CS2P
Climate Security & Peace Project

IRIS
INSTITUT DE RELATIONS INTERNATIONALES ET STRATÉGIQUES

BIODIVERSITY & SECURITY

# BIODIVERSITY LOSS PART II: DO WE HAVE WHAT IT TAKES?

Fiona Hurrey

DECEMBER 2022

# FOREWORD

**Attention to environmental issues must be generous and engaged, stretching to incorporate multiple issues, and resisting simplification of cause, consequence, and solutions. Reversing, stopping, or even slowing biodiversity loss is essential to human security and requires immediate intervention in all facets of society.**

**This is the second of two articles on biodiversity within the Climate Security and Peace Project (CS2P). It introduces and discuss limits of the dominant utilitarian and technocratic approaches to governing and assessing biodiversity which holds intrinsic, indirect value separate to human utilitarianism. The first presented concrete examples of how biodiversity underpins human security, arguing for urgent action on biodiversity depletion.**

## About the Climate Security & Peace Project (CS2P)

Composed of a team of young researchers, professionals, and students from diverse fields and backgrounds, **CS2P** aims to raise awareness and strengthen knowledge on the linkages between ecological disruptions, climate change and environmental degradation, and the emergence and dynamics of risks and threats to human security, peace, and international stability.

**For more information, click here.**

## About the Climate, energy & security program (IRIS)

The IRIS's **Climate, Energy, Security Programme** analyses the geopolitical and security issues of climate change and energy transition. This programme is structured around the Observatory of Climate Change Impacts on Defense and Security, the Observatory for the Security of Energy Flows and Materials, contracts led on behalf of the DGRIS of the Ministry of the Armed Forces, and the GENERATE Project (Renewable Energies Geopolitics and Future Studies on Energy Transition), jointly managed with the Ifpen, and supported by the French National Research Agency.

**For more information, click here.**

*DISCLAIMER: The statements made in this article do not engage the responsibility of the French Institute of International and Strategic Affairs (IRIS) nor CliMates, nor do they reflect an official position of the Climate Security & Peace Project (CS2P).*

# ABSTRACT

This article discusses dominant approaches of decision-makers to biodiversity in two sections, condemning an excessive reliance upon imperfect quantification and a tendency to address consequence over cause when it comes to biodiversity loss.

The first section problematises the utilitarian discourse central to current practice and discusses advantages and disadvantages of monetary valuation. Secondly, the potential of technological innovation to 'fill the gaps' left by biodiversity loss through technocentric or 'technofix' approaches is interrogated, with a warning about potentially insurmountable gaps in knowledge and the potential of such an approach to worsen human insecurity and inequality.

Ultimately, this piece argues that any successful approach must re-situate human society within natural ecosystems through the transformation of philosophical, economic, and social systems.

**KEY WORDS:** Biodiversity, ecosystem services, technofix, human/nature

# INTRODUCTION

Human security is dependent upon the continued functioning of ecosystems which provide human benefits in the context of health, agriculture, fresh water, air purification, climate regulation, and climate change mitigation(a). **Biodiversity underpins these systems, meaning that the current mass extinction will have serious implications for human security**. That biodiversity loss is an urgent issue of the 21st century, regardless of individuals' priorities, is clear. What is more obscure is the knowledge of how humans can address this degradation and the success of contemporary approaches.

This article asks **whether, on a more fundamental level, humans have the capacity to effectively compensate for biodiversity loss in the absence of dramatic societal and economic change**. To answer these questions, it interrogates how the conceptualisation of biodiversity shapes and reinforces the **dualism of human/nature** interactions, considers whether **measuring and valuing** biodiversity is appropriate, and analyses the feasibility and trade-offs of **technological substitution**.

(a) For further elaboration on examples of the interlinkages between biodiversity and human security, please see the first article in this CS2P Biodiversity series.

# I.Challenging the utilitarian paradigm

## I. 1. Valuing biodiversity

**The international biodiversity regime has been moulded by a utilitarian approach in which biodiversity is recognised and valued for the tangible benefits it contributes to human society.** This extractivism defines the dominant human-nature relationship, where nature is viewed as a resource for exploitation[1]. Despite the emergence of environmental impacts into wider areas of society including business and investment, a key driver of this interest is the realisation that current trends are negatively impacting material gains and public image[2].

**Mainstream action has largely become conditional on tangible and measurable impact, and the translation of loss and benefits into monetary units.**

One approach used to highlight the importance of biodiversity and ecosystems is to identify and isolate the equivalent economic contributions of these ecosystem 'services'. Ecosystem services (ESS) can be defined as "...the benefits human populations derive, directly or indirectly, from ecosystem functions."[3 p. 4]. Quantifying biodiversity in this way illustrates the importance of nature to human society in the form of a simple and accessible figure. It is also highly convenient for decision-makers when assessing of project impacts and benefits.

The International Union for the Conservation of Nature (IUCN) has estimated that **ESS contribute a value of US$33 trillion per year** to human society, more than the United States' gross global domestic product, which was US$20.95 trillion in 2020[4], [5]. Figure 1 presents a methodological approach for the economic valuation of biodiversity, created by Demir (2013)[6].

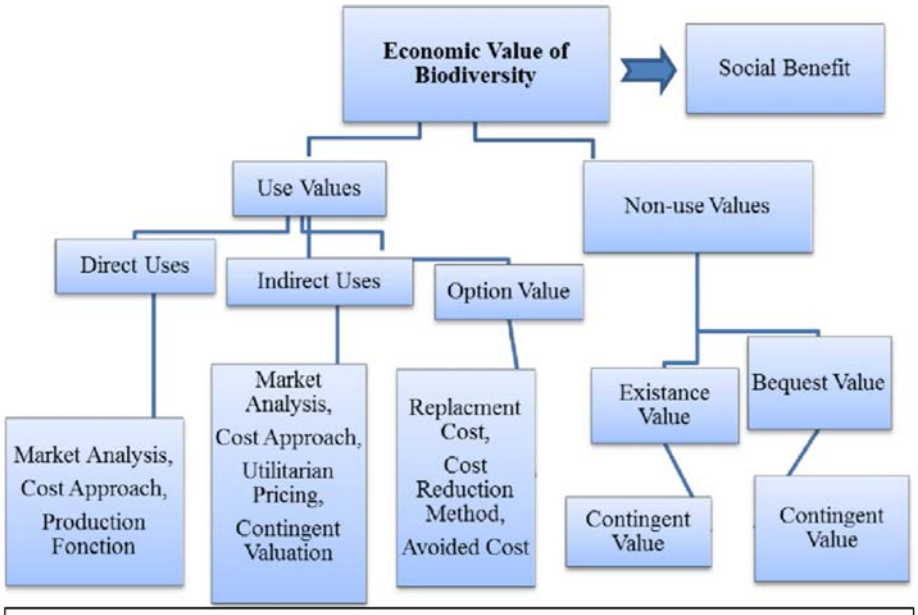


*Figure 1: Methodological approach to the economic valuation of biodiversity.*
*Source: Demir, 2013.*

While a staggering figure, the IUCN's estimate is likely to be a **gross underestimation** due to our **incomplete knowledge** of species, ecosystems, and resulting benefits to humans[7](b). This means that relying upon ESV to quantify environmental impact in a cost-benefit analysis will likely underestimate costs, leading to poorly informed decision-making and negative environmental impacts. The approach therefore **fails to effectively address the problem of negative environmental externalities.** Limited availability and reliability of data also has the effect of dissuading actors from turning attention to biodiversity loss over other, more measurable environmental issues such as local pollution or global warming [2].

## I. 2. Arbitrary measurements

A fundamental issue of monetary valuation, and of many international biodiversity negotiations thus far, is the erasure of non-utilitarian values. **Ecosystems, biodiversity, species, and living beings have an intrinsic existence value, regardless of their utility to humans**[8, p. 2]**.** Many biodiversity-related international negotiations, conventions, treaties, law, and policies are fundamentally concerned with the management and governance of biodiversity as resources[1]. This is particularly evident within the CBD and Nagoya Protocol, which emphasise access to and distribution of resources. This constructs and reinforces a highly utilitarian, extractivist vision of the human/nature relationship in which the environment is only valuable because it provides us with tangible, quantifiable benefits[1], [9].

Such a conceptualisation erases elements of culture, spirituality, religion, and wellbeing, leaving no room to consider other types of interactions, or to even acknowledge that we ourselves are part of wider ecosystems.

Furthermore, the monetary value assigned to ecosystem services (ESS) and the concept of ESS itself can be considered **arbitrary and non-inclusive**. For example, some communities conduct few or no monetary transactions, ecosystems on ancestral lands may have higher value for descendants than to mining companies, and it is difficult to place a number on benefits accrued from a walk in the forest (Figure 2) [10].

*Figure 2: Encountering nature, such as this wild Bee Orchid (Ophrys apifera), brings joy that is difficult to quantify.*
*Source: Hurrey, 2022*

(b) The first article in this series on biodiversity, 'Human Security Implications', highlights the challenges posed by our imperfect knowledge of species for measuring biodiversity loss, especially for poorly-known marine ecosystems. This imperfect knowledge logically extends to the interactions between species, habitats, human impacts, and ecosystem 'services' enjoyed by humans.

A typical ecosystem valuation (ESV) approach uses 'willingness to pay' surveys, identifying figures which fail to hold true in non-hypothetical scenarios[11]. ESS and ESV are often highly gendered, exclude future generations, and are irrelevant when stakeholders don't associate human/nature interactions with money[12], [13]. Such an approach also carries the risk of being used strategically for short-term economic gain. In this scenario, **over-reliance on limited ESV assessments - which are fundamentally incapable of providing a complete description of ecosystems - may lead to the approval of damaging projects.**

Some critics have suggested a more heuristic, non-monetary approach to valuing ecosystems which focuses instead on balancing trade-offs[14]. This requires acceptance that the aim of perfect 'offsetting' of negative or positive impact is misleading due to the unique characteristics and complexity of every ecosystem and habitat. It requires acceptance that every action has an impact.

## I. 3. A potentially useful, if imperfect, tool

Despite these flaws, ESV has become an important environmental, widely-used policy tool, aiming to finance biodiversity protection and describe natural assets by 'translating' the importance of ecosystems in politically and economically salient terms[1, p. 39].

**This economic approach aims to address market failures by including environmental externalities into decision-making.**

An example of failure to internalise externalities is the increase of agricultural yield at the long-term detriment to soil quality, eventually threatening the livelihoods of farmers and food security of consumers. In this case, ESV may be useful as **an indicator** in providing a more complete description of trade-offs when weighing the negatives and positives of new projects in monetary terms.

For example, the positive monetary return of a new development may be reduced, or even negated, if the equivalent financial loss caused by impact on biodiversity, habitat, or ecosystem services received by humans is calculated to be significant. However, **the use of such an approach necessitates the possession of near-perfect knowledge of both 'initial' and 'impacted' state of relevant ecosystems, chosen methodology, and the capacity of stakeholders to recognise and take such loss seriously(c).**

**Users must be constantly wary of the flaws of monetary valuation of ecosystems and avoid sole reliance on this conveniently quantitative, yet inexact, tool.**

(c) As any biologist will tell you, there is no such thing as having perfect knowledge of a living organism or ecosystem. Capacity of stakeholders refers to both willingness and ability, which must both be present for such valuations to be taken fully into account.

# II. The alluring technofix

## II. 1. A viable option?

There has been significant speculation about the possibility of technological advances allowing us to replace lost biodiversity or mitigate the negative consequences of biodiversity loss[15]–[17]. **Human-developed technologies may partially substitute for biodiversity. However, technological success would require a comprehensive understanding of the functioning and interactions of the ecosystems, species, and services they aim to replace.**

Given the large gaps in current knowledge, such an endeavour is particularly problematic [17].

The urgency of biodiversity loss requires immediate action and the deeming of what is 'acceptable' risk in terms of known and unknown consequences. **The 'technofix' approach to biodiversity loss includes measures such as functional replacement, in which the role of extinct or vulnerable species is replaced (or substituted) by a different species which fulfils the same role**[18]. For example, some researchers have suggested introducing elephants into Europe to fill the role of now extinct megaherbivores on the continent, and into Australia to consume excess dry material and reduce bushfire risk (Figure 3)[19]. This particular example is, of course, one of the more dramatic proposals for rewilding through functional replacement.

*Figure 3: Some rewilding proposals, such as the introduction of elephants into Europe and Australia, are highly controversial.*
*Source: The Conversation, 2021*

Critics have argued that such an approach is irresponsible, as biologists and conservationists don't possess a complete understanding of associated consequences for the wider ecosystem[20]. With poor understanding of risks, it is impossible to appropriately assess and accept them as a viable course of action[21].

Yet another challenge to surmount is the speed of biodiversity loss, estimated to be 100-10,000 times faster than the background extinction rate[22]. This poses the question of whether innovation can emerge quickly enough to address the rapidly growing gaps left when crucial species' evolutionary abilities are defeated by accumulated pressures. Similarly to these species, **humanity's capacity to adapt through means of technological innovation may be outpaced by transformations that we ourselves have orchestrated.**

Technological approaches imply high costs, access issues, and exacerbation of inequalities[15]. They place technological solutions and capital at the core of the response to environmental consequences, rather than addressing their causes.

## II. 2. The trickle-down trap

Another essential consideration in the pursuit of technology-reliant 'fixes' is accessibility. **In the case that an efficient substitution for biodiversity or ecosystem services were developed which could successfully 'prop-up' human security, it is naïve to believe that this would be accessible to all humans on Earth.**

Meanwhile, biodiversity loss is indiscriminate, often having a more severe impact on those already facing disproportionate food, health, and economic insecurity[23]. **Technology innovation is the domain of the wealthy, with large investments required for development and research, patenting, and supply chain issues creating insurmountable barriers for much of the world's population.**

The ingenuity of human technological advancement does not ensure that its benefits will reach all who are in need[24], [25]. A recent example of technology-related inequality is the pattern of COVID vaccine distribution, with only 22.7 percent of people in low-income countries having received at least one dose as of October 2022[26].

**Relying upon innovation to assure human security in the face of biodiversity loss, while neglecting to address its causes, is therefore immoral on a human level.** Moreover, this inequality may increase tensions between countries and communities with different access levels to technology even in the case that innovations succeed in compensating for biodiversity-provided services, such as fresh water, clean air, and disease prevention. Discontent with perceived or real access to 'replacement' technologies has the potential to erode social relations, trigger disputes over resources, and decrease domestic and international security.

# II. 3. Perpetuating the human/nature dichotomy

Technological approaches have the additional effect of perpetuating the dominant perception that human society is decoupled from nature. This encourages the further withdrawal of humanity from nature to form a 'synthetic high-tech society' which is disembedded from the material world[15, p. 105]. Its result is the encouragement of an exploitative 'business-as-usual' conduct, where actors defer responsibility through favouring technological innovation and may enter a vicious cycle of increased degradation[27].

Given the dependence of human security upon natural processes, and thus, biodiversity, and the fundamental truth that humans interact with nature daily, this artificial separation is misleading and potentially dangerous. Reliance upon technological advances leads to a pattern in which the 'solving' of past problems with new innovations often leads to even more complex future problems[27]. **Denial of the current urgency of biodiversity loss, of our flawed knowledge of the natural world, and of our own roles within the ecosystems we are determined to see as separate from ourselves, can only lead to further exacerbation of the issue.**

# CONCLUSION

**The sixth mass extinction of biological diversity is a human security challenge requiring urgent action and attention.** Action thus far is limited by its highly anthropocentric and utilitarianist lens, especially when actors aim to understand and measure biodiversity through arbitrary monetary valuation. Through a technocentric approach, many hope to avoid the transformational change of economic and social systems necessary to slow or stop current degradation. While technological replacement of some essential services provided by biodiversity may be possible, incomplete knowledge of ecosystem complexities renders the technological route far-fetched and unreliable.

Given the intensity of the biodiversity loss challenge, exploration of all possible courses of action is crucial. However, **if the use of such reactive, 'band aid' measures is seen to constitute a complete and appropriate response, these solutions risk failure both in slowing biodiversity loss and in safeguarding human security**.

Humanity's capacity to halt and reverse biodiversity loss, however limited or expansive, should not dictate our level of effort in addressing the issue. The stakes involved for humans, nature, and our planet are too high for us to continue with current approaches. To maximise probability of success, we need economic, social, and philosophical transformation which rejects dualistic paradigms and recognises the embeddedness of humans within biodiversity, ecosystems, and nature.

# References

[1] S. Maljean-Dubois, Le Droit International de la Biodiversité. Boston: BRILL, 2021. Accessed: Jun. 11, 2022. [Online]. Available: http://public.eblib.com/choice/PublicFullRecord.aspx?p=6636638
[2] B. Nauman, 'ESG investors wake up to biodiversity risk', FT.com, 2020.
[3] R. Costanza et al., 'The value of the world's ecosystem services and natural capital', vol. 387, 1997.
[4]'Tomorrow's production systems will be closer to nature', IUCN, Jan. 09, 2017. https://www.iucn.org/news/business-and-biodiversity/201701/tomorrows-production-systems-will-be-closer-nature (accessed May 23, 2022).
[5] 'GDP (current US$) - United States | Data'. https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=US (accessed May 23, 2022).
[6] A. Demir, 'Economic of biodiversity: The importance of studies aimed at assessing the economic value of biological diversity', Afr. J. Agric. Res., vol. 8, pp. 5376-5386, Nov. 2013, doi: 10.5897/AJAR2013.7850.
[7] 'How much do we really care about nature? A new report reveals all', World Economic Forum. https://www.weforum.org/agenda/2021/05/nature-conservation-care-awareness-online/ (accessed Jun. 11, 2022).
[8] N. Seddon et al., 'Biodiversity in the Anthropocene: prospects and policy', Proc. R. Soc. B Biol. Sci., vol. 283, no. 1844, p. 20162094, Dec. 2016, doi: 10.1098/rspb.2016.2094.
[9] F. Ducarme and D. Couvet, 'What does "nature" mean?', Palgrave Commun., vol. 6, no. 1, p. 14, Dec. 2020, doi: 10.1057/s41599-020-0390-y.
[10] C. Batavia and M. P. Nelson, 'For goodness sake! What is intrinsic value and why should we care?', Biol. Conserv., vol. 209, pp. 366–376, 2017, doi: 10.1016/j.biocon.2017.03.003.
[11] D. A. Hensher, 'Hypothetical bias, choice experiments and willingness to pay', Transp. Res. Part B Methodol., vol. 44, no. 6, pp. 735–752, Jul. 2010, doi: 10.1016/j.trb.2009.12.012.
[12] M. Fortnam et al., 'The Gendered Nature of Ecosystem Services', Ecol. Econ., vol. 159, pp. 312–325, May 2019, doi: 10.1016/j.ecolecon.2018.12.018.
[13] S. Purushothaman, B. K. Thomas, R. Abraham, and U. Dhar, 'Beyond Money Metrics: Alternative Approaches to Conceptualising and Assessing Ecosystem Services', Conserv. Soc., vol. 11, no. 4, pp. 321–325, 2013.
[14] D. J. Abson and M. Termansen, 'Valuing ecosystem services in terms of ecological risks and returns', Conserv. Biol. J. Soc. Conserv. Biol., vol. 25, no. 2, pp. 250–258, Apr. 2011, doi: 10.1111/j.1523-1739.2010.01623.x.
[15] K. W. Cross, 'Technological innovations tackling biodiversity loss: Solutions or misdirection?', Law Technol. Hum., vol. 1, pp. 100–128, 2019, doi: 10.5204/lthj.v1i1.1220.
[16] I. M. Goklany, 'Technological Substitution and Augmentation of Ecosystem Services', in The Princeton Guide to Ecology, Princeton: University Press, 2009, pp. 659–669. doi: 10.1515/9781400833023.659.

[17] J. O'Brien, 'Technologies for Conserving Biodiversity in the Anthropocene', Issues Sci. Technol., vol. 32, no. 1, pp. 17–21, 2015.
[18] M. W. Hayward et al., 'Reintroducing rewilding to restoration – Rejecting the search for novelty', Biol. Conserv., vol. 233, pp. 255–259, 2019, doi: 10.1016/j.biocon.2019.03.011.
[19] H. Wells, N. Ward, and R. D. Crego, 'Rewilding: conservationists want to let elephants loose in Europe – here's what could happen', The Conversation, Nov. 29, 2021. http://theconversation.com/rewilding-conservationists-want-to-let-elephants-loose-in-europe-heres-what-could-happen-168212 (accessed Oct. 03, 2022).
[20] J.-C. Svenning et al., 'Science for a wilder Anthropocene: Synthesis and future directions for trophic rewilding research', Proc. Natl. Acad. Sci. U. S. A., vol. 113, no. 4, pp. 898–906, 2016.
[21] I. Fazey and J. Fischer, 'Assisted colonization is a techno-fix', Trends Ecol. Evol., vol. 24, no. 9, p. 475, Sep. 2009, doi: 10.1016/j.tree.2009.05.003.
[22] G. Ceballos, P. R. Ehrlich, A. D. Barnosky, A. García, R. M. Pringle, and T. M. Palmer, 'Accelerated modern human–induced species losses: Entering the sixth mass extinction', Sci. Adv., vol. 1, no. 5, 2015, doi: 10.1126/sciadv.1400253.
[23] D. Roe, N. Seddon, and J. Elliott, 'Biodiversity loss is a development issue', p. 24.
[24] 'Income inequality and the development of environmental technologies - Sciences Po'. https://uspc-spo.primo.exlibrisgroup.com/discovery/fulldisplay?docid=cdi_proquest_miscellaneous_902382063&context=PC&vid=33USPC_SPO:SPO&lang=fr&search_scope=MyInst_and_CI&adaptor=Primo%20Central&tab=Everything&query=any,contains,technology%20innovation%20distribution%20inequality&offset=0 (accessed Oct. 03, 2022).
[25] United Nations, 'Closing the Technology Gap in Least Developed Countries', United Nations. https://www.un.org/en/chronicle/article/closing-technology-gap-least-developed-countries (accessed Oct. 03, 2022).
[26] H. Ritchie et al., 'Coronavirus Pandemic (COVID-19)', Our World Data, Mar. 2020, Accessed: Oct. 02, 2022. [Online]. Available: https://ourworldindata.org/covid-vaccinations
[27] B. Dillet and S. Hatzisavvidou, 'Beyond technofix: Thinking with Epimetheus in the anthropocene', Contemp. Polit. Theory, vol. 21, no. 3, pp. 351–372, Sep. 2022, doi: 10.1057/s41296-021-00521-w.

## CONTACTS


### CLIMATE SECURITY & PEACE PROJECT (CS2P)

**Sofia Kabbej**
sofiakabbej@gmail.com

**Timothée Moser**
timothee.d.moser@gmail.com

**CS2P Board**
**cs2pboard@gmail.com**

@CS2P_

Climate Security and Peace Project

@CS2P_

### ENERGY, CLIMATE & SECURITY PROGRAM

Under the supervision of **Julia Tasse**,
Senior researcher at IRIS

jtasse@iris-france.org





FRENCH INSTITUTE OF INTERNATIONAL AND STRATEGIC AFFAIRS

2 bis rue Mercoeur
75011 PARIS/France
T. + 33 (0) 1 53 27 60 60
contact@iris-france.org
@InstitutIRIS


CS2P Climate Security & Peace Project

IRIS INSTITUT DE RELATIONS INTERNATIONALES ET STRATÉGIQUES