



# Valuation of nature and nature's contributions to people

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## Introduction

Understanding nature's contributions to people (NCP) can improve people's ability to manage earth systems effectively, equitably, and sustainably (Chaplin-Kramer et al. 2019; Brauman et al., 2020). NCP can be perceived as a benefit or detriment depending on the cultural, temporal, or spatial context (Diaz et al. 2018). According to IPBES (2019), beneficial contributions from nature include food provision, water purification, flood control, and artistic inspiration. In contrast, detrimental contributions include disease transmission and predation that causes damage to people or their assets. Pascual et al. (2017) observed that previous studies that focus on the valuation of nature's contributions to people's good quality of life are often not sufficiently inclusive and tend to neglect conflicting perspectives. To address this, the NCP concept and framing is being promoted in inclusive ways and encompasses multiple ways to understand how nature benefits people, for instance, via the concept of ecosystem services (ESs) and embracing diverse world views, including those of indigenous people and local communities. Therefore, more multidisciplinary scientific research is essential to deal with NCP.

Increasing overexploitation of natural resources and unprecedented transformation of land, freshwater, and seasces over the past century have paralleled technological advances and supported better living standards for many but have also led to changes in climate and the accelerating decline of biological diversity worldwide. This overexploitation negatively impacts many aspects of a good quality of life (Diaz et al. 2019). In particular, global climate change is also associated with irreversible changes in NCP (Runting et al. 2017; Arneith et al. 2020; Pörtner et al. 2021). Maintaining or enhancing nature's beneficial contributions to a good quality of life without compromising nature's ability to provide the sustainability of NCP is one of the most urgent contemporary challenges (Diaz et al. 2018, 2019) and underpins the fulfillment of the Sustainable Development Goals (Griggs et al. 2013). To achieve this, decision-makers must understand how human activities affect nature and its ability to provide NCP. Multiple academic disciplines increasingly provide NCP information at regional and local scales and among different social groups. It is a valuable input that can help policy to help catalyze changes in attitudes and behavior. In addition, understanding the way NCP values and institutions (conventions, norms, and rules) are interlinked can help identify urgent needs to reform institutions (including

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policies) that can support the uptake of NCP values in policymaking to achieve transformation toward sustainability. This is necessary for reversing declines in biodiversity and ecosystems essential for the continued flow of NCP (Diaz et al. 2019; Sachs et al. 2019). This also calls for improving how NCP valuation methods and approaches are applied (Jacobs et al. 2018; Ellis et al. 2019). Valuation of nature forms a solid basis for conservation policy across the globe, and institutions as diverse as the United Nations (UN) and the World Bank (WB) embrace-related activities. Valuation of nature can inform policy by showing the value lost to people as a result of losses in NCP.

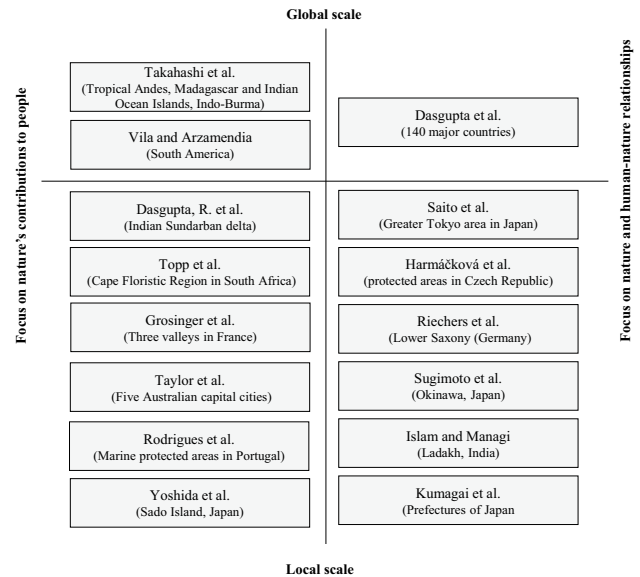
Plural approaches to the valuation of nature are an essential aspect of the NCP framing and need to underpin biodiversity conservation strategies (Pascual et al. 2021). This calls for using multiple approaches in valuation and making them compatible. New methodologies will also be required to monitor the status and trends of NCP, such as the inclusive wealth index (IWI), which includes natural, human, and manufactured capital in national accounts (UNU-IHDP and UNEP 2012, 2014; Managi and Kumar 2018; Dasgupta 2021; UNEP 2021). In parallel with the IPBES methodological assessment of diverse conceptualization of values of nature and NCP, this special feature (SF) aims to explore the potential role of NCP values and valuation framing to understand how major environmental and societal targets can be achieved. It presents various methodologies and practices of the valuation of nature and NCP. Articles in this SF provide perspectives and approaches on how multiple scientific disciplines can best contribute to operationalizing the NCP framing through a valuation lens applied from local to global levels.

## The articles in this special feature

Figure 1 categorizes the fifteen articles in this SF by their spatial scales (vertical axis) and their focus on either NCP or nature and human–nature relationships (horizontal axis). Three articles (Dasgupta et al. 2021a, b; Takahashi et al. 2021; Vilá and Arzamendia 2020) focus on the global to regional aspect of NCP, and the remaining twelve articles focus on NCP and valuation of nature at the local level. Studies in this special feature cover a large number of countries as well as marine, terrestrial, and urban ecosystems that are facing the challenges of monitoring NCP.

### Articles focusing on nature's contributions to people

Improving our understanding of NCP at the local level is one of the first challenges in the valuation of NCP. Vilá and Arzamendia (2020) use the IPBES conceptual framework and NCP as a framework of analysis and highlight



**Fig. 1** Placement of the fifteen articles in this SF. The figure does not include the articles published in the topical collection. The geographic locations of the studies are in parentheses

the multiple material and non-material benefits and associated instrumental and relational values that the people of the Andes have had for centuries for the Camelidae species. Dasgupta, R. et al. (2021) characterize non-material values across multiple coastal production landscapes in the Indian Sundarban delta. The study provides a comparative understanding of non-material benefits from different rural production landscapes/waterscapes. This research provides valuable spatial information for policymakers.

Regarding the production of NCP, Topp et al. (2021) demonstrate that nature conservation on privately owned land depends on land managers' decision-making. From interviews with thirty land managers, the authors identify thirteen different NCP. Non-material NCP is associated with a bottom-up conservation context and relational values, such as family ties. Also, Grosinger et al. (2021) emphasize that material and non-material benefits of nature are co-produced with people through current social and ecological resources and legacies of past resources. They illustrate this novel way of understanding the construction of benefits for a regional cheese production system which exemplifies other high nature value agricultural systems. Taylor et al. (2021) aim to understand the constraints of engagement with the diversity of values associated with NCP. They find that urban environmental managers facilitated positive NCP by improving people's relationships with nature. The authors identify opportunities for improved community engagement relevant to organizations responsible for urban ecological management.

Regarding the nexus between NCP and a good quality of life, Rodrigues et al. (2021) notice a limited understanding of the relationships between non-material NCP and human well-being, especially in the marine and coastal environment. This study finds that subjective well-being derived from relating to, interacting with, and experiencing marine and coastal sites can be grouped into four interpretable dimensions. These dimensions are ‘engagement with nature and health,’ ‘sense of place,’ ‘solitude in nature,’ and ‘spirituality.’ The findings offer interesting insights into marine conservation practice and policy to foster biodiversity and human well-being. Yoshida et al. (2022) hypothesize that perceived nature, conceptual human–nature relationships, place attachment, and social relationships contribute to subjective well-being. The results lend empirical support to understanding human–nature interdependency in socio-ecological production landscapes and seascapes. Takahashi et al. (2021) identify that trade-offs in NCP, particularly in material NCP versus regulating and non-material NCP, continue to rise. The authors investigated whether and how synergies in NCP exist within harmonious human–nature interactions and explored management interventions that enhanced these synergies. They show a wide array of NCP from various ecosystems and related harmonious human–nature interactions.

### Articles focusing on nature and human–nature relationships

As the quantitative evaluation of the relational values of nature is still limited, Saito et al. (2021) quantitatively explore the constructs of relational values concerning general nature and place-based nature in the Greater Tokyo area and building on the conceptual framework presented by Chan et al. (2016). Their findings suggest that people are unlikely to distinguish between relational values about place-based nature and nature in general.

Understanding the link between potential futures and the values underpinning them represents a fundamental question of current sustainability research. Harmač'kova' et al. (2021) identify that the pathways towards sustainable and just futures for people and nature are primarily driven by people's decisions and actions, underpinned by multiple types of motivations and values. The authors reflect on the utility of value-based participatory scenario planning as a means to strengthen sustainable governance.

Enhancing our understanding of the human–nature relationship is also important to achieve approaches to the valuation of nature as the perceived value is influenced by how people interact with nature. Losing connections to nature could potentially foster conflicts among actors with different values; combining the notions of human–nature connectedness and relational values can generate valuable insights and

help uncover new ways to foster sustainability. In this regard, Riechers et al. (2021) establish that landscape simplification, especially if rapid, negatively influences human–nature connectedness and particular relational values such as social relations, social cohesion, or cultural identity. Also, Sugimoto et al. (2021) focus on human–nature relationships to quantify the important pluralities of values among local people. According to their observation, five core elements encompass the values of the human–ocean relationships on Ishigaki Island. The respect and fear of nature elements are essential and a potentially unique value in these regions.

There are papers that employ the inclusive wealth approach. Dasgupta et al. (2021a, b) focus on the commitments by countries to meet the Sustainable Development Goals (SDGs). Indicators that can help evaluate whether a country's policies to meet the targets protect and promote sustainable development are missing. The article offers the concept of inclusive wealth, which includes natural capital, human capital, and produced capital to measure countries' achievements towards sustainable development. Islam and Managi (2021) demonstrate the economic valuation of NCP using the inclusive wealth method and a geographic information system. The economic valuations for NCP include different attributes, such as forest, agricultural land, animal husbandry, fishery, minerals, and fossil fuels. Kumagai et al. (2021) investigate Japan's perceived terrestrial and marine natural capital values. They identify little evidence on Japan's country-specific natural capital values, which provides useful information for national environmental policies. The authors conducted future projections of terrestrial and marine natural capital using scenarios developed in a previous study. This study concludes that Japan should follow a population-dispersed scenario for the sustainable management of natural capital up to 2050.

### The way forward

Recognizing and integrating the multiple values of nature and NCP into all forms of decision-making is critical for reversing the dangerous decline of nature. The SF presents global efforts that evaluate nature and NCP to support decision-makers across various sectors in the development of policies and strategies for the effective management of coupled social-ecological systems. The SF also demonstrates that the valuation of NCP requires recognizing a broad range of worldviews and incorporating values into its valuation process, which often requires local-level or site-specific analyses. This is in part why many of the studies in the SF focused on the valuation of nature and NCP at the local to regional scale while a few studies were conducted at the global scale. Further accumulation of theoretical as well as case studies on the valuation of nature and NCP across the

globe will further improve and enhance the use of NCP and its application in policy and planning.

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