of view (even with a telescope) from earth. Planet Lifeless is devoid of any sort of life, but Planet Flora contains photosynthesizing, reproducing, but sedentary organisms. The thought experiment argues that while we would have no ethical issue with destroying Planet Lifeless, it would be more ethically wrong to destroy Planet Flora.

A widespread example of a human–other animal trade-off comes in the eating of animal products. Although large-scale animal agriculture currently provides around 60% of protein intake in the global north (Bradford 1999; WUR n.d.), it is theoretically possible to provide all protein for the world population through plant-based foods (Jacobsen et al. 2015; Ritchie 2021), and even emerging technologies such as lab grown meat (Mattick 2018). Our framework would also cease the rapidly developing exploration of insects as a food source, rather than simply extending existing guidelines for animal welfare to insects (van Huis 2021). However, it is not necessarily the case that all people can immediately switch to a meat-free or vegan diet. For example, nomadic herders in Mongolia rely on the yak for food and labour; inclusion of other crops does not fit their nomadic lifestyles (Geary 2011). Similarly, the Iñupiat from Arctic Alaska rely on whales for sustenance as the conditions in areas where they live preclude agriculture (Sakakibara 2013). In such cases, minimising impact on their communities to ensure their survival is likely to come at the expense of some animals. This opens up an interesting discussion as although such indigenous communities have far less planetary impact than people in western societies, these communities do have a negative impact on the animals they kill for sustenance. Under our framework, this would be deemed unsustainable.

Interestingly, a capitalocentric perspective reveals that animal colonialism is closely connected with the post-Columbian colonisation of some indigenous communities (Krásná 2022; Moore 2017). An example is the milk colonisation that has been forced on many communities, condemning them to live within the western agricultural system (Cohen 2017; Robinson 2014). Our framework denounces western animal agricultural practices and suggests minimising our impact on (1) the animals by not constraining and killing them, and on (2) the planet, by not devoting swathes

of land (at the expense of natural forests) to animal agriculture operations that produce greenhouse gases and other types of pollution.

Of course, switching away from animal agriculture also requires transformational change of the farmers involved, and as demonstrated by the 2022 farmer protests in the Netherlands, opposition is likely to be vociferous (Boztas 2022). However, by ensuring that in transitioning away from current practice farmer welfare is improved, such opposition could be overcome in the medium term. The European Union Common Agricultural Policy—responsible for farm subsidies—has the potential to largely dictate how agriculture is conducted, but despite recent platitudes of greening, the EU block has resisted transformational change (EEB/BirdLife Europe 2022a, b). As such, radical policy change and both financial and educational support for farming communities would be needed to adopt sustainability as described here. Many farmers consider themselves locked into their current practices which they have inherited from previous generations (Meynard et al. 2018). For example, they frequently have large outstanding loans for infrastructure, and much of the communication around farming methods (including in education) centres around the ‘economies of scale’ concept, promoting larger farms and larger investments (Drury 2020). In these cases, the farmers may feel unable to make the choice to farm in a more ecologically friendly way. As such, governments would have to act to minimise farming impact on animals and the planet. This could come with the two-pronged approach of writing off loans or subsidising beneficial on-farm practices on the one hand, and strictly regulating (and enforcing) animal numbers and emissions on the other as a bridge to complete abolition of animal agriculture. As in many aspects of applying our framework, change is possible overnight, but it is likely to be heavily contested while the current economic paradigms are so prevalent in mainstream media and policy. This point adds more weight to our decision to remove ‘the economy’ from our definition of sustainability—we are advocating for a step away from mainstream western thought on the concept of economy.

## Recommendations

### Information and knowledge

There are two main conditions that need to be met in order for politicians, businesspeople, and the general public to be able to act in accordance with our framework. The first is *access to information* about the impact of a given choice, whereby people in their role as consumers can evaluate and compare the impact that a given product or

service has on people, other animals, and the planet. However, there comes a point at which it is unreasonable to be able to accurately quantify such information, such that it is accessible to everyone. The second condition, therefore, is that everyone has a *general knowledge of sustainability*, such as to be able to draw their own informed conclusions from the information that is available.

## Information

Ensuring that everyone has access to information which allows them to make a balanced comparison between available choices in all activities is an important part of democratising decision-making and implementing our framework. Currently, for those who take just a passing interest in such things, little or no information is readily available on the impacts a product has. To people willing to take a deeper dive, a LCA can provide some finer grained detail on at least some aspects of impact. LCAs evaluate the environmental impacts of products throughout their ‘lives’ and include supply chain impacts. However, LCAs are complex to produce and then best used to draw comparisons between similar products or solutions (Curran 2013; Lee et al. 1995). LCAs typically only take the environmental impact into account, and do not attempt to quantify impacts on animals or other people. While social LCA (S-LCA) is an attempt to remedy this latter point, inconsistencies in definitions and methodology still exist (Petti et al. 2018).

What is needed is a method by which to evaluate the impacts of a given choice in all three categories. To the best of our knowledge, no such thorough system currently exists. Companies could (be forced to) produce LCAs for all products to account for the planetary impact, and any humans and/or other animals affected in the supply chain could be included. The output for this could result in a label on products which demonstrates the three impacts. It could also include aspects of positive sustainability such as habitats restored, and restorative farming practices used. The issue with these systems is that they are not overly transformational—they would allow consumers to choose between types of product (i.e., compare which can of beans has the least impact), but do not go far enough in transforming the diets of consumers. A top–down approach here would be regulation on products whose negative impact on the three domains is too high and could also include incentives for lowering the impacts involved.

## Knowledge

In addition to information, people also need a basic knowledge of sustainability as a concept. A key element of sustainability knowledge is ‘recognizing systems complexity’ (Miller et al. 2011, p. 179), which is important

in understanding the nature of the wicked problems that face us (Rittel and Webber 1973). For example, peatlands are often restored to re-establish their function as carbon sinks; however, at least in the short term following rewetting, these peat bogs often become carbon sources due to high methane production, and the process can lead to a degradation in ecosystem functioning (Hahn et al. 2015). Other adaptation strategies may lead to maladaptation: when adaptation strategies make the situation worse (Schipper 2020). For example, in Fiji, the construction of seawalls against sea-level rise resulted in increased flood risk from inland floods as the walls blocked the exit of the water to the sea. The walls also affected distribution of sediments, which had knock-on effects to people along the coast, and adversely affected the marine ecosystems in these areas (Piggott-Mckellar et al. 2020). Given the interconnected nature of the three elements in our framework: humans, animals, and the environment, at least some understanding and knowledge of complex systems is important in determining the impact that a choice might have.

Of course, the tricky part here is introducing the mechanisms which would enable such knowledge to be disseminated. A logical start would be at the level of education. In order for education to be improved so as to help the acquisition of sustainability knowledge of the type commensurate with our framework, the current focus on technological and scientific solutions (often the product of siloed research disciplines) should change. Marouli (2021) argues that this shift should incorporate ‘knowledge about nature/ecosystems and technology but also [ask] critical questions about society, economy, and politics’ (p. 2907). A subsequent *eco-pedagogy* should combine ecological and societal knowledge with critical, allowing learners to critically evaluate the systems in which they are embedded, and gain a better understanding of the impacts that their decisions have (Kahn 2008). It would also centre around the concept of empathy towards humans, other animals, and perhaps also nature (Horsthemke 2020).

This section supposes that people would take up this sustainability ideal of their own volition. Of course, resolving the current socio-ecological crises requires both a top–down and a bottom–up approach. As such, the definition presented here would include decision-making by policy makers. At a certain point, top–down regulation of companies and products which violate our definition should be enacted into law, thus restricting the choices that consumers have to make. Recognition of this definition in developing policy goals would accelerate action and reduce our combined impacts forthwith.

## Conclusion

In conclusion, current definitions of sustainability and sustainable development are not fit for purpose; they reinforce the dominant capitalist paradigm of economic growth as a goal, a system which has contributed in no uncertain terms to the current state of the planet. Instead, we propose that sustainability is primarily an ethical issue which connects people, the planet on which we live, and the animals and other organisms which inhabit it. Our definition of sustainability states that in all decisions and actions on any scale, from the individual to the institutional, we should minimise our immediate and future negative impact on animals, the planet, and other humans, while simultaneously maximising our positive impacts on these domains. This distinction between positive and negative sustainability and the inclusion of animals come as significant departures from the current mainstream ways of thinking about the topic.

Our definition serves to contribute to the current discussions on sustainability and would work towards alleviating the serious ecological crises that are currently underway. It also serves as a blueprint for the future, which could see policies developed which require companies to take responsibility for their supply chains and communicate their impact on the three categories to consumers in a clear, unified metric. Further research could collate the existing information, perhaps using AI, to produce a simple form which could be used to assess and compare the impacts of given purchasing decisions, while also suggesting alternatives. Although this provision of information can be viewed as reinforcing the market-driven status quo, a change in education to reflect systems complexity thinking and a move to an eco-pedagogy could serve to shape decision-making in a more transformational direction.

**Data availability** Data sharing is not applicable to this article as no new data were created in this study.

## Declarations

**Conflict of interest** The authors did not receive support from any organization for the submitted work. In addition, the authors have no competing interests to declare that are relevant to the content of this article.

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