



## Review Paper

## The value of elephants: A pluralist approach

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## ABSTRACT

Biodiversity conservation strategies may prioritise certain values of nature over others. Whilst there will likely always be a need for compromise in conservation planning, the consequences of trade-offs depend on peoples' relative perceptions of values that are promoted or neglected. In practice, not fully understanding or taking into account the value systems of all stakeholders, including local people, leads to contention, social inequality, and ineffectiveness. Elephants provide an excellent case study to illustrate the need for multidimensional valuation systems as they provide multiple overlapping services and benefits in ecological, socio-cultural, economic, and spiritual dimensions. Yet, their conservation is often highly contentious and fiercely debated. Here, we present a pluralist valuation system that identifies the varied services and benefits of elephants, but which adds important dimensions missing from current frameworks such as that of IPBES. Two key additions: (1) incorporating moral values alongside the services and benefits, and (2) incorporating a feedback loop to promote mutually reinforcing interactions, will better support holistic and equitable conservation. Additionally, to aid the interrogation of the kinds of problems that lead to contention in elephant conservation, we mapped the types of trade-offs that occur when different values are at stake, which allows us to identify balanced conservation solutions that will lead to unity. This pluralist valuation approach, which is similarly applicable to other species and ecosystems, clarifies the necessity of properly accounting for stakeholder values in decision making, and promotes fairer conservation decisions that will generate broader buy-in and support, uniting people, and facilitating socially just and sustainable conservation outcomes.

## 1. Introduction

Nature offers a range of benefits fundamental to our well-being and survival (Costanza et al., 2014). In the Anthropocene, human activities transform ecosystems in profound and uncertain ways (Dirzo et al., 2014), diminishing ecosystem services and posing risks to nature's resilience and people, especially in the developing world (Bradbury et al., 2021; Chaplin-Kramer et al., 2019). A paradigm shift is needed from a linear, extractive and exploitative approach, to a circular, regenerative valuation of nature that aims for well-being in an inclusive and equitable manner (Chami et al., 2020; Van Norren, 2020). By encouraging balanced conservation policies that consider the multidimensional benefits of nature and account for all stakeholder valuations and worldviews, nature conservation and human well-being could be

better secured at both local and global scales (Biggs et al., 2017; Dwyer & Hodge, 2016; Kioko et al., 2015).

The valuations of nature – and the resulting trade-offs – made in conservation policies are often based on narrow, one-dimensional valuations of ecosystem services (Kenter, 2018; Pascual et al., 2021). Conservation approaches centred around economic valuation reflect a predilection for economic growth, which is often seen as essential for human development and conservation (Daw et al., 2015; Pascual et al., 2017). Market-based approaches such as the frameworks Natural Capital (Costanza et al., 2017), Ecosystem Services (Daily et al., 2000), The Economics of Ecosystems and Biodiversity (TEEB, 2020) and Common International Classification of Ecosystem Services (CICES) (Haines-Young & Potschin, 2012) have high levels of credibility, and aid in identifying socio-economic opportunities to enhance the well-being of

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local people. They also help to motivate people to prioritise conservation over alternative uses of nature (Díaz et al., 2015; Di Minin et al., 2013). However, market-based frameworks have been criticised for emphasising monetary value without sufficient recognition of nature's non-material benefits, such as recreation, inspiration, mental health, and social cohesion (i.e., well-being, sense of belonging, tolerance, equal rights and opportunities in society) (Bratman et al., 2019; Fonseca et al., 2019; Russell et al., 2013). Similarly, these market-based systems have been argued to potentially encourage resource-extractive activities (Büscher & Fletcher, 2019; Turnhout et al., 2013).

A second bias in biodiversity conservation strategies is the frequently occurring approach utilising a single worldview, for instance focusing exclusively on the protection of species or habitat (Pascual et al., 2021). Implementing a one-dimensional valuation system – be it economic, ecological, or social – that does not fully account for all values of nature can disadvantage marginalised people, promote unsustainable resource extraction and obstruct the long-term success of biodiversity conservation (Pascual et al., 2017, Pascual et al., 2021). To provide a more comprehensive account of nature's role in human well-being, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) developed a framework to assess nature's contributions to people (Díaz et al., 2018; Pascual et al., 2017). Building on earlier frameworks, IPBES identifies three overlapping elements in nature-people interactions: nature (intrinsic), nature's benefits to people (instrumental), and good quality of life (relational). The IPBES framework emphasises the impact of culture and power relations on the perception and valuation of nature. It assesses the diverse views on human-nature interactions across stakeholder groups, especially those of indigenous communities (e.g., viewing the value of nature as 'nature's gifts to people') (Pascual et al., 2017).

However, by viewing nature-people relations as a one-way flow from nature to people, and nature as a provider of benefits, opportunities to promote reciprocity with nature are missed even in the IPBES framework (Kenter, 2018; Van Norren, 2020). The framework incorporates intrinsic values, with examples such as animal rights and Gaia/Mother Earth (Pascual et al., 2017). Yet, the examples they provide are motivated by human ethics (e.g., morality, ideals, principles, broader life goals), thus are arguably anthropocentric and so not truly intrinsic. Furthermore, 'good quality of life' includes examples such as mental and physical health, cultural services, living in harmony with nature, and social cohesion, but important broader societal imperatives (e.g., human rights, environmental justice, rights of nature, intergenerational legacy) are missing (Kenter, 2018; Van de Water et al., 2022). We argue that incorporating moral values related to biodiversity conservation into the valuation framework will create a positive feedback loop between benefits to humans and biodiversity. This feedback loop will aid conservation policymakers and managers to take decisions that promote reciprocity with nature and enhance biodiversity and sustainability (Van de Water et al., 2022).

Given that nature's services, benefits, and associated values are inherently pluralist, biodiversity conservation needs a broad, pluralist approach (Pascual et al., 2021; Schwartz, 2021). It is increasingly argued that the valuation of nature must embrace and incorporate the diversity of benefits, valuations (i.e., intrinsic, instrumental, and relational), and underlying worldviews at play (Díaz et al., 2015; Neuteleers & Hugé, 2021; Pascual et al., 2017) and methods are being developed to integrate the multiple benefits of nature and associated worldviews and values. However, these have rarely been explicitly implemented in conservation policy because identifying the breadth of value systems can be difficult, time-consuming, or hindered by a lack of value-inclusive decision-support tools and connection to local contexts (Neuteleers & Hugé, 2021; Pascual et al., 2017).

Conflicting conservation views – which, for example, can arise when economic benefits are pitted against moral worldviews – divide stakeholders, cost valuable resources, and hamper solutions that promote the best outcomes for biodiversity and all stakeholders collectively (Biggs

et al., 2017; Pascual et al., 2012; Sandbrook et al., 2019; Scheiter & Higgins, 2012). The processes driving contrasting views on conservation are numerous and varied. They may be related to material interests, but also to the way nature is perceived, i.e., as secular (e.g., that nature should be used for economic gain) or sacred (that nature should be respected) (Schwartz, 2021). This, in turn, can result in various types of trade-offs such as routine, tragic, or taboo trade-offs (Daw et al., 2015; Hanselmann & Tanner, 2008; Schwartz, 2021). Not all trade-offs are perceived as equally challenging because they vary in scale and the types of values involved (Daw et al., 2015), but sometimes, conservation policies can stumble over what appear to be irreconcilable differences, particularly when worldviews and beliefs are involved (Biggs et al., 2017).

Elephant conservation offers a strong example of this. At all levels, from international to local, policy decisions about elephant conservation are frequently contentious, with stakeholders who seem to have irreconcilable views (e.g., see Biggs et al., 2017; Dickman et al., 2019; (Van Aarde et al., 1999); and the resulting commentaries). Globally, the three elephant species are classified as endangered (African savanna elephant, *Loxodonta africana*, and Asian elephant, *Elephas maximus*) or critically endangered (African forest elephant, *Loxodonta cyclotis*) (Gobush et al., 2021a; Gobush et al., 2021b; Williams et al., 2020). However, at local or regional levels, their conservation status may differ. For instance, in South Africa, the regional Red List status of the African savanna elephant is defined as 'least concern' (Selier et al., 2016a), and the elephant populations of Botswana, Namibia, South Africa and Zimbabwe are listed as Appendix II by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), whereas all other elephant populations are listed on Appendix I (CITES, 2017a).

These different listings result in varying levels of protection when savanna elephants cross international borders (Lindsay et al., 2017), and additional complexity arises because the majority of African elephants' range falls outside of protected areas, which means that overlaps with land inhabited by people are common (Wall et al., 2021). As elephants represent multiple overlapping services, benefits and values in ecological, socio-cultural, economic and moral dimensions (Bandara & Tisdell, 2003; Blignaut et al., 2008; Geach, 2002; Lötter, 2016; Platt, 2014; Poufoun et al., 2016), their conservation can be especially challenging and contentious. Local, national, and international views can diverge widely, and the economic benefits that some stakeholders routinely prioritise (such as using elephants for ecotourism, trophy hunting, as a source of ivory or labour) can conflict with the deeply held moral considerations of others (e.g., issues around animal welfare and the rights of nature) (Hanselmann & Tanner, 2008).

Despite evidence that long-term sustainability can best be achieved via conservation approaches that integrate all pertinent values (Chan et al., 2012; Pascual et al., 2021), current elephant conservation strategies often remain one-dimensional, focused on only economic or ecological or, rarely, social factors (e.g., Lainé, 2018). Policies typically focus on managing elephants in protected areas in isolation, where particular benefits are emphasised (e.g. economic or biodiversity benefits) whilst others are under-represented; or when local solutions are championed at the expense of global outcomes (e.g., proposals to sell ivory to fund local conservation which may impact poaching rates in other countries) (Lindsay et al., 2017), or vice versa. Given these controversies and challenges, this paper aims to develop a pluralist elephant valuation system that incorporates all relevant variables. The system will assist policymakers in weighing potential outcomes of conservation approaches for stakeholders at various scales, thereby facilitating future nature conservation planning. Specifically, the objectives of this study are (1) to evaluate the full range of services, benefits and values associated with elephants, (2) to develop a pluralist elephant valuation system, and (3) to account for peoples' values related to conservation and evaluate the impact of trade-offs that occur when certain values are promoted or neglected. This holistic, open approach accounts for the range of values at stake and should reduce confrontation, engender

societal support, deliver socially just outcomes for current and future generations and, therefore, promote genuinely sustainable conservation of elephants throughout their range.

## 2. Methods

### 2.1. Working definitions

The word ‘value’ has different meanings in conservation which are often used interchangeably, making it unclear what is meant when values or valuation are discussed. It can mean the worth or importance of biodiversity, but also refer to valuation systems (i.e., a system of expressing a value for a particular good or service, either financial, but also through measures from other disciplines (Büscher & Fletcher, 2020; MA, 2005)). In conservation, the various meanings of ‘value’ can be defined as: (1) a *measure*, often monetary, of the instrumental or assigned worth of objects; (2) the non-instrumental *importance* for itself or others, (3) a *preference* for a certain state of the world, or (4) a *principle* related to a certain culture or worldview (Büscher & Fletcher, 2020; Chan et al., 2012; Kenter, 2018; O’Connor & Kenter, 2019; Pascual et al., 2017). In this paper, we use ‘value’ to describe principles (i.e., human values), meaning the ways people perceive benefits through the perspectives of their differing worldviews. **Benefits** represent the tangible and intangible well-being gains derived from the contributions of elephants as experienced by people, for current and future generations (La Notte et al., 2017). For direct or indirect contributions of elephants to human well-being, we use ‘**services**’ (MA, 2005; TEEB, 2020).

The valuation system further classifies benefits and values into secular or sacred principles. For **sacred principles** (e.g., human rights, human life, nature, justice, freedom, identity), compensation for infringement of the principle is unthinkable, as these principles are perceived as inviolable, infinite, or transcendental (i.e., principles that are universally valid and should never be infringed or dishonoured) (Schwartz, 2021). For the loss of **secular principles**, however (such as cost-effectiveness, assigned values), compensation is possible (Biggs et al., 2017).

### 2.2. Sampling and data analysis

To identify the benefits and values of elephants, we performed a search of studies about the valuation of elephants, followed by a literature review, with the aim of gathering *all* described benefits associated with elephants, i.e., all specific and concrete benefits or opportunities elephants bring for human and nonhuman nature. Searches were conducted for all three elephant species (*Loxodonta africana*, *Loxodonta cyclotis*, and *Elephas maximus*), as not all aspects have been studied for each species. The approach is generally transferable and relevant to all three species, notwithstanding that some elements may be more or less applicable to one or more species, or to local context. It should be noted that in this paper, we only consider services, benefits and values associated with elephant conservation, and do not take into account disservices that may arise from elephants, such as human-elephant conflict (Di Minin et al., 2021), or ecological damage elephants may cause to vegetation (Asner et al., 2016; Henley & Cook, 2019). The importance of balancing elephant services and disservices are addressed in e.g., Ceașu et al., 2018; Van de Water et al., 2022.

The search terms used were derived from previous elephant valuation papers (e.g., Bandara & Tisdell, 2003; Berzaghi et al., 2019; Berzaghi et al., 2022; Blignaut et al., 2008; Chami et al., 2020; Geach, 2002; Platt, 2014; Poufoun et al., 2016); from general nature valuation papers (e.g., Costanza et al., 2014; Costanza et al., 2017; Díaz et al., 2018; Kenter, 2018; Pascual et al., 2017, 2021; TEEB, 2020); from our knowledge of previous work on the benefits elephants provide; and from discussions with colleagues and experts. We searched Web of Science and Google Scholar for English language, peer-reviewed publications, acts, constitutions, elephant conservation action plans, reports, news

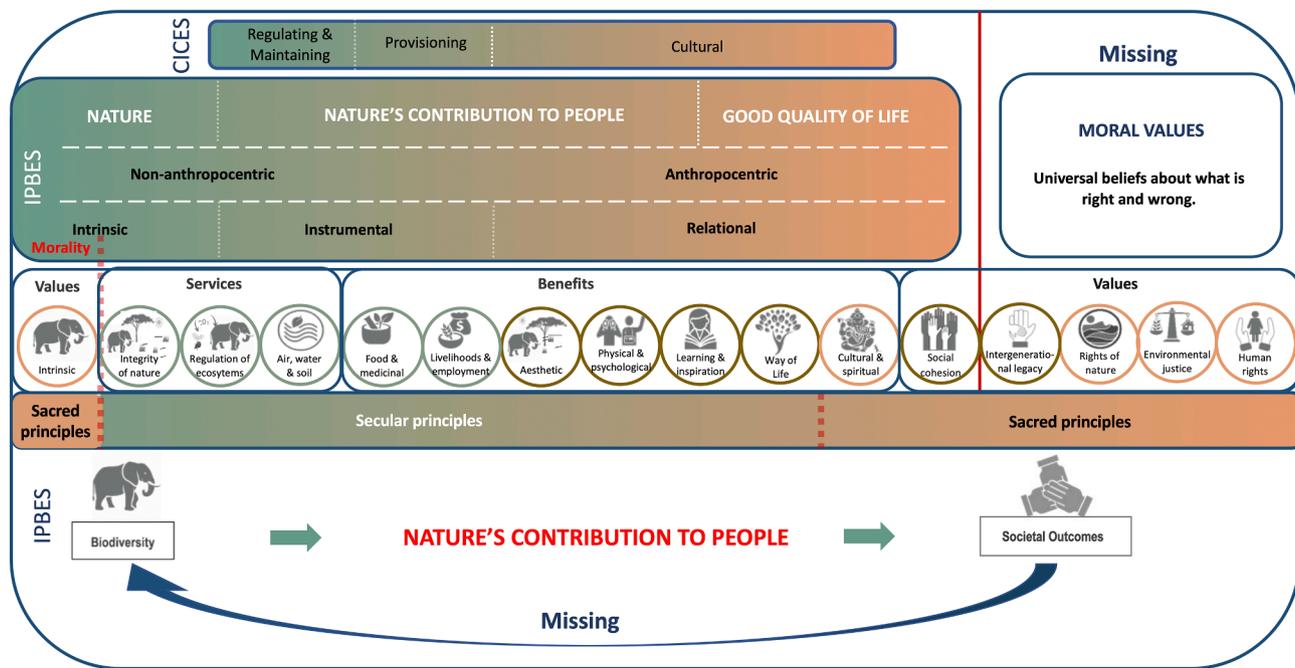
articles, and court cases, using broad search terms listed in appendix 1. To incorporate societal aspirations relevant to elephant conservation, national and regional elephant conservation strategies were assessed (e.g., the African Elephant Action Plan (CITES, 2010) and Asian Elephant Action Plan (Jackson & Santiapillai, 1990)), as well as the various social compacts relevant to elephant conservation (e.g., the Sustainable Development Goals, Convention on Biological Diversity, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, the Nagoya protocol, CITES, the Convention on Migratory Species, the UN Declaration on the Rights of Indigenous Peoples, Ubuntu). Articles focusing on human morality related to conservation, but not specifically to elephants, were searched by using “conservation” AND the search terms listed in appendix 1 related to moral values (e.g., moral duty, rights of nature, ethics, environmental justice). The reference lists of papers found were combed for other relevant sources, which were included where appropriate. Search and review were conducted between January 2019 and November 2021. The primary purpose was to ensure that the identification of potential services, benefits or values of elephants was evidence-based, rather than citing all sources that may link to or support a specific benefit or value.

For each service, benefit or value associated with elephant conservation, the description and citing reference(s) were recorded, as well as the elephant species the reference was focused on, and a name label was assigned. Similar benefits were subsequently collapsed under one label. Although there is still some overlap, each service, benefit and value on the final list reflects a discrete theme that emerged from the published descriptions.

### 2.3. Building the valuation system

To develop a comprehensive valuation system, we first assessed the existing ecosystem services valuation frameworks. CISES is based on the categories Regulating & Maintaining, Provisioning, and Cultural Services, which define ecosystem goods and services, or nature’s contribution to people (Haines-Young & Potschin, 2012). IPBES adds the elements ‘Nature’ (non-anthropocentric) and ‘Good Quality of Life’ (anthropocentric) (Díaz et al., 2015). Elements that are missing in the current systems were added: moral values and a feedback loop to promote reciprocity with nature (Kenter, 2018; Van Norren, 2020), as shown in Fig. 1. The benefits we identified through the literature review were grouped into 16 categories (adapted from Díaz et al., 2018), characterising specific and concrete services, benefits and values of elephants for human and nonhuman nature. The 16 service, benefit and value categories were further classified using the IPBES framework (intrinsic, instrumental and relational), with the additional ‘moral values’ category (Fig. 2). It is important to note that each service, benefit or value may be interconnected to various others. For instance, economic benefits from ecotourism connect to inspiration and human well-being (Chan et al., 2012). To incorporate a higher-order classification, we then divided the identified services, benefits and values according to whether they represent mainly sacred principles, mainly secular principles, or a combination of both (Schwartz, 2021) in order to highlight the link between moral and intrinsic values.

Finally, the various trade-offs that occur when the different types of principles are pitted against each other were assessed, as shown in Fig. 3. Trade-offs influence the level of emotion and perceived difficulty in decision-making (Hanselmann & Tanner, 2008). The overview of potential trade-offs (routine, tragic, and taboo trade-offs) was adapted from Daw et al. (2015) and Schwartz (2021), but we added a fourth: marginalisation. Marginalisation trade-offs occur when expressed sacred principles are countered by secular principles. Furthermore, a dimension was added that considers the principles behind *expressed* (conservation) proposals or actions, juxtaposed with the principles behind the arguments that *resist or control* these proposals, in a matrix of the four trade-offs. This aids in the interrogation of the kinds of problems that lead to debate in elephant conservation, and the trade-offs that must



**Fig. 1.** An assessment of the categories used in existing ecosystem valuation frameworks, incorporating our additional elements. Categories are taken from the Common International Classification of Ecosystem Services (CICES) (Haines-Young & Potschin, 2012) and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) (Díaz et al., 2015), with our additions of moral values and the feedback loop from societal outcomes back to biodiversity. Moral values that should be included in nature conservation are social cohesion (included in IPBES), intergenerational legacy, rights of nature, environmental justice and human rights. The specific and concrete services and benefits of elephants for human and nonhuman nature, and the values associated with elephant conservation are grouped in a system of 16 categories (centre) (adapted from (Díaz et al., 2018)). The 16 categories are classified as mainly secular (green-edged circle), partly secular/partly sacred (brown circle), and mainly sacred (orange circle). The benefits of nature are presented as a one-way flow from biodiversity to people as per existing frameworks (bottom) (Kenter, 2018), but we include a feedback loop from collective human sacred principles, to ensure the enhancement of biodiversity and sustainability (sensu Van de Water et al., 2022). Intrinsic value highlights this feedback between people and nature, as people are intrinsically part of nature. The feedback loop thus allows a shift from the linear, aiming for growth dependent on the exploitation of natural resources, to circular, aiming for reciprocal well-being based on respect for nature (Van Norren, 2020). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

be dealt with when values clash, which ultimately allows us to identify how balanced solutions/compromises can be reached that will lead to unity.

### 3. Results

#### 3.1. Assessment of valuation elements

Fig. 1 shows how the categories of existing valuation frameworks, such as CICES and IPBES (top left of Fig. 1), are extended by adding the category “Moral values” (top right in Fig. 1). Incorporating moral values into the valuation system creates a feedback loop back to biodiversity (bottom in Fig. 1), which is also missing in one-way nature-people interactions (Kenter, 2018) (bottom of Fig. 1). Our classification of sacred and secular principles highlights the relationship between human values and intrinsic values. Even though intrinsic values are considered to be independent of explicit human experience or evaluation (Pascual et al., 2017), there are implicit sacred principles attached to them, which involve moral values.

#### 3.2. Pluralist elephant valuation system

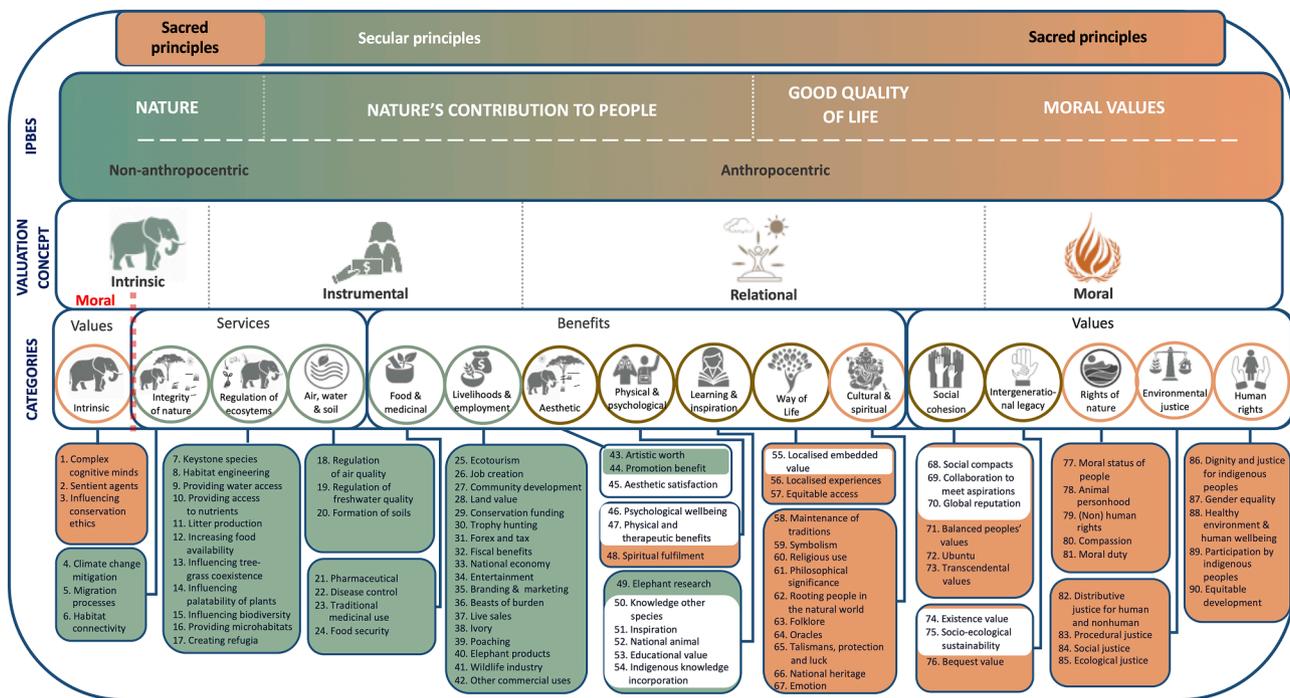
The services and benefits that elephants provide through their persistence in the natural system, and the values people attach to those benefits, have been collated into a pluralist elephant valuation system. Fig. 2 illustrates which benefits and values are ignored when any one aspect is considered in isolation. For instance, when only economic benefits are acknowledged, all non-economic benefits and values will be overlooked (i.e., 64 out of 90 benefits). If a conservation approach takes

a one-dimensional path, it will, in all probability, conflict with other desired benefits or the values held by different stakeholders.

To create a clear overview for policymakers, Fig. 2 integrates services and benefits of elephants with peoples’ values, allowing a pluralist conceptualisation of the valuation of elephants to emerge. The figure extends the valuation classifications of existing frameworks by adding moral values, and a higher-order dimension of secular and sacred principles. This can assist policymakers in predicting and preventing undesirable trade-offs, through incorporating the perspectives and values of all people, from local to global, which are often not considered in conservation policies in a balanced and equitable manner. Of course, perceived sacredness depends on individual values and cultural context (Daw et al., 2015), but this figure allows those different perspectives to be taken into account. For instance, the land that constitutes elephant habitat, such as forest, has a clear secular value, for which a market price can be calculated, but such land can also be perceived as sacred when linked to culture, identity, spirituality, sense of place, freedom, or independence (Schwartz, 2021). Some sacred principles are endorsed by laws or social agreements, such as human rights, or biodiversity protection (e.g., UN Declaration on Rights of Indigenous People, Convention on Biological Diversity) which, *de facto*, should be respected, even if not held sacred by all (Schwartz, 2021). The outcome of this process is a detailed, comprehensive categorisation of the services, benefits and values awarded to elephants, and an overview of the relationships among valuation concepts.

#### 3.3. The benefits of elephants

Table 1 gives a comprehensive overview of the services and benefits



**Fig. 2.** A visual representation of a pluralist elephant valuation system. The multidimensional relationships among four overlapping valuation concepts (intrinsic, instrumental, relational, and moral, adapted from Pascual et al., 2017) are shown above the 16 services, benefits, and values categories. The services, benefits and values associated with elephant conservation are further classified as mainly secular (green background), partly secular/partially sacred (white background), and mainly sacred (orange background). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

that elephants provide through their persistence in the natural system. The aim of this table is to be as comprehensive as possible. Therefore, benefits that some people experience, but which may not be legal in all circumstances are included, such as ivory sales, poaching, or sales of live elephants (CITES, 2019a; Cox & Collins, 2021). Inclusion of these potentially illegal activities aids in addressing the kinds of problems that can arise in elephant conservation and assist with the formulation of potential solutions. Additionally, it is important to note that some benefits, while producing apparent high value in themselves, may compromise a range of other services, benefits, and values. For example, benefits arising from killing an elephant would compromise many other ecological, relational, and moral values, and could undermine the long-term viability of populations and, therefore, their existence value.

Among the overlapping and interconnected services (3 categories), benefits (7 categories) and values (5 categories), 3 provide intrinsic, 39 provide instrumental, 31 provide relational benefits, 17 are moral values. The category with most benefits was *livelihoods & employment* (17 benefits), followed by *regulation of ecosystems* (11 benefits), and *cultural & spiritual* (10 benefits).

### 3.4. Peoples' values and trade-offs

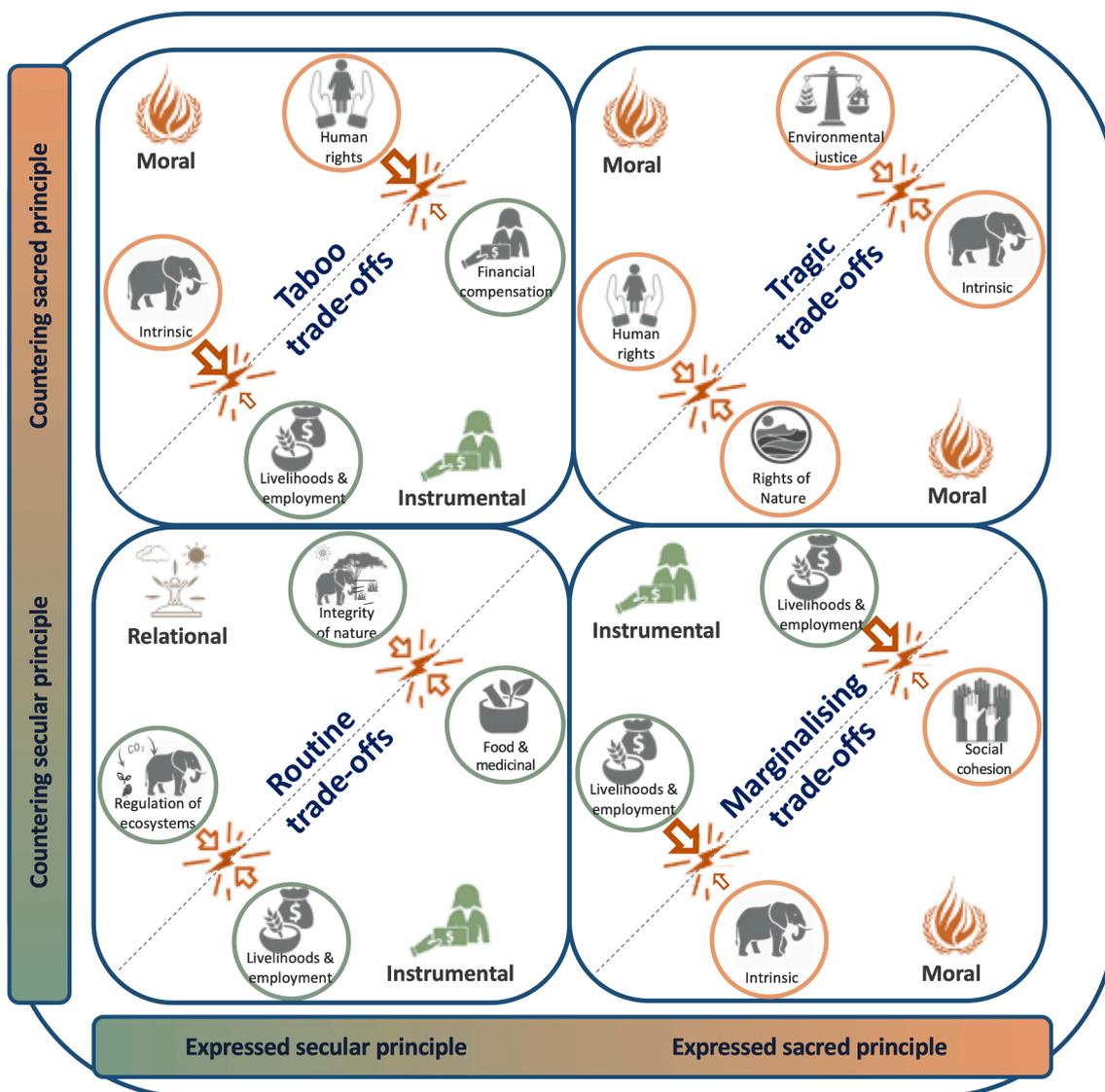
Elephant conservation can be contentious due to contrasting, yet veiled, value systems and agendas promoted by polarised interest groups and power asymmetries (Biggs et al., 2017; Büscher & Fletcher, 2019; Sandbrook et al., 2019). Contention centres around trade-offs, which can exacerbate negative emotions and perceived difficulty in decision-making. Balancing the benefits of elephants exposes trade-offs, where one needs to give up on something to gain something else (De Groot et al., 2010). Three types of trade-offs have been identified: routine, tragic, and taboo trade-offs (Hanselmann & Tanner, 2008). To include issues related to power inequality in conservation decisions, we have added a fourth trade-off termed marginalisation, which represents the trade-offs that occur when expressed sacred principles are countered by

secular principles (Fig. 3).

**Routine trade-offs** rely on rational calculations of costs and benefits between two secular principles (that can be economical or relational), which can result in socially acceptable decisions. For instance, proposals to build electric fences around elephant habitat to reduce human-elephant conflict (e.g., Slotow, 2012), countered by arguments for other types of barriers like beehive fences (e.g., King et al., 2017); culling elephants based on the argument that there are too many elephants that cause damage to vegetation, countered by arguments that many elephants represent a natural ecosystem and that change forms part of ecosystem dynamics (Owen-Smith et al., 2006); allowing ivory sales to satisfy demand and, thereby, reduce poaching (Martin et al., 2012), countered by the argument that permitting ivory trade will increase demand in destination countries, and so increase poaching (Bennett, 2014). In practice, conflicts arise when uncertainty remains about anticipated outcomes, but understanding the nature of the disagreement can illuminate what is required to move forward.

**Tragic trade-offs** occur when decisions involve two conflicting sacred values, where one needs to be sacrificed to enable the other. Decisions concerning tragic trade-offs are perceived as emotionally difficult and stressful (Daw et al., 2015; Hanselmann & Tanner, 2008). For instance, proposals to evict indigenous people from their land, or to prohibit cattle grazing by indigenous peoples to reduce threats to and from elephants, ensure free movement of wildlife, and protect fragile grassland ecosystems, countered by moral arguments related to human rights (Büscher & Ramutsindela, 2015; Spierenburg et al., 2006; Witter, 2013); or to sacrifice the life of individual animals to ensure the well-being of others within the dynamic web of life (Löfiter et al., 2008).

**Taboo trade-offs** occur when secular principles are overruled by sacred principles. For instance, proposals to financially compensate for the loss of life as a solution to human-elephant conflict (Anthony & Swemmer, 2015), countered by the morality of putting a price tag on human life (Fiske & Tetlock, 1997); using trophy hunting to support community development (Dickman et al., 2019), countered by moral



**Fig. 3. Trade-offs between sacred and secular principles relevant to elephant conservation debates** (adapted from Daw et al., 2015; Schwartz, 2021). The x-axis shows the expressed principle (proposals for a conservation action), and the y-axis is the countering principle (that underpins the resistance to do so). Routine trade-offs rely on rational calculations of costs and benefits between two secular principles, which facilitates socially acceptable decisions. Tragic trade-offs occur when decisions involve two conflicting sacred principles and are perceived as emotionally difficult and stressful. Taboo trade-offs occur when sacred principles collide with secular principles, which can trigger moral outrage. Marginalising trade-offs occur when secular principles take precedence in the trade-off and overpower the sacred principles of a minority or disempowered group. Taboo and marginalising trade-offs are inherently challenging, psychologically uncomfortable, and often negatively emotion-laden. The valuation concepts (intrinsic, instrumental, relational and moral values) illustrate how the different concepts can become opposed to each other, resulting in a trade-off.

arguments based on the intrinsic value of elephant life (Horowitz, 2019); exploiting elephants for entertainment to fund local conservation or development, pitted against the global existence value of elephants which makes people care about elephant well-being (Bandara & Tisdell, 2003; Wang et al., 2020); or culling of elephants to reduce local environmental pressure (Whyte et al., 1998), countered by global protests motivated by the intrinsic value of elephants and their rights (Dixon, 2008).

Lastly, we suggest **marginalising trade-offs** occur when expressed sacred principles are overruled by secular principles. When secular views take precedence in the trade-off, they tend to overcome the sacred views of a minority or a disempowered group, leading to the perception that the sacred principles are considered insignificant or peripheral. For instance, proposals to make space to conserve elephants and biodiversity through acknowledging the cultural integrity of indigenous peoples that used to occupy such spaces, countered by (short-term) economic

arguments for investment in other land -uses (Canney, 2021); proposals to allow elephants to roam freely based on rights of passage and increasing connectivity (Menon et al., 2020), countered by arguments to issue so-called damage-causing animal permits to shoot roaming animals (Slotow et al., 2021); proposals to ban ivory trade or commercial exploitation of elephants based on intrinsic value and rights (Horowitz, 2019; Lötter et al., 2008), countered by the need for economic development and conservation funding (Roe et al., 2020).

Taboo and marginalising trade-offs are inherently more challenging, psychologically uncomfortable, negatively emotion-laden, and morally repugnant, compared to routine and tragic trade-offs (Daw et al., 2015, and our assessment). Economic solutions for taboo and marginalising trade-off conservation challenges may be scientifically or politically viable, but may lead to moral outrage or social unrest because they are socially unacceptable (Schwartz, 2021). As such, people tend to avoid dealing with taboo and marginalising trade-offs, resulting in decision

**Table 1**

Comprehensive assessment of the services, benefits and values related to elephant conservation, as identified from an extensive literature review. The benefits have been grouped into 16 categories (adapted from Díaz et al., 2018). The first column shows the categories name, whether this concerns a service, benefit, or value, and the most relevant type of value: intrinsic, instrumental, relational (sensu IPBES), or moral (our addition). As services or benefits may differ per elephant species and as most services and benefits have been studied on single species, i.e., African savanna elephants (*Loxodonta Africana*), African forest elephants (*Loxodonta cyclotis*), and Asian elephants (*Elephas maximus*), the species each reference is focused on has been added (underlined in column 3; if applicable across species we insert the word general). For instance, forest and savanna elephants perform distinct ecological functions, and have different behaviours, diet preferences, and movement patterns. Less literature was found on the ecological role of Asian elephants, but more on the cultural benefits of Asian elephants. Rather than comprehensively referencing all possible literature, only selected references are provided to substantiate each of the benefits because the complete list is vast.

Label (out of 90)	Elephant species that the study is focused on, description and evidence
1. Model minds	<p><u>General</u>: Research on elephants' social and cognitive skills indicates that elephants possess cognitively complex minds (Marceau, 2020), and advanced abilities akin to human beings, such as insight, awareness of death, self-awareness, intentional and complex communication, memory and theory of mind (Bates, 2020; Moss et al., 2011; Münster, 2016; Plotnik &amp; Jacobson, 2022). For instance, elephants respond empathetically to other elephants in need or distress; they have preferred friends; and cooperate to solve problems (Byrne et al., 2009; De Silva et al., 2011; Plotnik et al., 2011). Their cognitive skills make elephants potential model organisms to increase our understanding of people (Bradshaw &amp; Schore, 2007; Hawley, 2011).</p> <p><u>African savanna elephants</u>: African savanna elephants are able to recognize up to 30 relatives from cues in urine and are aware of the location of these elephants (Bates et al., 2008), and are able to distinguish between the contact calls of elephants in their family and bonded group from elephants outside these group, indicating they are familiar with the acoustic communication of about 100 adult cows (McComb et al., 2000).</p> <p><u>African forest elephant</u>: Forest elephants have different personalities and express remarkable variation in movement patterns (Beirne et al., 2021).</p> <p><u>Asian elephant</u>: Asian elephants have different behavioural traits and abilities to adjust their behaviour to changing environments, and thus different personalities (Jacobson et al., 2022; Plotnik &amp; Jacobson, 2022).</p>
2. Sentient agents	<p><u>General</u>: Elephants are considered a higher-order intelligent species and complex social agents, forming multi-generational bonds even with non-relatives (Batavia &amp; Nelson, 2017; Goldenberg et al., 2019; Lötter, 2016). Elephants are considered among the most sentient nonhuman agents (Locke, 2013; Lötter, 2016; Pearce, 2015). They have shown empathy towards conspecifics (Mumby &amp; Plotnik, 2018), and have intrinsic value (Batavia &amp; Nelson, 2017).</p>
3. Influencing conservation ethics	<p><u>African savanna elephant</u>: Our knowledge about elephants' social and cognitive skills, and their social and spatial needs, influences our moral duties to elephants, and whether we should treat elephants differently compared to other animals, and consider their interest in conservation decisions (Lötter et al., 2008). As Samburu people regard elephants as moral beings, assigning a higher moral status to elephants than</p>

**Table 1 (continued)**

Label (out of 90)	Elephant species that the study is focused on, description and evidence
4. Climate change mitigation	<p>to any other animal, they view ownership of elephants as immoral (Kahindi, 2001).</p> <p><u>African forest elephant</u>: Being a keystone species (see benefit 45), elephants play a role in maintaining ecological processes and biodiversity, which can contribute to strategies to deal with climate change. In central African tropical forests, elephants reduce the number of plants and forest stem density, which results in a higher abundance of large trees with higher wood density, and increase aboveground carbon stored by 7% (Berzaghi et al., 2022; Chami et al., 2020). In addition to the carbon captured in their large bodies, elephants thus contribute to carbon dioxide reduction in the atmosphere (Chami et al., 2020) (African savanna elephants may limit aboveground carbon gains in African savannas, see e.g., Davies &amp; Asner, 2019). The forest elephants' carbon sequestration services can be translated to financial benefits that can be monetised on carbon markets for approx. USD 20.8 billion for the next ten years and USD 25.9 billion for the next 30 years (Berzaghi et al., 2019; Berzaghi et al., 2022; Chami et al., 2020). Companies or institutions that need to offset their carbon footprint can pay range states for the services of elephants, and contribute to a secure future for elephants, protection of their habitat, and support local communities living with elephants (Chami et al., 2020).</p>
5. Migration processes	<p><u>African savanna and forest elephant</u>: Elephants can be used in responding to climate change impacts, for example the positive effects of elephants digging for water helps other species survive during droughts. Therefore, elephants provide a nature-based solution as agents in a climate change mitigation strategy (Berzaghi et al., 2019; Haynes, 2012; Poulsen et al., 2017).</p> <p><u>General</u>: As a migratory species with large spatial displacements along regular routes, elephant migration pathways, like those of other keystone species, comprise clearly defined routes.</p> <p><u>African savanna elephant and Asian elephant</u>: Migration depends on large areas of landscape connectivity, and is a vital but threatened ecological process (Joshi &amp; Puri, 2021; Purdon et al., 2018). Elephants' migration routes aid in planning habitat corridors (Menon et al., 2020; Talukdar et al., 2020). Elephant migration, including transboundary movements, aids in maintaining meta-population processes, functional connectivity, reducing human-elephant interaction and repopulating sink habitats (Lindsay et al., 2017; van Aarde &amp; Jackson, 2007).</p>
6. Habitat connectivity	<p><u>African savanna elephant</u>: The overall value of elephants motivates people to keep areas wild instead of converting them to other land uses, and increases security of tenure as conservation land use (Geach, 2002).</p> <p><u>General</u>: Elephants serve as an umbrella species, helping to conserve large areas of landscape, ensuring the survival and evolution of a large number of other species (Albert et al., 2018; Redmond, 1996; Sukumar, 1989).</p>
7. Keystone species	<p><u>African savanna and forest elephant</u>: As megaherbivores and keystone species, elephants play a role in maintaining ecological processes, and providing resources to other species, relative to their abundance (Berzaghi et al., 2019; Bunney et al., 2017; Haynes, 2012; Joshi &amp; Puri, 2021; Poulsen et al., 2017).</p> <p><u>Asian elephant</u>: Elephants have cascading effects</p>

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Table 1 (continued)

Label (out of 90)	Elephant species that the study is focused on, description and evidence
8. Habitat engineering	on the availability of habitat, water and nutrients to other species (Joshi & Puri, 2021). <u>African savanna and forest elephant and Asian elephant</u> : Elephants influence forest structure, stem density and plant diversity. By maintaining grassland and pathways elephants create migration routes and habitat, and increase access to important resources for other species (Blake and Inkamba-Nkulu, 2004; Haynes, 2012; Keil, 2016; Kerley et al., 2008). Elephant pathways along forests adjacent to savanna ecosystems can function as firebreaks, contributing to the protection of forests (Cardoso et al., 2020). Elephants enhance long-distance seed dispersal (Bunney et al., 2017; Campos-Arceiz & Blake, 2011; Poulsen et al., 2021), although they can also trample seeds or inhibit tree regeneration in disturbed areas (Omeja et al., 2014; Piironen et al., 2017).
9. Providing water access	<u>African savanna elephant</u> : Elephants provide accessible water to other species by digging wells beneath the surface of dry riverbeds and trampling down river banks with their feet and trunks (Ramey et al., 2013; Stommel et al., 2016). Samburu people depend on elephants' knowledge to find water tables in dry riverbeds (Lemayian, 2018).
10. Providing access to nutrients	<u>African savanna elephant</u> : Elephants provide access to mineral supplements to other species by excavating subterranean salt (Bowell et al., 1996). General: Megafauna, such as elephants, enhance nutrient dispersal (Berti & Svenning, 2020), and they stimulate (re)growth, thereby making nutrients more available and contributing to forest and savanna functionality (Campos-Arceiz & Blake, 2011; Kohi et al., 2011; McConkey et al., 2018).
11. Litter production	<u>African savanna elephant</u> : Elephants discard about 25 % of the forage they pluck, and this material alters litter dynamics, which has cascading effects on biodiversity and ecosystem function (Kerley & Landman, 2006; Kerley et al., 2008; Lessing, 2007).
12. Increasing food availability	<u>African savanna and forest elephant</u> : Numerous invertebrates and vertebrates feed on the undigested materials in elephant dung, in some cases providing secondary seed-dispersing services. Over a hundred species of Scarabaeoidea beetles feed on elephant dung (Waltner-Toews, 2013). Vertebrates such as birds and small mammals feed on the invertebrates attracted to dung. Egrets feed on insects disturbed from grass where elephants walk (Ruggiero & Eves, 1998). By pushing over and uprooting trees, elephants redistribute and improve the quality of forage, which benefits small browsing herbivores and monkeys, and triggers a chain of events that creates habitat heterogeneity (Kerley et al., 2008; Kohi, 2013; Owen-Smith, 1989). Elephant browsing on <i>Colophospermum mopane</i> trees improves foliage growth which is important for browsing ungulates and for 'mopane worms', which can be harvested for human consumption (Redmond, 1996).
13. Influencing tree-grass coexistence	<u>African savanna and forest elephant</u> : Depending on the local context, elephants maintain heterogeneity and prevent converting grasslands into woodlands by suppressing tree cover (Goheen & Palmer, 2010; Omeja et al., 2014). Opening and maintaining patches of forest clearings supports grazers, mixed feeders and small browsers in foraging and predator

Table 1 (continued)

Label (out of 90)	Elephant species that the study is focused on, description and evidence
14. Influencing palatability of plants	detection, thus increasing biodiversity (Kohi, 2013; Poulsen et al., 2017). <u>African savanna elephant</u> : By influencing the chemical defences of plants, heavy browsing by elephants, like other browsers, stimulate plant defences for protection from herbivory, which can improve the palatability of forage for herbivores (Kohi et al., 2010), or reduce the palatability of some species (Callis-Duehl et al., 2017).
15. Influencing biodiversity	<u>African savanna elephant</u> : Elephants increase biodiversity by impacting woody vegetation (Nasseri et al., 2011). They can influence the available plant resources for ants, which affects trees (Palmer et al., 2008). Elephants can increase distributions of reptiles and amphibians (Nasseri et al., 2011), and disperse aquatic organisms (Vanschoenwinkel et al., 2011), which have cascading effects on biodiversity and ecosystem function (Legendijk et al., 2011; Legendijk et al., 2012) (However, elephants can also negatively impact biodiversity, see e.g., Abraham et al., 2021; Keesing, 1998; Lawes & Chapman, 2006; Ogada et al., 2008).
16. Providing microhabitats	<u>Asian elephant</u> : Elephant dung provides microhabitats for frogs, beetles, ants, centipedes, millipedes, scorpions, crickets, spiders, and termites (Campos-Arceiz, 2009). Water-filled elephant footprints provide microhabitats for tadpoles, frogs, and insects, and may function as stepping stones through an otherwise dry landscape (Platt et al., 2019).
17. Creating refugia	<u>African savanna elephant</u> : Vegetation broken by savanna elephants (e.g., stripping bark and splintering branches) creates refugia for arboreal lizards (Pringle, 2008). By damaging tree canopies, elephants create refuge for understory plants (Coverdale et al., 2016). <u>Asian elephant</u> : In the absence of litter, elephant dung provides daytime refuge for frogs (Campos-Arceiz, 2009).
18. Regulation of air quality	<u>African savanna elephant</u> : Because of elephants' requirement for space and resources and their value chain, large areas are protected and remain wild, instead of being used for, for instance, agriculture, providing ecosystem services which are essential to human and nonhuman health, including clean air (Ihwagi et al., 2015).
19. Regulation of freshwater quality	<u>African savanna elephant</u> : Depending on the elephants' spatial use and density and management approaches, conservation land use that includes elephants keeps land pollutant-free, with regulated freshwater quality, allowing for grasslands and woody vegetation, as compared to land use for domestic herbivores (overgrazing) or agriculture (chemicals use), which causes degradation and desertification (Kerley et al., 1995).
20. Formation of soils	<u>African savanna and forest elephant</u> : Elephant dung produces nutrient-rich compost, and, by searching for water and minerals, elephants excavate mineral hotspots, making nutrient-rich soil accessible (Klaus et al., 1998; Poulsen et al., 2017). The presence of elephants increases soil carbon and nitrogen pools and can reverse the negative effects of cattle (Sitters et al., 2020). As elephants prefer browsing nitrogen-rich leaves, they play an important role in transporting nitrogen to the soil (Doughty et al., 2016; Pretorius et al., 2011).
21. Pharmaceutical	<u>African savanna elephant</u> : Elephants have two extra cancer-fighting genes which suppress the development of cancer. This may advance medical science and the development of cancer treatment or prevention (Vazquez et al., 2018).

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Table 1 (continued)

Label (out of 90)	Elephant species that the study is focused on, description and evidence
22. Disease control	<u>Asian elephant</u> : Observations of elephant diet, health problems, and self-medicating behaviour in Asian elephants have contributed to human medicinal knowledge and use of medicinal plants (Dubost et al., 2019). <u>African savanna elephant</u> : Traditionally, elephant dung is burnt outside households as an insect repellent, keeping mosquitoes at bay and reducing potential incidents of malaria (Kuriyan, 2002).
23. Traditional medicinal use	<u>African savanna elephant</u> : In Maasai culture, elephant skin, dung, liver, placenta, amniotic fluids, milk, fat, bones, ear and fat are used for medicinal purposes. Elephant dung mixed with water is used to make sick people vomit to reduce diseases (Kioko et al., 2015). In Namibia, elephant dung is traditionally steamed and inhaled as a cure for flu, Covid19, and to treat body ailments such as nosebleeds (also in Limpopo, South Africa, Mafumo, pers. Comm. 2021), headaches and toothaches (Froneman, 2020). Powdered burned elephant bones or teeth are believed to cure swelling by Maasai people in Tanzania (Kioko et al., 2015). Elephant bones are used to treat rheumatism and bone fractures by Yoruba people in Nigeria (Soewu, 2008) <u>Asian elephant</u> : Indigenous people in Bangladesh apply powdered elephant dung mixed with ashes of medicinal plants as an ointment to treat skin diseases (Rahmatullah & Biswas, 2012). Asian elephant teeth and tusks are used for medicinal purposes, such as to treat conjunctivitis and pimples by tribal populations of Tamil Nadu in India, for toothache by the Biate tribe, and to treat eczema, leukoderma, and ringworm by the Naga people in India (Ngorima et al., 2020; Sajem Betlu, 2013; Solavan et al., 2004).
24. Food security	<u>African savanna elephant</u> : Apart from the fertilising services of their dung (see <i>formation of soils</i> ), which can contribute to increased food production, elephants can provide substantial meat protein. In some cultures, elephant meat, liver, fat, tongue, and bones are used for food (Kioko et al., 2015). Community members in the Kavango Zambezi Transfrontier Conservation Area in Zimbabwe identified meat as the primary benefit elephants provide to their livelihood (Ngorima et al., 2020). <u>African savanna elephant and Asian elephant</u> : In other cultures, such as Maasai, Samburu, Nuer and Karen, elephants will never be eaten due to their perceived similarity to people or as they are viewed as brothers or sisters (Greene, 2021; Kahindi, 2001; Kioko et al., 2015; Lemayian, 2018).
25. Ecotourism	<u>African savanna elephant</u> : Elephants attract tourists and are an important driver of tourism revenue (Brown, 1993; De Boer et al., 2007; Edge et al., 2017; Geach, 2002; Gnonlonfoun et al., 2019; Naidoo et al., 2016). Annually, a single living African elephant generates USD 22,966 from ecotourism (Iworry, 2014).
26. Job creation	<u>African savanna elephant</u> : Elephants provide jobs in nature-based tourism and spin-off industries (Blignaut et al., 2008; Naidoo et al., 2016). As elephants are key draw cards for international tourists (Brown, 1993; Sims-Castley et al., 2005), they not only contribute to job creation in reserves, but also in wider sectors such as transportation (air travel, local car hire, petrol), education, administration, media, research, conservation, tourism, anti-poaching industry (Massé et al., 2018), service delivery, security, marketing, communication, manufacturing, art/crafts, catering, guide

Table 1 (continued)

Label (out of 90)	Elephant species that the study is focused on, description and evidence
27. Community development	training, and construction (Gnonlonfoun et al., 2019). Wildlife-based ecotourism contributes to 3.5x more jobs compared to agricultural land use, provides more employee benefits, and provides proportionally more employment opportunities for women (Sims-Castley et al., 2005; Space for Giants, 2019). <u>African savanna elephant and Asian elephant</u> : Elephants also contribute to small enterprise development, such as the production of elephant-inspired crafts, using elephant dung for fuel supply, bio fertiliser, and the production of paper and soap (Canney, 2021; Petchimuthu & Fernando, 2019; Sayagie, 2021). <u>African savanna elephant</u> : Although elephants can also have a negative impact on communities, job creation from land use with elephants increases wealth and contributes to community development. Through community engagement and collaboration, communities are empowered to conserve natural resources, and gain fair access to the benefits of elephants (Canney, 2019). For example, the Elephant Dung Paper project in the Pongolapoort Nature Reserve in South Africa contributes to skill development, job creation, and education through school programs ( <a href="https://thewildlifespirit.com/projects/">https://thewildlifespirit.com/projects/</a> ). Through such projects, elephants provide opportunities to improve reserve-community relations.
28. Land value	<u>African savanna elephant</u> : Land surrounding 'Big 5' game reserves (i.e., reserves with elephant, lion ( <i>Panthera leo</i> ), African buffalo ( <i>Syncerus caffer</i> ), leopard ( <i>Panthera pardus</i> ), and rhinoceros ( <i>Ceratotherium simum</i> )) has a higher market value (Geach, 2002). The reserves' value also has trickle-down effects on the prosperity of neighbouring communities, creating opportunities for jobs, business and skill development (Di Minin et al., 2013; Sims-Castley et al., 2005). After investments, the value of a private game reserve in the Eastern Cape had increased by at least 10, up to 40x over a decade (Geach, 2002).
29. Conservation funding	<u>General</u> : As charismatic species, and given people's emotional attachment to elephants, elephants are regarded as flagship species that encourage biodiversity conservation in general (Albert et al., 2018; Bandara, 2004), and attracts substantial international funds for conservation (Biggs et al., 2008; Redmond, 1996). In India, for instance, the Asian elephant was used to raise awareness and promote conservation in the Rajaji and Corbett National Parks (Johnsingh & Joshua, 1994).
30. Trophy hunting <sup>1</sup>	<u>African savanna elephant</u> : In Namibia, trophy hunting financially supported 82 conservancies which cover about 20 % of the country's landmass. Over half of the income from trophy hunting in Namibia in 2013 was attributable to elephants (Naidoo et al., 2016). In Botswana, elephants represented 37 % of the income through trophy hunting (Blignaut et al., 2008). South Africa generated USD 1.19 million from hunting 33 elephants in 2012 (Di Minin et al., 2016). The Zimbabwe Parks and Wildlife Management Authority stated that between 2010 and 2015 about 65 % of CAMPFIRE contributions came from elephant hunts (USD 7.5 million in elephant hunting revenues in 5 years), by primarily American trophy hunters (Mandisodza-Chikerema, 2018). Botswana generated USD 2.3 million from selling hunting permits for 60 elephants in 2020 (an average of USD 39,000 per head) (Harvey, 2020).

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Table 1 (continued)

Label (out of 90)	Elephant species that the study is focused on, description and evidence
31. Forex and tax	<u>African savanna elephant</u> : Economic stimulation from elephants increased foreign exchange income, and national and regional tax revenues for elephant range countries (Blignaut et al., 2008).
32. Fiscal benefits	<u>African savanna elephant</u> : In South Africa, landowners receive a tax deduction for conservation commitment under the Income Tax Act. S 37D, which allows the value of elephant reserves to be deducted from taxable income (Stevens & Van Wijk, 2020).
33. National economy	<u>African savanna elephant</u> : It was estimated that over its' life, every elephant contributes over USD 1.6 million to the economy through travel companies, airlines and local businesses in Kenya, Tanzania, Zambia, and South Africa (Platt, 2014).
34. Entertainment	<u>Asian elephant</u> : Elephants have been used in zoos, circuses, and tourist camps involving elephant shows (elephants playing football or basketball, dancing, cycling, painting, making music, etc.), riding, washing, feeding, playing, or walking with them. In Thailand, where captive elephants are registered as working animals rather than as wildlife (Bansiddhi et al., 2020; Duffy & Moore, 2010), the price of an elephant was estimated to be as high as an expensive car (Schmidt-Burbach & Hartley-Backhouse, 2020). The average revenue from tourists bathing elephants in Thailand was USD 57.20 per visitor, which adds to a revenue of over USD 828,000 per day for all elephant bathing venues combined. An average full day of observation-only activity costs USD 106 (Duffy & Moore, 2010; Schmidt-Burbach & Hartley-Backhouse, 2020). It was estimated that pre-Covid-19, the captive elephant tourism industry generated between USD 581.3 to USD 770.6 million per year from 3,837 elephants in Asia (Schmidt-Burbach & Hartley-Backhouse, 2020). <u>African savanna elephant</u> : In South Africa, the price of interacting with, touching, and feeding elephants starts at USD 35 (the Elephant Sanctuary). <u>African savanna elephant and Asian elephant</u> : The average price for a one-hour ride was USD 42,80 in Thailand and at least USD 150 in Botswana. Elephants are also featured in films, television, and books across the world (Duffy & Moore, 2010).
35. Branding and marketing	<u>General</u> : As an icon representative of an area (e. g., the Elephant Coast, the African continent), elephants promote national/regional/local branding and stimulate natural land use. Elephants are used in logos to symbolise strength (Pretoria Portland Cement), memory (Evernote), or national heritage (Thai Chang beer, Kenyan Tusker beer, South African Amarula liqueur). The marketing value of elephants was captured and used by media retailers and other companies, such as Cote d'Or chocolate, or the Miss World Contest in South Africa (Duffy & Moore, 2010). As a Payment of Ecosystem Services, industries that used elephants for profit contributed financially to elephant conservation (e.g., Disney Worldwide Conservation Fund, National Geographic Conservation Trust, BBC Wildlife Fund, Lion's Share, Amarula Trust) (Good et al., 2017; Jepson et al., 2011).
36. Beasts of burden	<u>African forest elephant and Asian elephant</u> : Asian and African elephants were trained to be used as beasts of burden for transportation, agricultural work, war projects, or logging (Bansiddhi et al., 2020; Bennett, 1957; Lainé,

Table 1 (continued)

Label (out of 90)	Elephant species that the study is focused on, description and evidence
37. Live sales <sup>1</sup>	2016; Locke & Buckingham, 2016; Vanitha et al., 2011). <u>African savanna elephant</u> : Zimbabwe generated USD 2.7 million through selling over 90 live elephants to China and Dubai in 2019 (USD 30,000 each). In South Africa, between 2005 and 2007, live elephants were sold for USD 40,000–75,000 (trained elephants), USD 3,500–35,000 (juveniles), USD 1,000 (breeding herds, price per elephant), USD 4,800–6,800 (bulls) (Blignaut et al., 2008). <u>African savanna and forest elephant</u> : As of 2019, wild-caught African elephants can only be sold "to in-situ conservation programmes or secure areas in the wild, within the species' natural and historical range in Africa" (CITES, 2019a). <u>Asian elephant</u> : Myanmar exported 101 live elephants between 1980 and 2005, mainly to the Netherlands and China (Shepherd & Nijman, 2008). In Myanmar, 240 elephants were illegally captured between 2004 and 2006, and about 80 elephants between April 2011 and March 2013, for sale to tourist facilities in Thailand, for between USD 21,500 and USD 30,500 per individual elephant (Nijman, 2014; Shepherd & Nijman, 2008).
38. Ivory <sup>1</sup>	<u>General</u> : Even though most international trade in ivory is illegal under CITES, domestic ivory trade is allowed, if the ivory (products) is/are registered, and it does not contribute to poaching or illegal trade (CITES, 2019b). Between 2007 and 2017, almost 365,000 kg of ivory was seized (CITES, 2018). Ivory prices were highest in Asia and lowest in Africa (Sosnowski et al., 2019). In 2020, the average price for raw ivory in Africa was estimated at 92 USD/kg, a decline from the value of 208 USD/kg in 2017 (Rapid Assessment of the Illegal Ivory Trade in 2020, 2020). In 2011, the average wholesale price of raw ivory at workshop level was reported as USD 791/kg in Vietnam. In contrast, a kilogram of raw ivory at poachers level was sold on average for USD 26/kg in Cameroon (Stiles et al., 2011). Japan and China bought 102 tons of ivory from Botswana, Namibia, South Africa and Zimbabwe through CITES-sanctioned auctions in 2008, for on average USD 157/kg, amounting to a total of USD 15 million (CITES, 2008). <u>African savanna elephant</u> : Under certain circumstances, non-commercial international trade in individually marked and certified worked ivory (e.g., carvings or jewellery for personal or household use) is allowed for Namibia and Zimbabwe (CITES, 2017a; CITES, 2017b). <u>Asian elephant</u> : The demand for ivory in East Asia, where it is used in medicine, curios, and luxury goods, is the main driver of poaching in Africa (Ngorima et al., 2020). Data from 2019/2020 showed a decrease in elephant poaching, which could be linked to a lower ivory price because of stricter law enforcement in China and elsewhere (Vigne, 2021; WJC, 2020a). However, large quantities of ivory are still on offer (WJC, 2020a), and it is unclear how the lifting of COVID travel restrictions, which limits ivory import into China, will affect ivory demand (Vigne, 2021; WJC, 2020b). Illegal trade in ivory and elephant parts in Mong La in Myanmar totalled an estimated USD 1.2 million during a 2013–2014 survey (Nijman & Shepherd, 2014). On average, one tusk was worth about USD 20,000.
39. Poaching <sup>1</sup>	<u>African savanna elephant</u> : In areas with high rates of unemployment and a lack of alternatives,

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Table 1 (continued)

Label (out of 90)	Elephant species that the study is focused on, description and evidence
40. Elephant products	poaching can provide (illegal) income for impoverished families (Massé et al., 2018). In the Okavango Delta, for instance, almost half of the respondents of a household survey stated that they poach a variety of wildlife for subsistence purposes, while 35 % noted that they poach for commercial reasons (Mogomotsi et al., 2020). <u>General:</u> Besides the tusks, which are in most cases the reason for poaching, other body parts may be used for commercial or personal reasons, such as meat, feet, skin, tail, trunk, ears, fat, bone marrow, musth liquid (Cameroon), molars, pelvic bones, jewellery made out of elephant tail hairs (Myanmar, Thailand), and elephant skin beads and powder (Myanmar) (Elephant Family, 2018; Shepherd & Nijman, 2008; Stiles et al., 2011). In Maasai culture, elephant parts were used for commercial purposes (Kioko et al., 2015). For the poacher, the financial profit of elephant meat may exceed that of ivory (Stiles et al., 2011). Elephant dung is used to produce paper, soap, coffee and beer and as a mosquito repellent (Brough, 2015; Sayagie, 2021).
41. Wildlife industry	<u>General:</u> Industries centred around the management and protection of elephants emerged due to the need for anti-poaching measures, training of rangers and guides, translocation (Blignaut et al., 2008), or in the development, sales and implementation of equipment such as tracking, insurance, wildlife ranging, camera traps, genetic testing, darts, etc. (Marvin et al., 2016).
42. Other commercial uses	<u>Asian elephant:</u> Private elephant owners offered their elephants to join ceremonies (e.g., temple festivals, engagements, weddings), commercial activities (e.g., film shoots, VIP programs, circus companies) or used elephants for street begging (Vanitha et al., 2011).
43. Artistic worth	<u>General:</u> The artistic worth of elephants is represented through elephant jewellery, fashion, curios, sculpture and paintings (Gnonlonfoun et al., 2019; Redmond, 1996; Vijaykrishnan & Sinha, 2019).
44. Promotion benefit	<u>African savanna elephant:</u> The aesthetic benefit of, for instance, an elephant silhouette in front of an acacia tree at sunset is an image that promotes a continent as a tourist destination (Redmond, 1996).
45. Aesthetic satisfaction	<u>African savanna and forest elephant:</u> People derive aesthetic satisfaction from elephants and argue for humanitarian and compassionate considerations in elephant conservation (Glennon, 1990).
46. Psychological Well-being	<u>African savanna elephant:</u> Spending time in nature contributes to increased psychological well-being and reduced mental illness, mental fatigue or aggressive behaviour, implying that the same effects occur when observing content elephants in intact ecosystems (Bratman et al., 2019; Hausmann et al., 2016).
47. Physical and therapeutic benefits	<u>Asian elephant:</u> Elephant-assisted therapy for people with autism is argued to improve adaptive behaviour, sensory processing, postural control, and balance (Satiensukpong et al., 2008). Children with Down syndrome may have benefited from elephant-assisted therapy in improved visual motor integration (the ability to make sense of visual information and use it appropriately for motor tasks such as tool use, sports or writing) (Satiensukpong et al., 2016).
48. Spiritual fulfilment	<u>African savanna elephant:</u> Spending time observing elephants and contributing to their conservation provides a sense of physical, emotional, and spiritual fulfilment (Naidoo et al., 2019; Wittemyer et al., 2008).

Table 1 (continued)

Label (out of 90)	Elephant species that the study is focused on, description and evidence
49. Elephant research	<u>African savanna elephant:</u> After chimpanzees, African elephants are the most studied large mammals in sub-Saharan Africa (Trimble & van Aarde, 2010), contributing to increased scientific knowledge. <u>General:</u> Due to the complexity of elephant conservation challenges, elephants motivate consideration of human dimensions of conservation and multi-disciplinary research (Marchini, 2014).
50. Knowledge of other species	<u>General:</u> Studies and conservation strategies initially intended for elephants may be applicable to the conservation of other species. For instance, (transboundary) collaboration between different stakeholders (e.g., the African and Asian Elephant Action Plans, Convention on the Conservation of Migratory Species of Wild Animals (CMS)) focused on elephants may also be used to study or conserve other species. Mitigation methods developed to reduce human-elephant conflicts may also work for other human-wildlife conflicts (e.g., compensation and insurance schemes, fencing, community conservation, Hoare, 2015). Elephant researchers have contributed to knowledge about trees' survival strategies in savanna ecosystems, and elephant researchers have induced evolutionary association between ants and trees (Goheen & Palmer, 2010; Sheil & Salim, 2004).
51. Inspiration	<u>Asian elephant:</u> Observing the behaviour and character of elephants provides spiritual inspiration, for instance for Buddhists (Ramanathapillai, 2009). <u>General:</u> As an iconic species, elephants inspire people to develop an interest in them. People study, admire, respect or worship them, which can influence peoples' actions and interest in conservation (Barua, 2011).
52. National animal	<u>Asian elephant:</u> The Asian elephant is Thailand's national animal and is used to increase public awareness of the need to conserve elephants and conservation in general (Clucas et al., 2008). In India, elephants are declared the national heritage animal; most people in India cannot imagine their country without elephants (Bist et al., 2002). In the past, the King of Laos declared the Asian elephant the national animal of Lao PDR (Norachack, 2002). <u>African forest elephant:</u> The African elephant is the national animal of Côte d'Ivoire (Ivory Coast), which used to be home to one of the largest elephant populations in West Africa. The country dedicated its name to elephants and declared elephants their national animal (Kouakou et al., 2020).
53. Educational value	<u>General:</u> Various conservation organisations offer educational programs centred around elephants for local schools and communities. Educational programs focusing on animal cognition have the potential to create a bond between people and other species and create more positive attitudes towards conservation (Makecha & Ghosal, 2017).
54. Indigenous knowledge incorporation	<u>African savanna elephant:</u> Some elephant conservation strategies encourage incorporating indigenous knowledge into natural systems management and community engagement in conservation (Kuriyan, 2002).
55. Localised embedded value	<u>African savanna elephant:</u> Integrating the local meaning, locally embedded value of elephants, and concerns about elephants in conservation strategies, will result in local support for conservation (Büscher & Fletcher, 2020; Kamau, 2017).

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Table 1 (continued)

Label (out of 90)	Elephant species that the study is focused on, description and evidence
56. Localised experiences	<p><b>African savanna elephant:</b> The tourist perception of elephants differs from the perception of people sharing habitat with elephants, especially when their crops are impacted by elephants, or when fear of elephants impacts their lives (Redmond, 1996). Perceptions of elephants and large trees vary between tourists and private landowners (Edge et al., 2017).</p> <p><b>Asian elephant:</b> Local residents are more willing to pay for human-elephant conflict (HEC) mitigation if they have experienced HEC injury in their family (Neupane et al., 2017), and are more tolerant toward elephants when they experience benefits from living with elephants (Van de Water &amp; Matteson, 2018).</p> <p><b>General:</b> When conservation solutions are at odds with local people's lived experiences, they may not be effective (Jimenez-Soto, 2020).</p>
57. Equitable access	<p><b>African savanna elephant and Asian elephant:</b> Local perceptions about elephants and conservation are influenced by historical experiences, access to, and control over lands and resources, and the sharing of benefits, including non-materialistic benefits of living with elephants (Kamau, 2017; Kansky et al., 2020; Van de Water &amp; Matteson, 2018). Therefore, elephants highlight the need to ensure equitable access to the benefits of nature.</p>
58. Maintenance of traditions	<p><b>African savanna elephant and Asian elephant:</b> In Maasai and Karen cultures, elephant parts and products have traditionally been used for cultural, spiritual, and ceremonial purposes. The loss of these practices equates to the degradation of traditional culture (Greene, 2021; Kioko et al., 2015). In various cultures in Africa and Asia, elephants form an integral part of religious or spiritual traditions (Vanitha et al., 2011).</p> <p><b>Asian elephant:</b> In almost all south and southeast Asian countries, elephants have spiritual significance, and people feel a strong connection with elephants (Locke, 2017). In some Buddhist communities, elephant calves are welcomed as members of the community by rituals to connect the souls to the body, similar to when people are born (Greene, 2021).</p>
59. Symbolism	<p><b>General:</b> Elephants symbolise wisdom, loyalty, patience, and power; they provide cultural benefits like totems (symbols of power and royalty), and as political emblems (e.g., the Republican Party in the United States). In San mythology, elephants are linked to rainmaking (Deacon, 1988). Cultures with a deeply rooted connection to nature may consider elephants to be sacred or have elephants as their totem or clan name to acknowledge interconnectedness, and advocate for their protection and the integrity of creation (Alves &amp; Souto, 2015; Kioko et al., 2015; LenkaBula, 2008).</p>
60. Religious value	<p><b>Asian elephant:</b> Elephants have religious significance in Buddhist and Hindu traditions (god Ganesh), in royal rituals and processions (Bansiddhi et al., 2020; Bowen-Jones &amp; Entwistle, 2019; (Buckingham, 2016); Jayewardene, 1994; Ringis, 1996; Sukumar, 2011). For instance, the night before Queen Maya gave birth to Buddha, she dreamt that a white elephant visited her. According to Jataka tales, Buddha had several elephant lives before his final reincarnation as a human being (Ramanathapillai, 2009; Wisumperuma, 2012). In Thailand, elephant statues can be found in stupas and on the corners of Buddhist temples to provide protection (Ringis, 1996). In Hinduism, elephants are associated with Ganesh, the God of wisdom and the remover of obstacles, and with Erawan, the</p>

Table 1 (continued)

Label (out of 90)	Elephant species that the study is focused on, description and evidence
61. Philosophical significance	<p>white elephant with three heads who carries Indra, the king of heaven and the God of rain and fertility (Greene, 2021). Temples in India use captive elephants to perform rituals for the deity, bless devotees, and participate in temple-festival processions (Vanitha et al., 2011).</p> <p><b>Asian elephant:</b> Buddhist philosophy elevates elephants beyond the natural and human realms while emphasising that all beings are equal but can reach superior potential (Ramanathapillai, 2009). In Buddhism and Hinduism, elephants are seen as a symbol of mental strength and are, therefore, highly respected.</p>
62. Rooting people in the natural world	<p><b>African savanna elephant:</b> Maasai people view elephants as similar to people in many ways and, therefore, care about their well-being (Kioko et al., 2015). A Samburu clan believes elephants came from humans and sees elephants as brothers and sisters who may not be killed (Kahindi, 2001; Lemayian, 2018).</p> <p><b>African forest and Asian elephant:</b> Amongst Nuer (Sudan), Karen (Myanmar, Thailand) and Nepali people, the lives of elephants and people are viewed as entangled, and they have developed an intricate relationship with elephants in which they award elephants a degree of personhood (Greene, 2021; Kioko et al., 2015; Locke, 2013; 2017). For instance, for Nuer people killing an elephant is viewed as similar to killing a human being (Greene, 2021). In Assam, people and elephants both create pathways, contributing to shared habitat enhancement (Keil, 2016).</p>
63. Folklore	<p><b>African savanna, forest and Asian elephant:</b> Elephants provoke a nostalgic appreciation of stories of the past. Elephants symbolise wisdom and leadership in folklore and traditions. Oral stories and legends, such as the view that elephants were once human (Kioko et al., 2015), illustrate a high level of integration of elephants in Maasai, Nuer, and Karen cultures.</p>
64. Oracles	<p><b>Asian elephant:</b> Ancient cultures in China used elephant bones as oracles to advise on decisions affecting society (Dress et al., 2016).</p>
65. Talismans, protection, and luck	<p><b>African savanna elephant:</b> In Kenya, elephant dung is used for various medicinal and cultural purposes, such as the use of elephant dung smoke for cultural or spiritual cleansing, for instance, to repel evil spirits when opening a new house or during a marriage ceremony (Lemayian, 2018). A piece of elephant skin worn on the body is believed to give protection, and a piece of dried placenta is believed to bring luck (Kioko et al., 2015).</p> <p><b>Asian elephant:</b> Rings or pendants of ivory or elephant tail hair are worn for protection against strong spirits by Karen people by catalysing the spiritual strength of the elephant (Greene, 2021). As elephants are believed to increase fertility in Thailand, couples sometimes pose under elephants, elephants participate in fertility ceremonies and parades, and the umbilical cord of a new-born elephant is used in rituals to increase fertility, and to ensure a strong and healthy child (Greene, 2021).</p>
66. National Heritage	<p><b>Asian elephant:</b> Nations where elephants occur view elephants as their national heritage, enhancing people's sense of place. Elephants are symbols of national pride (e.g., the national animal of Thailand), and form an integral part of Indian culture and religion (Johnsingh &amp; Joshua, 1994). Elephants are valued for their services in past wars, contributing to the pride and identity of countries (e.g., China, Thailand, Indonesia, Vietnam) (Bowen-Jones &amp; Entwistle, 2019).</p>

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Label (out of 90)	Elephant species that the study is focused on, description and evidence
67. Emotion	<u>African savanna elephant</u> : Throughout history, people have felt a close affinity with elephants; few animals evoke such strong emotions as elephants (Blignaut et al., 2008).
68. Social compacts	<u>General</u> : To conserve elephants and secure ecological systems while improving human well-being and social cohesion simultaneously, national and regional elephant conservation strategies should be aligned with global, regional and national aspirations, for instance the SDGs, CBD, IPBES, the Nagoya protocol, CITES, the African and Asian Elephant Action Plans, CMS, the UN Declaration on the right of indigenous peoples or Ubuntu (Pascual et al., 2017, 2021; Van de Water et al., 2022; Van Norren, 2020). Together, the specific and concrete benefits of elephants for human and nonhuman nature contribute to the achievement of multiple regional and global goals. As elephants require large-scale protected areas, their conservation helps meet biodiversity conservation goals through encouraging land use for conservation purposes (Albert et al., 2018; Redmond, 1996).
69. Collaborations to meet aspirations	<u>General</u> : All elephant range states collaborate through IUCN's Asian and African Elephant Specialist Groups. Thirty African elephant range states joined the African Elephant Coalition ( <a href="https://www.africanelephantcoalition.org">https://www.africanelephantcoalition.org</a> ). As Asian elephants are listed in Appendix I of the Convention on Migratory Species, they strengthen transboundary conservation and cooperation (Joshi & Puri, 2021). By requiring large spaces, elephants encourage us to think beyond isolated protected areas, and to consider transboundary movements. This motivates transboundary cooperation to maintain meta-population processes. In Southern Africa, five Transfrontier Conservation Areas (TFCAs) have been established, generating ecological but also economic benefits in the form of international development assistance (Lindsay et al., 2017). At national levels, in some elephant range states government, elephant specialists, NGO's, elephant owners and managers, and communities living with elephants work together in processes to develop National Elephant Strategies, Elephant Action Plans, or Norms and Standards for the management of elephants. At local levels, elephants create opportunities for scientists, NGOs, government, and local communities to collaborate.
70. Global reputation	<u>Asian elephant</u> : Elephants can impact the reputation of nations on a global scale. For instance, a recent elephant migration in China captured the world's attention, and China received worldwide praise for its professional and considerate handling of the wandering elephants (e.g., evacuating towns and blocking roads to make way for the elephants, full compensation for damage, use of non-invasive technology). The media hype was a rare occasion of positive news about animal conservation in China, which helped create a more positive perspective on the country. A welcome message, as president Xi Jinping called in May 2021 for a "credible, lovable and respectable image of China" after receiving global criticism about human rights abuses. This showed that elephant conservation serves the nation's interests, and successful, soft power conservation approaches can enhance a country's global reputation (Li, 2021).
71. Balanced peoples' values	<u>General</u> : Framing conservation strategies around people's aspirations and values promotes more diverse relations between human and nonhuman

Table 1 (continued)

Label (out of 90)	Elephant species that the study is focused on, description and evidence
72. Ubuntu	<u>General</u> : As an African social compact for just relations between humanity and nonhuman nature, Ubuntu is relevant to African elephant conservation. Ubuntu promotes harmonious relations based on respect for nature for nature's sake, and economic and ecological justice for all, especially for communities that are negatively affected by ecological destruction and economic globalization (LenkaBula, 2008; Van Norren, 2020). Relatedness to future generations as expressed in the notion of Ubuntu can contribute to an ongoing discourse in environmental philosophy about our moral obligations to future generations (Grange, 2015). Ubuntu mitigates against the impact of capitalism and economic globalisation, harmful ecological practices, excessive exploitation of ecological resources, and privatisation of commons. Instead, it advances human dignity by promoting attitudes of care and nurture (LenkaBula, 2008).
73. Transcendental values	<u>General</u> : Conceptions about desirable end states or behaviours that transcend specific situations, such as harmony with nature (Raymond & Kenter, 2016). Aligning elephant conservation with local people's transcendental values will enable local support for conservation, reciprocity, and harmony with nature (Raymond & Kenter, 2016; Van de Water et al., 2022; Van Norren, 2020).
74. Existence value	<u>Asian elephant</u> : Elephants impart to people a feeling of well-being derived from knowing that elephants exist (Bandara & Tisdell, 2003; Wang et al., 2020). Motivated mainly by the non-use values of elephants, 88.7 % of urban residents in Sri Lanka reported being willing to pay for solutions to reduce conflicts between elephants and people (Bandara & Tisdell, 2002). Chinese residents were willing to annually donate USD 232 for the conservation of African elephants (Wang et al., 2020). <u>African savanna elephant</u> : People in Sweden were estimated to be willing to pay USD 53.7 million for the conservation of African elephants (Blignaut et al., 2008). <u>General</u> : Many people are willing to pay for elephant conservation, simply to know that elephants will continue to exist (Glennon, 1990), which may be influenced by feelings of moral obligation towards elephants (Bandara, 2004), or by past experiences of elephants (Bandara & Tisdell, 2002).
75. Socio- ecological sustainability	<u>General</u> : The elephant's existence and bequest value contribute to intergenerational legacy, which is a prerequisite for socio-ecological sustainability and resilience (e.g., the Well-being of Future Generations (Wales) Act 2015, anaw 2).
76. Bequest value	<u>General</u> : People enjoy the existence of elephants, and would like to know that elephants will continue to exist in the wild for future generations to enjoy (Bandara, 2004; Brown, 1993).
77. Moral status of people	<u>African savanna elephant</u> : The judgement of a lion bone case in South Africa gave two reasons for the constitutional importance of animal welfare: 1) to prevent the degeneration of the moral status of humans, 2) the intrinsic values we place on animals as individuals (Society for

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Label (out of 90)	Elephant species that the study is focused on, description and evidence
78. Animal personhood	<u>Prevention, 2019</u> . Conceptually, this easily extends to supporting the welfare of elephants. <u>Asian elephant</u> : As sentient beings, elephants have been recognised as persons in Sri Lanka in 2014, when an illegally captured elephant calf was found and taken into a rehabilitation facility. In the legal prosecution, the elephant was considered the “aggrieved party” ( <u>Jasinghe &amp; Fernando, 2016</u> ). In 2018, the elephant Happy became the first elephant to have a habeas corpus hearing on an elephant’s legal personhood and right to bodily liberty ( <u>Nonhuman Rights Project, 2018</u> ).
79. (Non) human rights	<u>African savanna elephant</u> : Limited elephant rights have been included in several policy and elephant management plans, such as the South African Norms and Standards for Elephant Management ( <u>DEAT, 2008; Lötter et al., 2008</u> ). <u>Asian elephant</u> : In 2018, a High Court in India ruled that animals have the status of legal entity/legal person ( <u>Pallotta, 2019</u> ). In 2020, a High Court in Pakistan recognised legal rights to nonhuman animals and ruled that keeping the elephant Kaavan in solitary confinement was an infringement of the right to life ( <u>Islamabad Wildlife Management Board v. Metropolitan Corporation Islamabad, 2019</u> ) . General: Conservation strategies should aim to reconcile the rights of human and nonhuman species ( <u>Shoreman-Ouimet &amp; Kopnina, 2015</u> ). In 2008, Ecuador became the first country to include the rights of Nature in its constitution, as a new sustainable development tool based on living in harmony with nature ( <u>Kauffman &amp; Martin, 2017</u> ).
80. Compassion	<u>Asian elephant</u> : According to the Indian Constitution, citizens are expected to show compassion towards all living creatures, and the use of elephants for entertainment is illegal ( <u>Brara, 2017</u> ).
81. Moral duty	<u>General</u> : If an action is wrong, based on accepted rules or ethics, we are morally obligated not to commit the act, regardless of any beneficial outcomes. The intentions of the act are what count, rather than the outcomes ( <u>Batavia &amp; Nelson, 2017</u> ). By recognising our moral duty to protect higher-order intelligent species against exploitation ( <u>Bandara, 2004</u> ), and by incorporating ‘integrative’ values, conservation decisions will not exclusively be based on economic benefits, self-interest or the greatest utility, but on attitudes of respect, and the acknowledgement of relationships between all living beings and their environment ( <u>Bilchitz, 2017; Lötter et al., 2008</u> ).
82. Distributive justice for human and nonhuman nature	<u>General</u> : The environment should be protected for humans and nonhuman nature alike, which is justice for nature ( <u>Kopnina &amp; Washington, 2020</u> ), and the benefits from nature, including elephants, should be equally shared amongst all people ( <u>Blackmore, 2017</u> ). Conservation strategies should acknowledge that whether people view elephants as an asset or a burden may stem from inequality created by industrial economic development ( <u>Kopnina, 2016</u> ). Through distributive justice, risks associated with an excessive focus on economic growth can be moderated, recognising issues related to power, access, and justice ( <u>Menton et al., 2020; Van de Water et al., 2022</u> ).
83. Procedural justice	<u>General</u> : Procedural justice concerns fair and equitable processes and decision-making, including the distribution of benefits and burdens and recognition of who is involved and has influence in those decisions ( <u>Menton et al.,</u>

Table 1 (continued)

Label (out of 90)	Elephant species that the study is focused on, description and evidence
84. Social justice	<u>2020</u> ). Community participation in elephant conservation decisions, good governance, and economic transparency of benefit distribution enhances people’s positive attitudes toward elephants ( <u>Neupane et al., 2017</u> ). Marginalising people who bear the brunt of conservation leads to inequality, which, in turn, leads to resistance to conservation and, sometimes, violence towards elephants or authorities ( <u>Mariki et al., 2015</u> ). <u>General</u> : The recognition of and respect for inter-human differences, traditional knowledge, cultural practices, the challenges of living with elephants, for different collective identities and their concerns, needs and livelihoods in relation to the environment should be integrated into inclusive conservation strategies ( <u>Menton et al., 2020; Van de Water et al., 2022</u> ).
85. Ecological justice	<u>General</u> : From a non-anthropocentric perspective and especially for elephants, environmental justice does not only concern people, but it also entails moral and legal considerations about the treatment of nonhumans ( <u>Kopnina, 2016</u> ). Through its nature, elephant conservation promotes integrated strategies that aim for justice for all species and mitigation of contention between those conservationists who focus on people and those who focus on wildlife or the environment, reconciling social justice and ecological justice ( <u>Shoreman-Ouimet &amp; Kopnina, 2015</u> ).
86. Dignity and justice for indigenous peoples	<u>General</u> : Moderation of elephant conservation decisions through a human rights filter ensures that decisions are fair and based on principles such as equality, inclusion, dignity, and freedom (e.g., UN Declaration on Rights of Indigenous People) ( <u>Canney, 2021; Van de Water et al., 2022</u> ).
87. Gender equality	<u>General</u> : Elephant conservation provides opportunities for equitable social development, and can contribute to reduced gender inequality, for instance through the empowerment of women through skill development for ecotourism, for women-led initiatives to mitigate human-elephant conflicts by using chilli or beehive fences ( <u>Chang’a et al., 2016; Van de Water et al., 2020</u> ), or all-female anti-poaching teams ( <u>Mkono et al., 2021</u> ).
88. Healthy environment and human well-being	<u>General</u> : states have a legal obligation to protect people’s right to a healthy environment, which is expressed in over 100 constitutions ( <u>Boyd, 2018; Menton et al., 2020</u> ), such as the right for all South Africans to have their environment protected ( <u>South African government, 1996</u> ) or the right for every person in Norway to an environment that is conducive to health and to natural surroundings whose productivity and diversity are preserved ( <u>The Constitution of Norway, article 112, 2018</u> ). As the previous benefits show, elephants contribute to healthy environments and enhance well-being.
89. Participation by indigenous peoples	<u>General</u> : Indigenous peoples have experienced historic injustices from colonisation and dispossession of lands, territories and resources (UN charter Indigenous people). In Africa alone, the number of people evicted to make way for conservation is estimated at 900,000 to 14.4 million (e.g., 250,000 people were evicted to establish Kruger National Park) ( <u>Geisler &amp; De Sousa, 2001</u> ). Top-down, fortress conservation approaches with elite access open the door to racial, gender and class divisions ( <u>Büscher, 2016; Büscher &amp; Fletcher, 2020</u> ). Recently proposed policy changes propose inclusive conservation strategies, by putting people at its core, and

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90. Equitable development	<p>promoting the participation of local people (e.g., South Africa's Draft policy position on the conservation and ecologically sustainable use of elephant, lion, leopard and rhinoceros, <a href="#">DFFE, 2021</a>).</p> <p><u>General:</u> Elephant conservation strategies should balance conservation and human development goals, and acknowledge that exclusion-based, or an inordinate focus on economic growth and the commodification of nature, promote short-term human gain thereby risking increasing poverty and inequality (<a href="#">Büscher &amp; Fletcher, 2019</a>; <a href="#">Canney, 2021</a>).</p>

<sup>1</sup> It is important to consider that killing or displacing elephants can disrupt their behaviour and socio-ecological functioning ([Goldenberg and Wittemyer, 2017](#); [Goldenberg et al., 2018](#); [McComb et al., 2011](#); [Shannon et al., 2013, 2022](#); [Slotow et al., 2000](#)), potentially undermining the long-term viability of populations. The benefits that require the killing of elephants also compromise a wide range of ecological, relational, and moral values, which can lead to negative unintended consequences.

deadlocks ([Biggs et al., 2017](#); [Daw et al., 2015](#)). Fair representation of all arguments, with appropriate weightings given to all voices, and recognition of moral principles, can help to overcome these deadlocks ([Biggs et al., 2017](#)).

#### 4. Discussion

Like many global conservation approaches, elephant conservation tends to have a narrow, one-dimensional focus which prioritises certain values of nature, such as economic or ecological values, over others ([Pascual et al., 2021](#); [Van de Water et al., 2022](#)). Current elephant value assessments typically focus on their Total Economic Value, the valuation of ivory trade (average of USD 20,000 per tusk), trophy hunting (average of USD 39,000 per elephant head), or the carbon captured by elephants (estimated at USD 1.75 million per living African forest elephant) ([Bandara & Tisdell, 2003](#); [Blignaut et al., 2008](#); [Chami et al., 2020](#); [Geach, 2002](#); [Naidoo et al., 2016](#)). These assessments quantify elephants' benefits for human and nonhuman nature in terms of monetary value, and this economic value is then used to argue for their conservation ([Di Minin et al., 2013](#)). However, such a one-dimensional lens can promote conservation approaches that risk violating principles that are included in social compacts (e.g., the Sustainable Development Goals, the Convention on Biological Diversity, the UN Declaration on Rights of Indigenous Peoples, the African philosophy of Ubuntu), and, ultimately, contribute to continued environmental decline.

For example, promoting the belief that nature must provide financial benefits to people - as 'new conservation' perspectives do (e.g., [Kareiva, 2014](#); [Marvier, 2014](#)) - will lead to decisions based solely on instrumental benefits. Applying the pluralist valuation system shows that this focus on instrumental benefits for people, and collaboration with profit-driven companies, may ignore benefits such as intergenerational legacy and the intrinsic value of nature. This can be viewed in the highly controversial topics of ivory trade, poaching, culling, and trophy hunting, which may provide short-term financial gain, but which could have long-term consequences that are often not considered, such as disruption of animal well-being and social systems which can affect environmental health, and which also ignore human (sacred) values. Acting for short-term gains often encourages unsustainable natural resource extraction to the cost of long-term conservation ([Bilchitz, 2017](#); [Büscher & Fletcher, 2019](#); [López-Bao et al., 2017](#)). Conversely, protectionist conservationists ([Hutton et al., 2005](#)) - who also apply a one-dimensional lens - emphasise aesthetic or ecological values of nature and pristine wilderness, while local people are excluded. Applying our pluralist

valuation system, we see that these one-dimensional approaches ignore or even violate the value systems and views of people living alongside wildlife, who may have additional relationships with nature, incorporating multiple values ([Pascual et al., 2021](#)).

To develop more effective, equitable and fair conservation policies and practices, it is crucial to understand and incorporate a wide range of values of nature. The pluralist elephant valuation system presented in this paper promotes systematic thinking about the various interactions between elephants, the environment, and people. First, we highlight that instrumental benefits are broader than direct-use economic benefits like elephant viewing, rides, or hunting. For instance, evidence of the estimated USD 1.75 million indirect-use value for humanity per living African forest elephant exceeds direct-use economic benefits by far and provides additional arguments for legal rights for elephants ([Chami et al., 2020](#)). Secondly, we demonstrate the impossibility of using a single measurement scale to comprehensively recognise and realise all benefits and values associated with elephant conservation ([Bengston, 1994](#)). Sacred principles (e.g., human life, nature, freedom), for instance, cannot be expressed in one-dimensional economic values. Thirdly, we emphasise that one-dimensional conservation objectives, whether they focus on a benefit in isolation, or are planned by a stakeholder with a single value system, do not incorporate the diversity of stakeholder perspectives and the multiple values of nature, which will result in trade-offs that can be very contentious ([Lainé, 2018](#)). Our pluralist valuation approach added moral values to the IPBES classification system. These are often the strongest sacred values and ignoring these values results in limited understanding of the consequences of taboo and marginalisation trade-offs. Furthermore, by adding the dimensions of sacred-secular principles to the IPBES system, greater clarity is provided on the importance of understanding, recognising, and incorporating the full spectrum of benefits and values associated with elephant conservation, including peoples' worldviews. This is the first step for stakeholders to build mutual trust and look beyond what seem to be irreconcilable views on conservation ([Biggs et al., 2017](#)). The sacred-secular principles dimension will aid policymakers and managers in developing conservation strategies that incorporate hitherto often neglected indigenous knowledge systems, respect the rights of local people and long-term sustainability ([Pascual et al., 2021](#)).

We acknowledge that the presented elephant valuation assessment has some limitations. First, it focuses only on favourable valuations of elephants (services) and does not assess potential disservices (sensu [Ceaşu et al., 2018](#)), such as crop damage and threat to human life, which are a serious concern in most elephant range countries ([Di Minin et al., 2021](#); [Shaffer et al., 2019](#)), nor potential ecological disservices that elephants cause to vegetation ([Asner et al., 2016](#); [Henley & Cook, 2019](#)). Secondly, categorising all benefits of elephants involves a risk of double counting, as some services of elephants (e.g., supporting and regulating ecosystem services) are inputs to other benefits of elephants ([Brouwer et al., 2013](#)). For instance, elephants, as keystone species (benefit 45) feed into their aesthetic value (benefit 28), contribution to psychological well-being (benefit 34) and inspiring people (benefit 40), which in turn makes elephants a flagship species for conservation (benefit 61). Although overlaps are eliminated as much as possible, some overlapping benefits remain as we believe it is important to incorporate final and intermediate services to highlight the multi-dimensionality of value systems in which certain services benefits will influence the potential of perceiving other benefits. Furthermore, people may prioritise elements differently, which is lost when collapsing the detail. A better understanding of the interlinkages between (partly) overlapping benefits is key to promoting consideration of all these aspects in conservation.

Thirdly, the question as to whether all peoples' values should be considered equally in specific circumstances remains open. It may be necessary for conservation policymakers and practitioners to develop relative value weightings, dependent on circumstances. For example, the needs, rights, and values of people who experience elephant crop

damage could be rated higher than those of people that have never experienced elephant disservices. However, it is evident that only by first recognising *all* values and stakeholders, can informed, appropriate, and fair decisions about relative weight be made. Fourth and relatedly, implementation can be challenged by power imbalances, as the short-term, private interests of powerful stakeholders may overwhelm the system, even when there is awareness of the importance of balancing benefits and respecting all value systems. We hope our valuation assessment stimulates understanding and robust decisions that minimise trade-offs for current and future generations, by counterbalancing short-term, private, or inequitable interests against long-term common good (Nilsson et al., 2016).

Long-term common good centres around sacred principles that are shared (or at least recognised), and intergenerational. These are largely captured within the Moral values added to the IPBES classification system. We believe that including these will facilitate recognition of the long-term common good, which aligns with the concept of the public trust doctrine in which the environment is protected for all people, to serve the public interest and protect our common heritage (Blackmore, 2017). The recognition of sacred principles, the multiple value systems of people living with wildlife, and the transparent and equitable evaluation of potential trade-offs between secular and sacred principles, lead to conservation solutions that respect human rights, good governance, intergenerational legacy, and environmental justice (the social compact filters of Van de Water et al., 2022). Although it may remain impossible to realise 100 % satisfaction for all stakeholders involved in conservation decision-making, we believe that the presented process ensures consideration of all stakeholders' worldviews and interests, along with increased transparency and accountability. The greater understanding this would allow will promote the levels of consensus that are necessary to move forward collectively.

#### 4.1. From one-dimensional to mutually reinforcing strategies

Careful consideration of moral values in conservation decisions adds a circular dimension that promotes biodiversity conservation and facilitates the resolution of trade-offs. For instance, when people lose access to conservation areas on which they historically depended, compensation through creating temporary jobs with poor labour conditions (i.e., a marginalising trade-off) may result in social division, unrest, or poaching, as peoples' moral values were not respected. The added dimension of morality ensures that created jobs are meaningful, dignifying, and empowering, and that solutions are co-developed through community participation and ownership. Considering moral values also requires policymakers and managers to think beyond commonly applied management interventions or conservation policies. Simply financially compensating for crop damage or loss of life due to human-wildlife conflict will be insufficient and may lead to negative human-nature interactions if moral values are not considered. A positive feedback loop with biodiversity conservation can be created through, for instance, mutual agreement on the type of compensation, ensuring the compensation is culturally appropriate, accompanied with an apology which acknowledges guilt and responsibility, and ensuring that efforts are taken to prevent future loss (Anthony & Swemmer, 2015; Schwartz, 2021). The morality feedback loop added to the IPBES classification system incentivises local people to conserve nature through inclusion, respect, and rights, and transforms the system from a one-way value chain to a value circle (sensu Van de Water et al. 2022), promoting regenerative nature-people interactions. One-way nature-people interactions will only provide outcomes on one side of the value chain, while the circular feedback provides opportunities for multiple outcomes through mutual reinforcement. There are important additional dimensions of the consequences of conservation decisions to consider, such as localised versus global, individual versus communal, and short-term versus long-term. In general, the economic and relational benefits of elephants are often experienced individually, at local levels, while

higher order value systems tend to be more communal or universal, and held at a global level. Considering these scaling dimensions helps to predict the impact of conservation decisions beyond on-the-ground practice, and enables the development of universal, mutually reinforcing solutions and regulations (i.e., from a one-way chain to a circular system). For example, for some elephant conservation challenges, locally appropriate solutions may be effective (e.g., fencing, anti-poaching measures, population control, agricultural changes) as they do not directly affect the overall survival prospects of the species in question across its entire range. However, for other conservation solutions, local measures might be expected to have an impact at a universal range level (e.g., when one country wants to sell ivory internationally, this will arguably have an impact on poaching rates in other countries, as promoting or reducing ivory demand has range-state-wide impacts (Bennett, 2014)).

Local solutions are further challenged by transboundary migration (e.g., 76 % of African elephants form part of transboundary populations) (Lindsay et al., 2017), especially when species have different levels of legal protection when they cross national borders (Selier et al., 2016b). Although the Asian elephant has recently been included in Appendix I of the Convention of Migratory Species (CMS) (Joshi & Puri, 2021), both African species remain listed in Appendix II of the CMS (UNEP/CMS Secretariat, 2016). Asian elephants are also listed in Appendix I of CITES for all Asian range countries (Williams et al., 2020). Yet, because the CITES listing of African elephants varies across countries, elephants may migrate from a country where international commercial trade in, for instance, ivory or live elephants is prohibited (Appendix I of CITES; 33 African range States) into a country that allows some form of regulated trade (Appendix II of CITES, i.e., Botswana, Namibia, South Africa, and Zimbabwe). The varying classifications, and subsequently varying levels of protection, promote isolationist conservation solutions, ignore ecological realities, and prevent opportunities for realising international partnerships and sustainable conservation outcomes (Lindsay et al., 2017). Unified, consistent continental elephant conservation policies and transboundary cooperation can strengthen habitat connectivity, genetic diversity, and legal protection across the range (Joshi & Puri, 2021; Lindsay et al., 2017), but such unification requires an approach that is aware of the dimensions of scale.

#### 4.2. Examples of mutually reinforcing conservation strategies

Mutually reinforcing strategies enable accountable conservation decisions, decrease division in conservation, and reduce vulnerability to societal risks and threats (Nilsson et al., 2016; OECD, 2020). Careful consideration of the trade-offs involved in conservation goals, in concert with good governance practices, can resolve and even merge conflicting strategies and solutions, such as including local communities in some conservation areas where human benefits are enhanced, and excluding people in other areas with fair compensation for lost access, and with support to develop alternative livelihoods and new skills (Kopnina, 2016).

An example of a successful conservation solution that involved trade-offs is the establishment of the Thirunelli-Kudrakote Elephant Corridor in 2015 in Kerala, India (Menon et al., 2020). To increase habitat connectivity and reverse the negative impacts of habitat fragmentation, a strategy was developed to establish a wildlife corridor in an area of intense human-elephant conflict. Local communities were asked to relocate voluntarily to create space for elephants and allow coexistence. When such interventions are carefully and fairly managed - with equal participation of communities in the decision-making, support for suitable alternative livelihoods, and with improved access to communication, healthcare, education or electricity - conservation initiatives can demonstrably provide long-term, mutual benefits for species (integrity of nature, intrinsic value); the environment (clean air, water, & healthy soil, regulation of ecosystems, integrity of nature, rights of nature); and for people (livelihoods & employment, cultural & spiritual,

intergenerational legacy, environmental justice, human rights) (Menon et al., 2020). Moreover, the promotion of wildlife-friendly land use aligns with the public's sacred principles associated with conservation, and can contribute to achieving multiple SDGs simultaneously, including SDG 1 (no poverty), SDG 2 (zero hunger), SDG 3 (good health and well-being), SDG 4 (quality education), SDG 5 (gender equality), SDG 8 (decent work and economic growth), SDG 13 (climate action), SDG 15 (life on land), SDG 16 (peace, justice and strong institutions), and SDG 17 (partnerships for the goals).

## 5. Conclusions

The comprehensive categorisation of services, benefits and values associated with elephant conservation presented here increases our understanding of the dynamics of the conservation landscape and allows policymakers to interrogate the kinds of problems that arise and trade-offs that must be dealt with. However, although accounting for multi-dimensional services, benefits and stakeholder value systems helps map nature conservation and human well-being at different scales, the specific local context in which each conservation policy is implemented needs to be taken into account. The vast research on elephants enabled us to develop this comprehensive overview, which may not be possible for other less well-studied species or ecosystems. Our valuation system can be applied to other species and ecosystems and to conservation planning at national/regional scale, as well as at local scales. At a national scale (e.g., National Biodiversity Assessment and Action Plans under CBD, a National Protected Area Expansion Strategy, or National Elephant Action Plan under CITES), in-depth research on the different values associated with conservation decisions, such as presented in this paper, may be required. Locally, managers may not have time or capacity to enumerate all values at stake, for example in developing Park Management Plans or intervention projects or programs, but they should, by default, assume that the broad scale of values, such as those presented in this paper, are relevant, and should be considered, consulted, communicated, and applied.

We believe that the pluralist valuation of elephants will help policymakers and managers to have a better understanding of what elephants mean to people, why elephants are important in themselves, and what values and interests are at stake. Recognition of all values helps to confront structural inequality and uneven socio-ecological pressures. This process provides insight into the consequences, often unintended, of conservation decisions, and can lead to solutions that promote equity and unity. We add indispensable dimensions to the IPBES framework, by including moral values, and emphasising a feedback loop to overcome the flawed one-way value chain (Kenter, 2018; Van Norren, 2020). The presented elephant valuation system aids in defining solutions that are not based on economic gains or political stature for a few individuals, but on long-term common good and the goals and aspirations of society in general, enabling societal support and acceptance of solutions by preferably all stakeholders (Büscher & Fletcher, 2020; Kenter, 2018; Van de Water et al., 2022). The approach can be used in developing conservation action plans that are socially and politically acceptable, will garner public support, and are ecologically sound. Elephant conservation will then be mutually beneficial for human and nonhuman nature, for current and future generations.

## 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 a relationship with Bring The Elephant Home Foundation that includes: employment. Although the work was conducted under contract from the National Department of Environment, Forestry and Fisheries with the University of KwaZulu-Natal, the authors undertook the work independently

## Data availability

No data was used for the research described in the article.

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## Appendix 1

Search terms used for the literature review were: “elephant” AND “aesthetic” OR “artistic” OR “beasts of burden” OR “behaviour” OR “beliefs” OR “benefits” OR “bequest” OR “biodiversity goals” OR “bio-economic value” OR “Buddhism” OR “brand” OR “carbon sequestration” OR “climate change” OR “cognition” OR “community development” OR “compassionate” OR “community development” OR “conservation” OR “conservation ethics” OR “cultural value” OR “cognitive minds” OR “ecological values” OR “ecology” OR “ecological justice” OR “ecosystem services” OR “ecotourism” OR “elephant dung” OR “emotions” OR “entertainment” OR “environmental justice” OR “ethics” OR “existence value” OR “flagship species” OR “gender equality” OR “folklore” OR “habitat architecture” OR “human rights” OR “human well-being” OR “iconic species” OR “inclusive conservation” OR “indigenous knowledge” OR “indigenous peoples” OR “ivory” OR “keystone species” OR “live sales” OR “migration” OR “moral duty” OR “moral values” OR “national animal” OR “national heritage” OR “oracles” OR “pharmaceutical” OR “physical therapeutic” OR “poaching” OR “microhabitats” OR “religion” OR “rights of nature” OR “sentient agents” OR “spiritual” OR “sustainable development” OR “symbolism” OR “trade” OR “traditional medicinal” OR “trophy hunting” OR “umbrella species” OR “Ubuntu” OR “valuation” OR “value” OR “women empowerment”.

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