Human-elephant coexistence through aligning conservation with societal aspirations

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ABSTRACT

Nature's contributions to people diminish when people are alienated from nature. We developed a framework to help support more sustainable people-nature interactions in the context of the conservation of African elephants (*Loxodonta africana* and *L. cyclotis*). Elephants are iconic, and ecologically, culturally, and socio-economically important, but are also competing and in conflict with people who still benefit little from elephant conservation. We demonstrate how this framework can be used to address challenges over elephant conservation and management, and help achieve human-elephant coexistence, by (i) balancing integrity of nature with social cohesion and human wellbeing, and (ii) moderating the use of nature through widely accepted values, aspirations, and rights. The framework provides mechanisms for policymakers and managers to improve existing community-based conservation initiatives, promotes equitable policies for elephant conservation, and can be applied to the conservation of other iconic species that pose management challenges.

1. Introduction

Nature plays a crucial role in securing, maintaining, and enhancing peoples' life quality for current and future generations (Chaplin-Kramer et al., 2019; Díaz et al., 2018; Guerry et al., 2015). Natural resources (i.e., the world's stock of natural assets including soil, air, water, animals, and plants) provides important ecosystem services (e.g., pollination, carbon sequestration), which sustain human wellbeing in everyday life (Díaz et al., 2018). However, human activities are responsible for the global loss in biodiversity, and this is reducing ecosystem services and affecting human well-being (Bradbury et al., 2021; Chaplin-Kramer et al., 2019). By 2050, it is estimated that up to 5 billion people, particularly in Africa and South Asia, will be at risk of experiencing diminishing ecosystem services (Chaplin-Kramer et al., 2019). Strategies to reverse downward trends in ecosystem services may achieve positive outcomes, but may not be sustainable when continuing human activities are still conflicting with conservation efforts (Kareiva, 2014; Marvier, 2014; Tallis et al., 2008). The development of Biodiversity Value Chains (BVC) can enhance the benefits of nature and support the

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implementation of sustainable conservation actions, therefore helping achieve global agreements (e.g., the Sustainable Development Goals) (De Leeuw et al., 2018). However, local voices are often ignored, and the benefits of nature rarely fully reach the social domain (Büscher and Fletcher, 2019; Büscher et al., 2017; Dowie, 2009; López-Bao et al., 2017). To enhance the effectiveness of conservation actions, it is essential that local communities are an integral part of such strategies (Büscher and Fletcher, 2020), and that they are aligned with broader values and aspirations (Kenter, 2018).

Elephants are charismatic, sentient, complex, and intelligent beings (DEAT, 2008; Di Minin et al., 2013; Lötter, 2016), and have great existence value, even for people whose experience with elephants is restricted to books or screens (Alexander, 2000; Wang et al., 2020). As an umbrella species, elephants help conserve their habitats and a large variety of co-occurring species (Albert et al., 2018; Roberge and Angelstam, 2004), and they strongly influence the structure and functioning of ecosystems, acting as ecological engineers (Berzaghi et al., 2019; Poulsen et al., 2017), for instance by dispersing seeds and recycling nutrients (Bunney et al., 2017). As a flagship species (i.e., species that have the ability to generate support for conservation), elephants provide a substantial source of income, and represent an intense focus of planning, management, and large conservation investments (Biggs et al., 2008; Di Minin et al., 2022; Naidoo et al., 2016; Walpole and Leader-Williams, 2002).

Elephant conservation and management strategies can be contentious, and discussions are often polarised as views and values of stakeholders diverge widely. First of all, there are ongoing debates as to whether elephants have adverse effects on biodiversity, for instance by impacting trees (Asner et al., 2016; Henley and Cook, 2019). Secondly, contention arises around access to, and property rights of, wildlife, often placed in the hands of national governments, conservation authorities, or wealthy individuals, and excluding local communities who bear the brunt of living with elephants (Brockington and Igoe, 2006). It is evident that elephants may be abhorred by the people who live alongside them due to increasing human-elephant conflicts (HEC), while the general public greatly admires them and is willing to pay just for seeing them (Thomas and Mmopelwa, 2012). The third point of contention centres around the illegal killing of elephants for their ivory; which may be the most extensively debated and reported global conservation issue (Biggs et al., 2017). Finally, elephants are the subject of animated international, multilateral, and media discussions when they are hunted (e. g., Botswana's recent reversal of the elephant hunting moratorium (Di Minin et al., 2021a; Mokobela et al., 2019)), culled for management purposes (Owen-Smith et al., 2006), or held in captivity for entertainment purposes (Baker and Winkler, 2020 and resulting commentaries; Schmidt-Burbach et al., 2015).

To facilitate a shift towards an integrated conservation approach, we propose the Towards a Unified System of Key Environmental Relations (TUSKER) Framework to align the conservation of African elephants with societal aspirations. The present study (i) discusses the consequences of disconnected natural and social systems in the context of the African elephant; (ii) introduces the TUSKER framework to balance integrity of nature with social cohesion and human wellbeing and moderate nature use through the global social compact, and (iii) applies the framework to the case study of the African elephant. A social compact is an agreement among various societal stakeholders about norms, values, aspirations, and ethics, outlining the duties and rights of each party (Haywood et al., 2019). These agreements are consolidated into constitutions, charters, or conventions, such as the Sustainable Development Goals (SDGs), the Convention on Biological Diversity (CBD), the African philosophy Ubuntu, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), and the UN Declaration on Rights of Indigenous Peoples. Specifically relevant to elephants are the African Elephant Action Plan, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and South Africa's recently drafted Policy Position on the Conservation and Ecologically Sustainable Use of Elephant, Lion, Leopard and Rhinoceros (DFFE, 2021). Policymakers and managers can apply the TUSKER framework to assess the broader implications of conservation decisions, and align conservation with societal aspirations. The purpose of the framework is to facilitate meaningful human-elephant coexistence, enhance the participation and benefit-sharing of local communities, and help restore the full value that elephants have for nature and people.

2. Current conservation challenges

2.1. Ecosystem Disservices: Increased risk of human-elephant conflicts

Many areas across Africa are at potentially severe risk of HEC (Di Minin et al., 2021b). Kavango-Zambezi Transfrontier Conservation Area, home to half of the world's elephant population in Southern Africa, reported widespread crop damage by elephants which significantly reduced food security (Salerno et al., 2021). In the Eastern Okavango Panhandle in Northern Botswana, a HEC hotspot area, local communities compete with over 11,000 elephants (Cassidy and Salerno, 2020; Pozo et al., 2017). HEC-motivated policy changes have recently been proposed in Southern African countries. For instance, one of the objectives of the auction of 170 live elephants in Namibia was to reduce HEC (MEFT, 2021) and South Africa's policy position has a strong focus on enhancing human-elephant coexistence (DFFE, 2021). To mitigate the threats of HEC to elephants and local communities, integrated, proactive solutions are needed, as opposed to reactive and disconnected solutions (Ceauşu et al., 2018; Shaffer et al., 2019).

2.2. Disconnected natural and social systems

Disconnected approaches are defined here as approaches that do not integrate the natural and social systems. The impact of disconnected natural and social systems on overall sustainability is visualised through assessing the elephant BVC. In conventional conservation practices, the value flow is often blocked by a physical or figurative 'fence' that separates the natural and social systems. The elephant BVC starts at the left at biodiversity (e.g., elephants as a key species), which forms part of the ecological infrastructure (e. g., elephant habitat for ecological communities, trees for shade, rivers for nutrient flow, corridors for dispersal), and provides

ecosystem services (e.g., carbon storage in trees, clean air and water safeguarded in elephant habitat), or ecosystem disservices (e.g., natural disasters such as floods, human and livestock diseases, human-wildlife conflicts) which affect the social system. The social system here stands for the benefits people derive from biodiversity through direct or indirect use (e.g., ecotourism, recreation, medicine), non-use (cultural, social, spiritual and intrinsic values), and societal outcomes (e.g., wealth, health, wellbeing, cohesion), as well as the potential negative impacts of nature on humans (e.g., loss of life, stress, anger, loss of income, crop damage). The flow of the value chain goes in both directions: from left to right reflects nature's benefits to people, which are expected to generate positive societal outcomes, and contribute to multiple societal goals. The flow from right to left represents investments and mitigations required to enhance biodiversity, sustainability, and coexistence.

Conventionally, protected areas tend to focus on the natural system as if it exists in isolation, for instance when strictly protected areas exclude local communities, or when nature is perceived as separate from people (Büscher and Fletcher, 2019), or on the exclusive management or conservation of elephants (e.g., African Elephant Action Plan objectives are all framed around the natural system, and the reduction of conflict prioritises the protection of elephants (CITES, 2010); Norms and Standards for the Management of Elephants in South Africa all focus on elephants and their habitat (DEAT, 2008); all six main objectives of Kruger National Park's Elephant Management Plan focus on the natural system (Ferreira et al., 2012). By excluding the social system, such conventional conservation approaches do not consider the entire value chain. Few benefits reach local communities that bear the brunt of HEC, while the impact of disservices increases (e.g., frustration and anger over HEC increase when local communities are excluded from decision-making processes or from access to natural resources, which can lead to poaching, retaliatory killings, resentment, or human dispute) (Ceaușu et al., 2018; Goldman, 2011; Tallis et al., 2008). This increases risks and threats to both the natural (e.g., poaching, habitat degradation, over-exploitation, loss of local support for conservation) and the social system (e.g., inequality, crime, power imbalances, social conflicts).

2.3. Poor socio-ecological outcomes

Conservation approaches that focus on *the natural system* in isolation (e.g., protectionist conservation), without sufficient attention given to the societal context, will likely fail to ensure long-term results, as no incentives are created for local communities to conserve nature, nor for the broader society to prioritise nature over other land uses (Amit and Jacobson, 2018; Büscher et al., 2017; Dowie, 2009; Dudley et al., 2018; Hutton et al., 2005). Conservation approaches that focus on *the social system* in isolation may also pervert overall outcomes, as it may motivate people to exploit resources for self-interest and short-term economic gain, leading to the tragedy of the commons and depletion of natural resources (Hardin, 1968). Poor social outcomes resulting from disconnected natural and social systems are in conflict with, for instance, the intent of the UN Declaration on the Rights of Indigenous Peoples, and with SDG 10 (reducing inequality), and SDG 16 (peace, justice, and strong institutions). Policymakers and managers should consider that half of the SDG targets related to poverty, hunger, health, water, cities, climate, ocean, and land are negatively affected by the decline in biodiversity and ecosystem services (IPBES, 2019), and who it is that experiences the costs and benefits of conservation solutions. A disconnected system can increase consequences of scaling effects, which can lead to complex conservation trade-offs and resulting dissonance when issues of scale are not considered. For instance, conservation solutions may be effective on local levels, while they can have range-state-wide detrimental impacts (e.g., proposals by one country to sell ivory internationally can increase poaching rates in other countries where monitoring or protection is less viable) (Van de Water et al., (in prep)).

2.4. Elephant examples of disconnected conservation approaches

In order to conserve elephant habitat in Mozambique, it has been proposed to resettle people living in the Great Limpopo Transfrontier Conservation Area and to restrict traditional land-use practices (Spierenburg et al., 2006). By implementing an exclusionary and militaristic approach, this strategy can create challenges in the form of violation of human rights, social inequality, undermining of local incentives to conserve wildlife, and compromised overall sustainability (Booker and Roe, 2017; Büscher and Ramutsindela, 2015; De Leeuw et al., 2018; Duffy et al., 2019; Witter, 2013).

In South Africa, the Elephant Management Plan of Kruger National Park (KNP) integrates natural and social values, for instance by providing local communities with access to some of the benefits of the park (e.g., employment and business opportunities, free or facilitated access to KNP, environmental education, natural resource harvesting, meat donations), and establish partnerships that foster equity redress (Ferreira et al., 2012; Swemmer et al., 2017). The elephant population of KNP has grown significantly since a moratorium was placed on culling elephants in 1994 (Owen-Smith et al., 2006). KNP proposes innovative initiatives addressing the cause of local overabundance of elephants rather than simply the symptoms, such as through range expansion by removing fences between KNP and adjacent reserves in South Africa and Mozambique. However, the KNP Elephant Management Plan can be improved based on other aspects of the social compact, for instance where it proposes a landscape of fear through lethal shooting and elephant pitfalls intended to provoke distress calls from trapped elephants to scare others (Map 8, Table 4, Box 15 in (Ferreira et al., 2012)). This ignores principles of good governance, as it does not comply with the Norms and Standards for Management of Elephants in South Africa (DEAT, 2008), which prohibit intentional disturbance of elephants to change their ranging behaviour (Amit and Jacobson, 2018). Moreover, it proposes illegal activities in terms of the South African Animals Protection and Meat Safety Acts, and contradicts the global standards for the slaughter of animals of the World Organisation for Animal Health (Slotow et al., 2021). These regulatory documents encapsulate the social compact that protects the welfare and wellbeing of elephants, and safeguards the moral responsibility of people, in line with the environmental human rights, as established in the South African Constitution (National Council of the Society for Prevention of Cruelty to Animals v Minister of Environmental Affairs and Others, 2017).

Botswana is known as an African success story, with a culture of democracy, public consultation, and equitable access to natural resources (Madzwamuse et al., 2020; Mogomotsi et al., 2018). As a result of Botswana's conservation success, and movement of elephants across national boundaries, Botswana currently supports the largest elephant population in the world (Junker et al., 2008; Lindsay et al., 2017; Thouless et al., 2016). Despite the many positive results, the conservation approach in Botswana can still improve on the social compact side. Control of wildlife and other natural resources, and community beneficiation, remained centralised, limiting the control of community-based conservation (CBC) governance structures over resources and the impact they can have on supporting livelihoods (Cassidy, 2021). Almost half of the interviewed residents of the Okavango delta stated that they engage in poaching for subsistence reasons, that they had no interest in participating in anti-poaching efforts, and that they had negative attitudes towards wildlife due to lack of consultation, access, or ownership (Cassidy, 2021; Ceauşu et al., 2018; Drake et al., 2021; Mogomotsi et al., 2020). Without adequate community-level governance and beneficiation, fair and sustainable outcomes are not likely to occur (Cassidy and Salerno, 2020; Di Minin et al., 2022; Drake et al., 2021). The example from Botswana illustrates an issue of scale (national vs household income), as the top-down approach of community trusts solely disbursing funds managed by the central government tend to manage the social implications of conservation poorly, undermine good governance, and risk alienation of communities from wildlife conservation (Drake et al., 2021; Mogomotsi et al., 2018). This has been exacerbated by the lifting of the moratorium on elephant trophy hunting in 2019 (Wasser and Gobush, 2019). Elephant trophy hunting has a long history in Botswana, and is promoted as an important tool for community beneficiation (Mbaiwa, 2018). However, it is not clear how revenue from trophy hunting will provide adequate, long-term benefits for affected communities, or how inequity in the distribution of money will be avoided (Dellinger, 2019; Di Minin et al., 2021a; Wasser and Gobush, 2019). In terms of risks to the natural system, the commercialisation of hunting and problem animal control may result in the extinction of older bulls, which could degrade the genetic health of elephant populations (Selier et al., 2014; Shaffer et al., 2019). Looking at the risks to the social system, trophy hunting converts wildlife into a commodity which opens the door to short-term, individually motivated behaviour (Bilchitz, 2017; Mkono, 2019). Although Botswana's Community-Based Natural Resources Management approach does contribute to poverty alleviation and job creation (Chevallier and Harvey, 2016; Mbaiwa, 2018), a solution that solely depends on single-source economic systems, such as the sale of licences to a small group of wealthy hunters, is not likely sustainable (Hackel, 1999; Kansky et al., 2020). A neoliberal system with neocolonial characteristics could exacerbate risks related to power dynamics and inequity in distributing benefits gained from wildlife (Büscher and Fletcher, 2020; MacDonald, 2005; Mkono, 2019; Wasser and Gobush, 2019). Moreover, trophy hunting alone cannot offset the costs of coexisting with elephants (e.g., injury or death, crop losses,or infrastructure damage), and thus generate a net benefit to communities, which hunting conservation models often aim for (Drake et al., 2021). The global and local debates about lifting the trophy hunting moratorium reflect concerns over violating the social compact, including the traditional African social compact Ubuntu
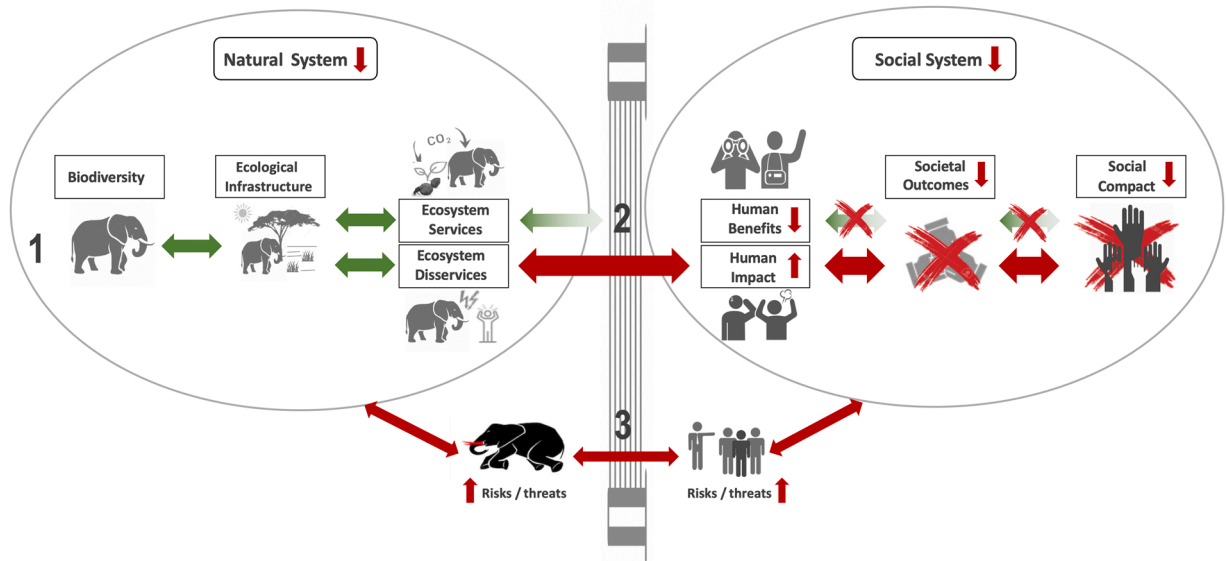

Fig. 1. Visualisation of the Biodiversity Value Chain (BVC) (1) (green arrows) in a disconnected socio-ecological system, the blockage symbolised by a fence (2), whereby the value of biodiversity does not reach the social system. Green arrows represent beneficial pathways, and red arrows represent negative pathways. The barrier blocks the flow of ecosystem services (2) (green arrow blocked by the fence), and may even increase the negative impact of ecosystem disservices such as human-wildlife conflicts or diseases (enlarged red arrow crossing the fence) (Ceauşu et al., 2018). This increases risks and threats to the social system (e.g., inequality, crime, power imbalances) which, in turn, increases risks and threats to the natural system (3) (red arrows). Increased inequality and reduced social cohesion motivate individuals to exploit resources for economic gain to the utmost, such as by poaching (Dowie, 2009). This leads to the tragedy of the commons (3) (red arrows), which occurs when people act purely out of self-interest and short-term gain, to the extent of causing harm to others and the environment (Hardin, 1968). The end result is the depletion of natural resources and a breakdown of the social compact (Berkes, 2006; Hardin, 1968). The disconnected 'Natural Systems' and 'Social Systems' are depicted at the two sides of "fence" (i.e., people are seen as separate from nature), and apply to 1 and 2 as well as the feedback loops at 3.

([Mkono, 2019](#)).

3. TUSKER: a framework that links elephants and human wellbeing

To align elephant conservation decisions with societal values and aspirations and facilitate meaningful human-elephant coexistence, the TUSKER framework was developed ([Fig. 2](#)). TUSKER is based on an inclusive conservation vision that integrates natural and social systems, in which elephants contribute fully to socio-ecological sustainability through removing barriers, and through applying
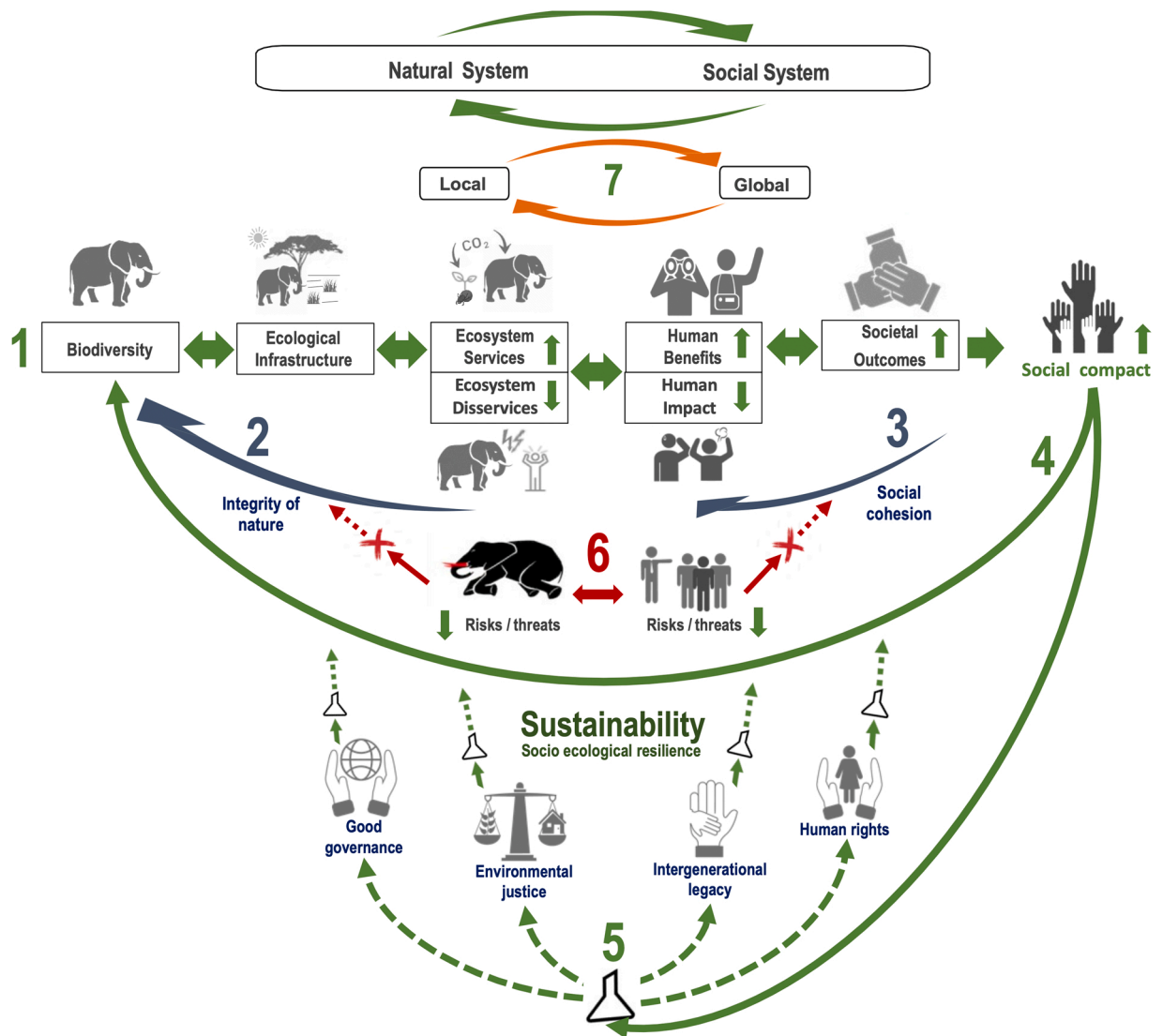
Fig. 2. The TUSKER framework. Visual representation of the Towards a Unified System of Key Environmental Relations (TUSKER) framework linking biodiversity to societal outcomes as defined by the social compact, using African elephants as a case study. The green arrows (1) represent the cycle of expected values (left to right), balanced with the investments and mitigations required to enhance benefits and sustainability (right to left). Two mitigating processes ensure sustainability: a dimension that balances integrity of nature (2) with social cohesion (3) (blue arrows) through the mitigation of risks and threats to the natural system (e.g., poaching, habitat degradation, over-exploitation, climate change), and to the social system (e.g., inequality, discrimination, urbanisation, crime) with the aim of socio-ecological resilience (represented as Unified System in the name of the framework) (4) (orange arrow); and (5) a dimension in which the social compact (i.e., global values, aspirations, and rights) moderates all decisions along the Biodiversity Value Cycle, through four filters of good governance, environmental justice, intergenerational legacy, and human rights (green dashed arrows) (represented as Key Environmental Relations in the name of the framework). Overall sustainability is realised by linking the natural and the social system through the balancing (4) and moderating dimensions (5). This will decrease ecosystem disservices and the resulting human impact (6), and mitigate the risk of the 'Tragedy of the Commons' (as highlighted in [Fig. 1](#)). The scaling dimension local vs global (7) aids predicting the impact of interventions at local levels as well as beyond on-the-ground practice, and enables development of universal, mutually reinforcing solutions and regulations that mitigate scaling mismatches ([Cumming et al., 2006](#)).

the globally adopted social compact. The framework is centred around the BVC and incorporates two dimensions that are under-represented in existing approaches. First, it includes a balancing dimension of integrating integrity of nature and social cohesion, through mitigating risks and threats to the natural system (e.g., poaching, habitat degradation, overexploitation, climate change), and to the social system (e.g., inequality, discrimination, crime). The balancing dimension promotes socio-ecological resilience (see 3.1 for more details), which is understood here as the system's capacity to continue to support human and ecological well-being despite experiencing change (Folke et al., 2016). Secondly, TUSKER includes a moderating dimension in which the social compact (i.e., global values, aspirations, and rights) moderates all decisions along the BVC, through the filters of good governance, environmental justice, intergenerational legacy, and human rights, thereby ensuring accordance with the social compact (see 3.2 for more details). The balancing and moderating dimensions of the framework emphasise a Biodiversity Value Cycle, rather than a chain, creating positive feedback loops that increase a wide range of ecosystem services, including the socio-cultural and spiritual benefits of nature, and the resulting human benefits. The cycle facilitates *meaningful* coexistence, in a way that recognises human beings as part of nature, incorporates indigenous knowledge, and transforms political economic structures (Fiasco and Massarella, 2022). The scaling dimension of the TUSKER framework identifies potential trade-offs of conservation measures at local and global levels, which can help prevent dissonance within conservation and provide opportunities to mitigate potential mismatches in scale (sensu Cumming et al., 2006). Through integrating the socio-ecological system and balancing and moderating conservation decisions, we move beyond the fortress conservation idea that nature must be protected from people, while we also transcend the frame in which nature is purely commodified, without sufficient recognition of its broader values (Büscher and Fletcher, 2019).

3.1. Balancing integrity of nature with social cohesion and human wellbeing

Two feedback loops enhance ecological (i.e., integrity of nature) and social (i.e., social cohesion) resilience. First, a feedback loop between ecosystem services and biodiversity represents the investment needed to mitigate risks and threats from human natural resource exploitation (i.e., exploitation of elephants and their habitat), including risks and threats from people's responses to ecosystem disservices (Ceaușu et al., 2018) (e.g., poaching as a reaction to elephant causing loss of life or damaging crops or infrastructure). Investments needed to protect the natural system and enhance ecological restoration can be planned through monitoring the impact of the use of nature on biodiversity, for instance through habitat restoration. Ecological resilience is vital to allow persistence during environmental change (Scheffer et al., 2015), and to guarantee future benefits of nature.

The second feedback loop between human outcomes and human benefits represents the investments needed to improve the sustainability of resource-use and social resilience, by mitigating risks and threats posed to the social system (e.g., inequality, discrimination, urbanisation, and crime). Social resilience contributes to solidarity, cohesion, and distributive justice (Doorn, 2017), which allows us to collectively cope with risks and threats, and is critical to prevent the 'Tragedy of the Commons' (Hardin, 1968). With the social compact as guidance, conservation policymakers and managers can move toward holistic management by looking back and forth throughout the value cycle as shown in TUSKER, aiming for sustainability and resilience all around by balancing the ecological feedback loop with the social feedback loop.

3.2. Moderation through four filters of the social compact

With an increasingly emphatic, informed, and participatory civil society (López-Bao et al., 2017), respecting the social compact is important to ensure that conservation decisions are societally and socially accepted and supported (DEAT, 2008; Lötter, 2016; Lötter et al., 2008). Conservation that results in holistic benefits sustains and strengthens the social compact. In order for this to happen, societal risks and threats to nature conservation (e.g. conflicts of interest, boycotts, sanctions) should be mitigated. To this end, a moderating dimension linking both extreme ends of the value chain (the social compact and biodiversity) was added, thereby creating a circular dimension, turning the value chain into a value cycle. Overall, the moderating function of the social compact directs what are aspirational outcomes, acceptable interventions, appropriate uses, priorities for investment, and identified beneficiaries. The moderating dimension implies that all decisions and actions along all aspects of the Biodiversity Value Cycle are moderated through the four filters of the social compact: good governance, environmental justice, intergenerational legacy, and human rights. The good governance filter is characterised by a multilevel approach (Ostrom, 2007) (from local communities and organisations to international institutions), as opposed to top-down, and defined by values such as equity, effectiveness, responsiveness, robustness, respect for the law, accountability, transparency, dynamism, as well as by innovative ways of social collaboration, and participatory institutions within and across multiple levels (Bennett and Satterfield, 2018; Gavin et al., 2018). The environmental justice filter moderates the risks associated with an inordinate emphasis on economic growth (SDG 8) (Otero et al., 2020), and recognises issues related to power, access, and injustice (Menton et al., 2020). Intergenerational legacy emphasises the sacrifices made for the benefit of future generations, and the importance of building a positive legacy, which are prerequisites for socio-ecological sustainability and resilience (e.g., the Well-being of Future Generations Act, Wales, 2015, anaw 2). The human rights filter ensures that conservation decisions are fair, and based on principles such as gender equality, inclusion, dignity, and freedom (e.g., UN Declaration on Rights of Indigenous Peoples, 2007; Constitution of the Republic of South Africa, 1996).

3.3. Applying the TUSKER framework

The TUSKER framework will improve upon existing CBC initiatives because, through its filters, it embeds conservation squarely in the broader social compact. Secondly, it allows for inclusion of differing perceptions of the value of elephants. Policymakers and

managers can utilise the TUSKER framework to assess the broader consequences of elephant conservation decisions, thereby promoting mutually beneficial relationships between people, elephants, and the environment. For instance, a reserve manager who is confronted with increasing elephant excursions causing crop damage and subsistence farmers demanding compensation, can use TUSKER to assess how the BVC interacts with the social domain. This may uncover that the benefits of wildlife only reach a few, whilst the costs are carried by many (Cassidy and Salerno, 2020). These local lived experiences are often ignored by central governments, international bodies, or the global public, potentially leading to contention. For instance, when local communities call for legal hunting or culling of elephants to mitigate conflicts, whilst international animal welfare and conservation groups discourage the killing of threatened species, as uncovered by the scaling dimension of the TUSKER framework. The balancing dimension of TUSKER inspires managers to develop solutions that contribute to integrity of nature and social cohesion simultaneously, such as creating corridors of tolerance (Zimmermann et al., 2009), fencing farmland instead of conservation land (Fernando et al., 2019), applying natural elephant deterrents (e.g., bees and chilli, King et al., 2017), and developing elephant-friendly livelihoods (e.g., community-based ecotourism, fair trade, changing to crops disliked by elephants, Gross et al., 2017). The moderating dimension of the TUSKER framework filters conservation actions through social compacts relevant to the specific situation. This ensures that the farmer has a say in developing solutions, that injustices are avoided, and that current and future generations will be able to benefit from wildlife, a healthy environment, and sustainable livelihoods. Combined, these solutions promote a coexistence or convivial conservation approach (Büscher and Fletcher, 2019), which is in accordance with the scaling dimension of TUSKER and various social compacts. Supporting wildlife-friendly land uses (Salerno et al., 2021), ensuring access to natural areas to gather food sources, and increasing habitat connectivity and community benefits (Asian Elephant Specialist Group, 2017), can help offset the costs of living with elephants in a sustainable manner and decrease the impact of elephants on food security (Salerno et al., 2020). By applying the framework, integrated, community-based solutions can be developed that not only reduce the costs of living with elephants, but also generate benefits to local communities, the environment, and society at large.

Fig. 3. Examples of holistic elephant conservation approaches providing evidence of positive impact on integrity of nature and social cohesion: (a) community-based wildlife tourism contributing to reduced elephant poaching and peaceful coexistence in Kenya (photo credit: Labanowski, Save the Elephants), (b) bees help to deter elephants from farmland while increasing household income and social upliftment simultaneously in Kenya (photo credit: Van Fleteren, Save the Elephants), (c) an unarmed joint community/forester patrol to protect elephants and their habitat improves local livelihoods and equity in Mali (photo credit: the Mali Elephant Project, WILD Foundation/ICFC), and (d) by building protective walls around water points, Elephant Human Relation Aid protects water tanks and solar panels in a way that grants elephants access to water without them being able to cause damage to pipes or other infrastructure, supporting the wellbeing of people and elephants in Namibia (photo credit: Van de Water).

4. Discussion

4.1. Elephant conservation examples of TUSKER

Several African elephant conservation projects have successfully removed the barriers between the natural and social system, or apply the moderating filters, which aids in demonstrating the potential positive impact of the TUSKER approach (Fig. 3). In Mali, communities were empowered to develop their own elephant and nature conservation approach based on their own values, for instance through unarmed joint community/forester patrols. By integrating the natural and social systems, ensuring easy access to natural resources, and promoting community benefits, the Mali Elephant Project has allowed for more elephant habitat to be protected, and for poaching to be reduced, while improving local livelihoods and social cohesion (Canney, 2021; Di Minin et al., 2022). Through an inclusive governance system that was locally rooted, community members were actively involved in managing natural resources, and in restoring degraded habitat (Canney, 2021), which shows the relevance of the good governance filter. The importance of the human rights filter is emphasised as the project showed that respecting the inherent rights of local communities, especially the rights to their lands, shows, contributed to the success of the project (Nelson et al., 2021). By acting on the understanding that a reduced elephant population indicates a reduction in nature's continued capacity to support life, the intergenerational legacy filter is also recognised. After decades of elephant absence in the southern Kunene and northern Erongo regions of Namibia due to poaching and war, elephants returned to the region in 1995. Competition for water has led to increasing conflicts between elephants and people without knowledge about elephants or experience in coexisting with them (Castaldo-Walsh, 2019). An integrated conservation project by Elephant Human Relation Aid (EHRA), working with the Namibian Ministry of Environment, Forestry and Tourism, has applied the environmental justice and human rights filters through investments in education, community empowerment and water point conservation, to benefit elephants and people alike (Castaldo-Walsh, 2019). EHRA's community education programme empowers community members with practical knowledge about elephants, and skills to foster coexistence. The training includes practical sessions in the field to track and observe elephant behaviour, which aids in reducing fear and building tolerance (first author, personal observations). The water point conservation programme balances the needs of farmers and elephants by building walls around vulnerable water infrastructures, to prevent damage by elephants, and secure access to water for both people and elephants. In the Laikipia-Samburu ecosystem in Kenya investments in the development of community-based wildlife tourism showed positive outcomes for both the natural system, in terms of reduced elephant poaching, and the social system, in terms of peaceful coexistence (Ihwagi et al., 2015). Community-based tourism enterprises that enhance community independence, transparency in decision making and community empowerment, and discourage elitism, are more likely to contribute to sustainable human development (Manyara and Jones, 2007). Also in Kenya, in the Tsavo ecosystem, Save the Elephants promotes beehive fences to deter elephants from entering agricultural land, resulting in reduced HEC, but also in increased income from the sales of honey, skills development, and social upliftment (King et al., 2017). The approach promotes a living in harmony approach, and provides opportunities to remove barriers between the natural and social systems by protecting farmland, instead of building fences around protected areas (Fernando et al., 2019; Van de Water et al., 2020).

4.2. Broader relevance of TUSKER

The relevance of the four filters and feedback loops of the framework have been demonstrated in several studies in other contexts. The International Institute for Environment and Development (IIED) identified best practices by engaging communities in tackling illegal wildlife trade, as reported by 49 community-based initiatives in Africa, Asia, and Latin America. In the report, IIED highlighted the importance of local management and ownership, and long-term multi-stakeholder partnerships (Booker and Roe, 2017), and, therefore demonstrated the good governance and environmental justice filters. The TUSKER framework recognises, supports and contributes to existing conservation approaches with similar overall win-win goals, such as CBC, "other effective area-based conservation measures'' (OECMs), and areas protected by indigenous peoples and local communities (ICCAs) (Dudley et al., 2018). Although CBC can strengthen local governance institutions, the approach also varies greatly in standards of good governance, regarding equity in benefit-sharing and power distribution, and in their impact on biodiversity and human wellbeing (Calfucura, 2018; Drake et al., 2021; Salerno et al., 2021). Although, in theory, CBC is predicated on community ownership and economic benefits to communities, in practice CBC governance is often still centred at higher levels of government, and benefits are experienced by few (Brooks et al., 2013; Drake et al., 2021). CBC areas can also depend on nongovernmental organisations (NGOs) or private individuals, which prevents true local ownership (Galvin et al., 2018). These types of challenges can be revealed through the scaling lens of TUSKER that identifies these mismatches, and then provides opportunity for correction based on understanding which mechanism or process needs to be addressed.

Applying the TUSKER framework will require integration of the multilevel nature of CBC governance structures into conservation systems (Salerno et al., 2021), but with each component at the appropriate scale, e.g. national, community, or household. TUSKER will promote the integration of local governance arrangements and traditional leadership in the broader government conservation framework. A lack of building enduring local capacity and human agency, critical to the success of CBC projects (Brooks et al., 2013; Drake et al., 2021; Salerno et at., 2021), will be noticed when the human rights filter is applied, as per the UN Declaration on the Rights of Indigenous Peoples that highlights the importance of social learning, local leadership, and consideration of cultural worldviews, which are often missing in CBC case study assessments (Galvin et al., 2018). Ownership of CBC projects is often not linked to ownership of land or land tenure security, preventing intergenerational legacy, another TUSKER filter (Borrini-Feyerabend and Campese, 2017; Brooks et al., 2013; Calfucura, 2018). Furthermore, ownership of CBC projects is not accorded equal status with Protected Area

management agencies, which limits CBC projects' ability to engage and influence conservation decisions at similar levels. This lack of influence at higher levels, inequity in decision-making, and imbalance of control, violates the environmental justice filter, and hinders CBC objectives (Drake et al., 2021; Galvin et al., 2018; Salerno et al., 2021). Some promising steps aligned with some of the filters of the TUSKER framework have been made. OECMs emphasise the importance of good governance, human rights, and respecting diverse worldviews (Dudley et al., 2018). ICCAs are a good example of integrating various use and non-use values of nature perceived by local communities, as opposed to the perception of higher governance structures (Borrini-Feyerabend and Campese, 2017). But, despite IUCN's recognition of ICCAs as one of the four main conservation governance types, the ICCA Consortium identified as threats internal political and socio-cultural change, and external interventions, that undermine the institutions governing ICCAs (Borrini-Feyerabend and Campese, 2017).

The TUSKER framework can be applied to improve decision-making in complex socio-ecological contexts for other species, for example, where there are similar problems of lack of access or poor beneficiation from the BVC, associated with ecosystem disservices such as human-wildlife conflict. For instance, Lion Guardians' (http://lionguardians.org/), a successful lion *(Panthera leo)* conservation model and NGO in Eastern Africa, focuses on lion conservation on community land instead of in protected areas. By practicing community participation, adopting indigenous knowledge and value systems, and promoting local incomes, this unique network in fact applies the moderating filters of the TUSKER framework. Lion killings are reduced by 90% (Hazzah et al., 2019). In Costa Rica, a participatory assessment of the drivers of coexistence between local communities and jaguar *(Panthera onca)* and puma *(Puma concolor)* formed the basis for an "incentives to coexist with big cats plan". The plan highlights standards for equity, good governance, and social norms (Amit and Jacobson, 2018), similar to the balancing and moderating filters of the TUSKER framework. In Ghana, an adaptive community-governed hippo sanctuary *(Hippopotamus amphibius)* showed that respecting the good governance and human rights filters, through balancing biodiversity protection and poverty alleviation, and through considering cultural practices and local livelihoods, balanced outcomes could be realised for the protection of an iconic species, biodiversity conservation, and poverty alleviation (Sheppard et al., 2010).

By applying the proposed framework, policymakers and managers will be able to look beyond the boundaries of protected areas and conservation-must-pay approaches, towards a conservation vision inspired by a public trust doctrine, and by the intention to protect the environment for all people and nonhuman nature alike. The TUSKER framework, thus, provides mechanisms for policymakers and managers to combine innovative elements of existing approaches, but promote success by mitigating risk through balancing and moderating for socio-economic sustainability. This will provide opportunities for local conservation initiatives to assert their material and spiritual significance, to prevent interventions from external powerful stakeholders with different agendas (Borrini-Feyerabend and Campese, 2017), and to move beyond monetising wildlife (Cassidy, 2021). Conservation policies conceived along this line will aim for equity in sharing the benefits of nature, including for local communities and future generations (Blackmore, 2017; Otero et al., 2020). Alignment with the social compact will likely attract local and global support for conservation measures. It creates opportunities for novel solutions, including civic-based funding for conservation and human development, avoiding dependence on a single support system or on global markets (Soulé, 2013; van Norren, 2020). This will lead to social and ecological resilience, which is vital, especially in a post-Covid-19 world (Naidoo and Fisher, 2020).

4.3. Outlook and conclusions

Biodiversity-related social compacts set clear goals to improve human wellbeing and social cohesion through reduced poverty and inequality, improved education, nutrition, health, and employment opportunities, while securing the ecological systems on which life depends (Guerry et al., 2015; Pascual et al., 2017; Smith et al., 2020). Although these goals require strategies that reconcile conservation and human wellbeing, this is not common practice nowadays (van Norren, 2020). Conventional conservation frameworks are still often exclusion-based in the form of strictly protected areas, or focused on economic growth and the commodification of nature (Büscher and Fletcher, 2019). Commodifying nature also promotes behaviour motivated by short-term human gain, especially when people consider wildlife as private property (Blackmore, 2017; Menton et al., 2020). This approach to nature has led to biodiversity loss, increased inequality, poverty, and unsustainable practices (Menton et al., 2020; Otero et al., 2020; Soulé, 2013; Turnhout et al., 2013; Wiedmann et al., 2020).

Nature conservation contributes more strongly to equitable sustainable development when all values of nature are included (Smith et al., 2020), and when multiple, carefully tailored solutions are moderated by the social compact. In this vein, the TUSKER framework guides transformation towards a more equitable, locally embedded and multiple-value Biodiversity Value Cycle in which community ownership is central, thereby ensuring long-term sustainability (Dellinger, 2019; Mogomotsi et al., 2020; Shaffer et al., 2019; Wasser & Gobush, 2019). The TUSKER framework is inspired by a 'living with' philosophy and convivial conservation, which proposes peaceful, mutually beneficial relations within and among the components of the natural and social systems (Büscher and Fletcher, 2019; Turnhout et al., 2013). The framework is also based on the principles of the African philosophy Ubuntu and similar communal approaches that emphasise the importance of relatedness ("*I am because we are*"), the common good of society, humaneness, compassion, inclusiveness, and being in harmony with and respecting nature and people (Mkono, 2019; van Norren, 2020). In the spirit of Ubuntu, the framework promotes meaningful coexistence and economic and ecological justice for all, especially for communities that are negatively affected by ecological destruction and economic globalisation (LenkaBula, 2008; Mabele et al., 2022; Venter, 2004). TUSKER guides a worldview of interconnectedness, in which nature is promoted for, to, and by humans, rather than protected from humans, and in which human development is dependent on regenerative socio-ecological systems (Büscher and Fletcher, 2019; Canney, 2021; Mabele et al., 2022). The application of the framework provides opportunities to realise bold conservation targets, such as to conserve or rewild large parts of the world, but with human rights and other filters in place to enable local and global support for

conservation (Dudley et al., 2018). Rather than by simplifying, dominating, and commodifying nature, societal goals are achieved by reconnecting with nature through recognising and promoting interactive relationships and positive feedback loops whereby people, and the rest of nature, benefit.

CRediT authorship contribution statement

A.W., E.D.M., and R.S. developed the conceptual foundations and the main arguments. A.W. and R.S. prepared the first draft of the manuscript. A.W., E.D.M., and R.S. contributed to the development of the main arguments and to writing, and improving the structure and style. A.W. led the manuscript revision process.

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Antoinette van de Water reports financial support was provided by National Department of Forestry, Fisheries and the Environment of South Africa. Antoinette van de Water reports a relationship with Bring The Elephant Home that includes: employment.

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Competing interests

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