Natural Capital in international environmental cooperation:

Concepts and applications

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CONTENT

Executive Summary

Natural capital (NC) and ecosystem services (ES) are considered key concepts to support environmental sustainability, nature conservation, and protected areas. Many international studies and initiatives have contributed to their mainstreaming in scientific and political advice. However, neither 'ES assessment' nor 'NC valuation' (NCV) are clear-cut concepts. For some, they serve as interdisciplinary research paradigms, whereas others recognize their potential for re-framing environmental policy issues. They constitute a dynamic field with considerable attention from policy and business, but are also contested and unclear conceptual terrain, with many partly overlapping frameworks and methods.

The purpose of this paper is to contribute to the debate on NCV, sharpen its understanding, and provide recommendations for applying the concept and related instruments for environmental policy and practice. It seeks to clarify for which specific purposes and under what conditions it will be successful. It synthesizes various debates, initiatives, and practical experiences in different policy areas and economic sectors about the de facto potential of NCV to inform international environmental cooperation, to support biodiversity policy, and to strengthen protected areas.

Six controversies around NCV challenge the concept. These concern its conceptual clarity, its ability to deal with the dynamics and complexity of biodiversity, as well as with ethical and non-economic values and arguments, concerns regarding the commodification of nature, as well as questions on equity and social justice. It is argued that despite being contested, NCV is suitable to provide strong arguments and evidence for the role nature conservation and protected areas play for human development in the long-term.

'Natural capital' is an economic framing of the environment but should be interpreted broadly. In responding to the 'economic invisibility of nature', NC describes ecosystems as the 'stock' or the 'natural asset' from which 'ecosystem services' flow freely and associated benefits can be enjoyed. It should be interpreted in a broad sense: Natural capital refers to societies' biophysical basis. Natural capital valuation describes a broad range of approaches, including economic, socio-ecological, cultural, and spatial approaches, that can be used to examine diverse aspects of human dependence on this biophysical basis. NCV complements and supports ethical arguments for nature conservation and the intrinsic value of biodiversity to explicitly address actors beyond the 'green sector'.

NCV and natural capital accounting (NCA) are backed in various biodiversity policy arenas on global level. NCV and NCA are proposed for inclusion in a post-2020 Global Biodiversity Framework of the Convention on Biological Diversity (CBD) and inform at least nine Sustainable Development Goals of the 2030 Agenda for Sustainable Development. Initiatives like TEEB, SEEA, WAVES and its successor GPS have created awareness about the relevance of biodiversity and ES for national economies and for measuring national progress towards SDGs. Nonetheless, biodiversity debates and recent IPBES reports provide a mixed picture as to the role, NC and NCV should play. For example, a focus on the 'usefulness of nature' can weaken intrinsic motivations to conserve. Furthermore 'biodiversity' – the diversity of life in

all its forms – is not per se the same as 'useful nature'. Others support the idea that measuring nature's benefits to people and society is a necessary catalyst for action on biodiversity.

A growing interest of business can be observed in different sectors. There is an increasing wealth of information, data, and tools available for assessing impacts and dependencies of production and consumption on natural capital (including ecosystem services). This is matched by increasingly standardized approaches and frameworks. On one hand these scale up NCV to sophisticated systems approaches addressing the full value chain of products (production, manufacturing, distribution and consumption), all four capitals (natural, produced, human and social capital) and the flows or impacts (outputs; purchased inputs; ecosystem services; pollution and waste). On the other hand they also make them sector specific and applicable to certain industries and organisations.

Despite its potential, NCV currently only plays a minor role in investment decisions of financial institutions. Many banks, including large development banks, demand sustainability standards within their due diligence procedures, i.e. to decide whether a client company or project is eligible for receiving a loan. The World Bank's International Finance Corporation (IFC) recognized NCV within their performance standards. In addition, a growing number of investors not only want to avoid negative impacts but seek to support activities with an explicitly positive environmental return alongside a financial return. However, discussion on establishing natural capital as an independent asset class, and a mainstreamed application of NCV, are still at an early stage.

In the context of in-situ conservation, NCV supports protected areas (PAs) in at least four different ways:

1. **Make the case for stronger government commitment and for building alliances:** There is substantial evidence that PA systems and individual PAs in developing countries lack high level political support and are generally significantly under-funded. NCV has possibly been used most prominently in addressing these issues with the rationale that it speaks the language of government, finance, and economic ministries. In addition, NCV enables alliance building and mainstreams concern for PAs with relevant sectors or interest groups: among others the tourism sector, water supply and hydroelectricity sectors, agriculture, and fishing industry.

2. **Inform PA planning and management:** NCV can play a significant role in integrating PAs into their surrounding landscapes, thus incorporating protected area design and management into a broader framework of national and regional land-use plans and natural resource laws and policies. On the whole, NCV is not yet widely used for these purposes.

3. **Support the resolution of PA-related conflicts:** Conflict over access to and the use of PA land and resources is relatively common and is likely to increase in the future in tandem with resource scarcity. Without NCV, it is highly unlikely that PAs would stand much of a chance in situations where they have to defend continued protection against other land use alternatives, such as conversion of PAs to agriculture. NCV enables different benefits from ecosystems to be specified. This in turn helps to recognize different rights.

4. **Identify and develop PA finance solutions:** In addition to making the case for additional PA finance, NCV can be used to support the design of new finance mechanisms for PAs, such as Payments for Ecosystem Services (PES) schemes, biodiversity offsets etc., through the identification of beneficiaries and the valuation of the magnitude of the benefits that accrue to them. NCV, however, is only a small component in a much larger effort to strengthen the financial base for conservation.

Key recommendations to international environmental cooperation for integrating natural capital valuation and accounting in policy and decision making include:

1. **Increase political relevance of natural capital valuation –** Recognize the huge potential of and increase support to a broadly understood NCV in order to increase political visibility and relevance for environmental sustainability and nature conservation.

2. **Leverage through international agendas –** To increase its relevance in the post-2020 global biodiversity framework, NCV should be seen as a key enabling condition for achieving biodiversity goals and promoted as a cross-cutting issue to mainstream biodiversity into the economic sector.

3. **Address economic sectors and policy areas –** Continue to make NCV applicable for economic sectors and policy areas and create a regulatory enabling environment such that economic actors, business, and finance integrate NCV in their decision-making.

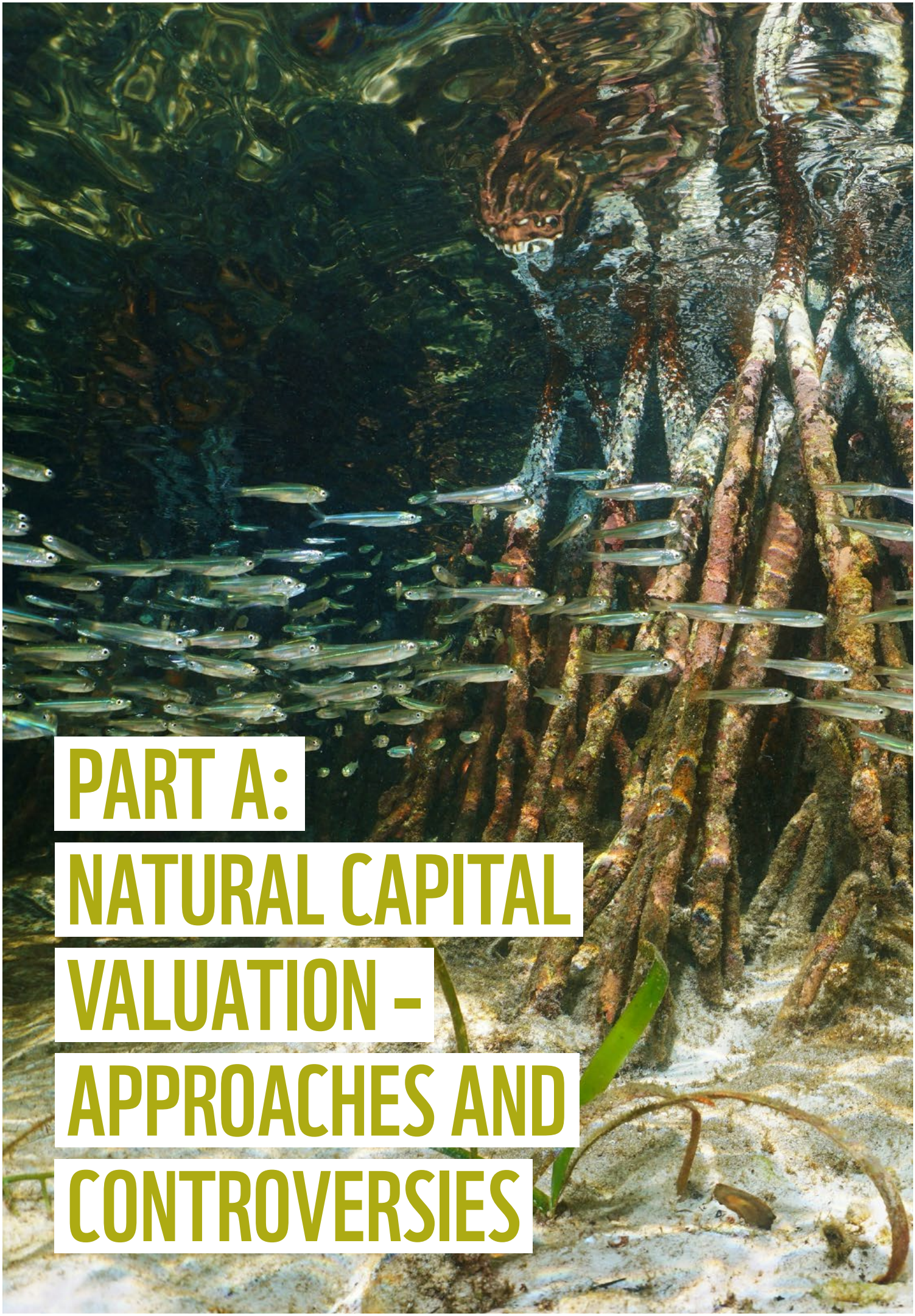
4. **Further develop the Natural Capital Accounting approach –** Capitalize on the shared language created through NCA and consider the advantages of institutionalized, readily available, and regularly updated information systems.

5. **Close knowledge gaps –** Invest in closing the remaining knowledge gaps on natural capital and ecosystem services, particularly in regards to regulating services and public goods.

6. **Ensure credible implementation –** Follow criteria and safeguards in implementing NCV and NCA to ensure impact and avoid pitfalls.

7. **Strengthen protected areas –** Implement NCV for protected area systems and individual protected areas to make their natural capital contributions to economic sectors and societal goals visible, and in particular to:

   a) Close existing evidence and information gaps on the ecosystem services provided by PAs at the global, national, and local level.
   b) Acknowledge the role of PAs in conserving natural capital and ecosystem services in addition to their primary goal of biodiversity conservation.
   c) Better consider PAs and their ecosystem services in national budget allocations.
   d) Mobilize private finance and investments and create enabling environments for private sector engagement, while considering that many provided ES are valuable public goods for which (private) beneficiaries will not, cannot, or should not pay.
   e) Commit to longer-term support programmes for the use of NCV and advance institutionalised measurement frameworks to enhance impact and success.



PART A: NATURAL CAPITAL VALUATION – APPROACHES AND CONTROVERSIES

1 Introduction: Setting the scene

Ever since Costanza et al's (1997) controversial and influential USD 33 trillion/year estimate of the global value of 17 ecosystem services, the valuation of natural capital (NC) and ecosystem services (ES) is considered (by some) a prime strategy to mobilise support for environmental sustainability and nature conservation.

In the last two decades, thousands of (academic) publications have explored this topic. The Millennium Ecosystem Assessment[1] (2005), TEEB reports and follow-up projects[2] (2008- today), and (to a lesser extent) more recent IPBES reports[3] (2014- today) have contributed to mainstreaming the valuation of natural capital and ecosystem services in scientific policy advice. Within the UN Convention on Biological Diversity's Strategic Plan, ES assessment is an explicit commitment in various Aichi Targets.[4]

However, neither 'ES assessment' nor 'NC valuation' (NCV) are narrow, clear-cut concepts. Even though they both seek to explicitly quantify human dependence on nature, the former is more rooted in conservation science, whereas the latter has an economic connotation. Furthermore, academic debates and (science-) policy initiatives differ in their use of these terms: For academics, it is mainly an interdisciplinary research paradigm, whereas political and scientific advisors recognize its potential for re-framing environmental policy issues.

Despite these ambiguities, it makes little sense to narrowly define NCV as the monetary valuation of ecosystems (as we argue below). A broader scope of NCV provides strong arguments and evidence for sustainability and the role protected areas play for human development in the long-term.

In this report, we seek to synthesize various debates and initiatives. In Part A, we provide an overview of the conceptual controversies around NCV; followed by a review of how NCV is used in biodiversity and other policy areas (Part B). Finally, we take a more in-depth look at different uses of NCV in protected area (PA) management (Part D) and conclude with detailed recommendations for the future use of NCV in biodiversity policy and other areas (Part E).

1 *https://www.millenniumassessment.org/en/index.html*
2 *http://www.teebweb.org/our-publications/*
3 *https://ipbes.net/library*
4 *https://www.cbd.int/sp/targets/*

2 Defining 'Natural Capital Valuation'

'Natural Capital' is an economic framing of the environment. It describes ecosystems as the 'stock' or the 'natural asset' from which 'ecosystem services' flow freely and associated benefits can be enjoyed. When the Living Planet Report[5] states that humans consume 50 % more per year than the earth can replenish, this can be interpreted in economic terms: we are no longer living off the dividends of natural capital, but off the capital itself.

Figure 1: *Natural capital and its relation to other 'capital'*

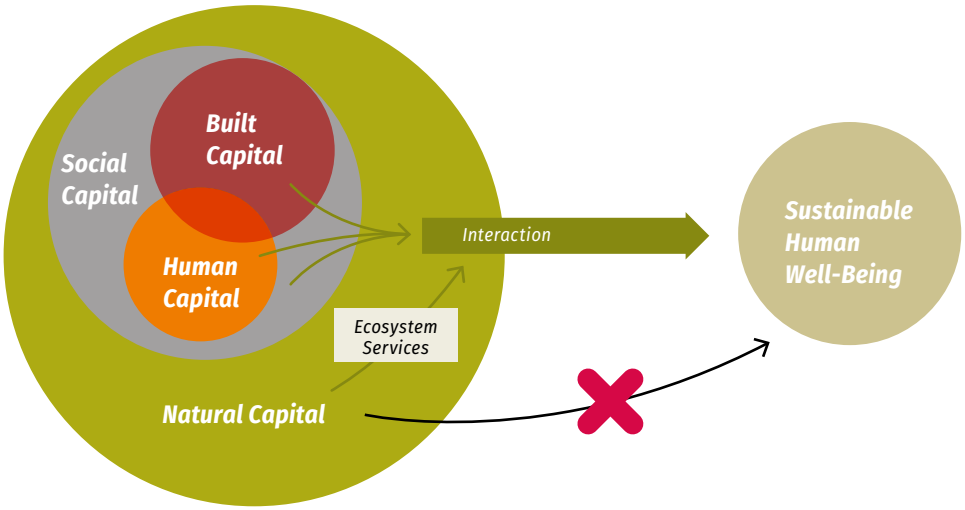


Figure 1 shows that natural capital mostly provides benefits to human well-being by interacting with other types of capital.

Assessing the value of changes in natural capital and the benefits (i.e. ecosystem services) it provides is considered useful for deciding how and where funds should be invested in maintaining healthy ecosystems. The UK Natural Capital Committee states: "Many of the goods and services that people obtain (either wholly or in part) from natural capital are not supplied by private firms through markets (e.g. clean air, flood control, woodland walks). Some of these 'public goods' lack market prices, while the value of others is only poorly reflected in prices. **The lack of meaningful or observable prices results in the value of natural capital benefits being frequently overlooked or ignored in decision-making"** (NCC, 2017a).

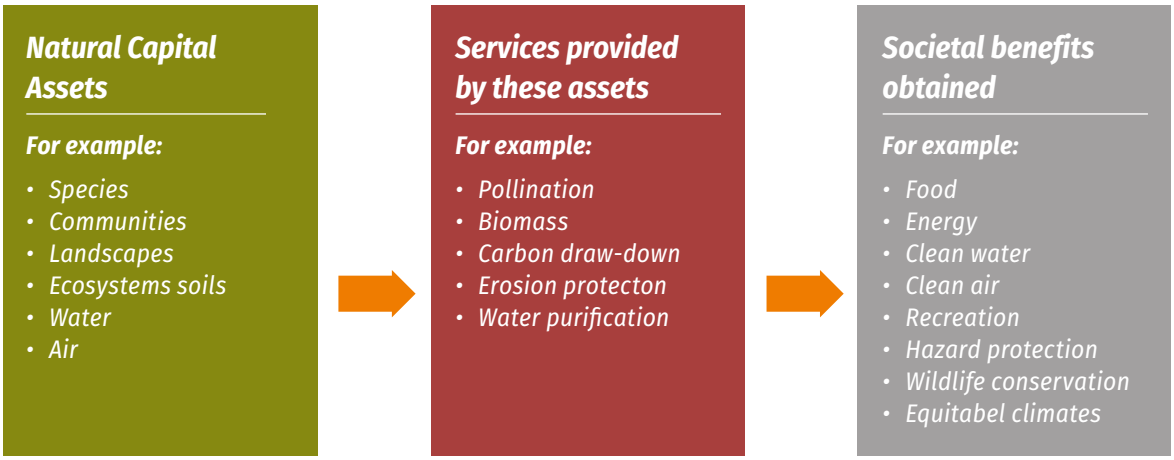
This 'economic invisibility of nature' is the principal argument for NCV. Yet, **there are many different interpretations of what valuation means and how to apply valuation in practical decision-making contexts.** Next to the monetary

5 *WWF (2018): Living Planet Report – 2018: Aiming Higher. Grooten, M. and Almond, R.E.A. (eds.). WWF, Gland, Switzerland; https://wwf.panda.org/knowledge_hub/all_publications/living_planet_report_2018/*

calculation of natural capital, the Ecological Footprint[6] for example uses hectares of land/sea-scapes as a metric for comparing human consumption with global bio-capacity to sustain human activity.[7] (For an overview of methods see the following section.)

A simple version of the NC concept distinguishes between 'natural capital assets', the 'services provided by these assets', and the 'societal benefits obtained' (see Figure 2):

Figure 2: *Natural capital approach considerations*



This conceptualization is mirrored in the slightly more complex **'ecosystem service cascade'** (see Figure 3, page 10), which uses a more pronounced natural science framing, but essentially suggests the same sequence:

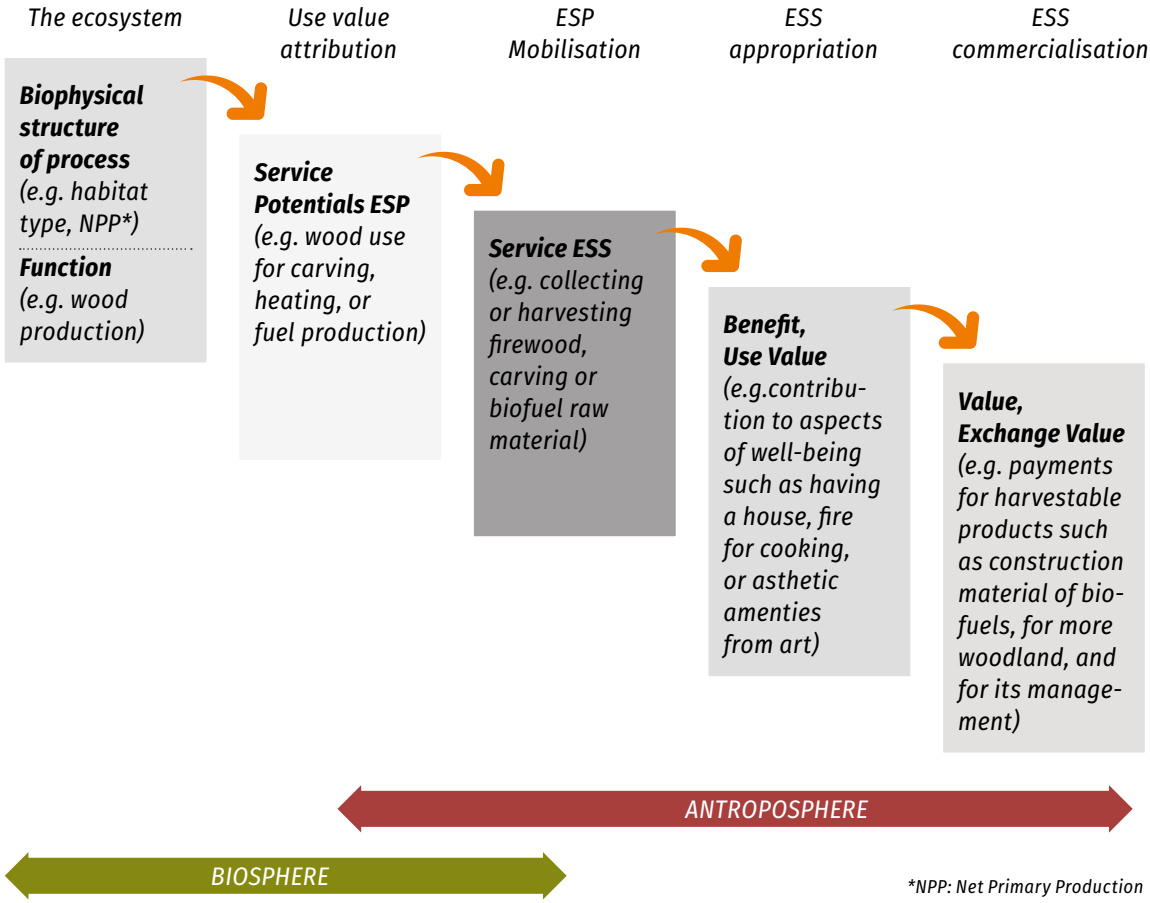
The key point is that while stocks and flows differ, there does not seem to be a meaningful way to value stocks without revaluing the (potential) flows derived from it. Thus, **NCV is essentially the valuation of all types of ecosystem services, which is achieved by attributing value to the benefits derived from these services.** In practice, ecosystem services, resulting benefits, and attributed values are often used interchangeably. Whether such conflation is a problem depends on the context.

Like Spangenberg et al (2014), various authors have emphasized that the actual benefits derived from natural capital depend at least as much on **human agency** as on the NC's quality or quantity. The human skill of fishing determines whether fish stocks are of benefit and have value to humans or not. The inherent problem in this is that all which currently appears to be of no use is prescribed as having no value.

6 *https://www.footprintnetwork.org/resources/data/*

7 *The Ecological Footprint is derived by tracking how much biologically productive area it takes to provide for all the competing demands of people. These demands include space for food growing, fiber production, timber regeneration, absorption of carbon dioxide emissions from fossil fuel burning, and accommodating built infrastructure. A country's consumption is calculated by adding imports to and subtracting exports from its national production. All commodities carry with them an embedded amount of bioproductive land and sea area necessary to produce them and sequester the associated waste. The Ecological Footprint uses yields of primary products (from cropland, forest, grazing land and fisheries) to calculate the area necessary to support a given activity.*

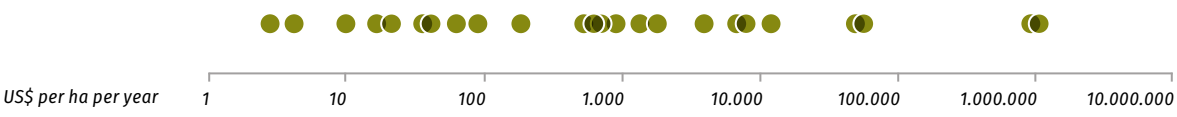
Figure 3: *Ecosystem service cascade*



Source: Spangenberg et al, 2014 – based on earlier works by Haines-Young and Potschin

Figure 4 shows the implications of this when interpreting NCV results. A global review of studies that examined the touristic value of coral reefs found values ranging from 5 to 1.000.000 USD per ha per year (TEEB, 2009). The underlying challenge is in interpreting this data: Are these values linked to the characteristics and condition of the coral reefs – or rather, to the presence of international airports and 5-star hotels? **NCV results are context- and situation specific; therefore, circumstantial factors shape the meaning of results, which makes comparison across sites difficult.**

Figure 4: *Range of the value of coral reefs for tourism*



Source: TEEB, 2009

Economists address this challenge by including intrinsic values and so-called 'option values' as part of the Total Economic Value concept. However, as it is unknown which environmental attributes may be important to humans in 50+ years (or: which coral reef tourism destinations will be en vogue then), quantification of these option values is often equally difficult.[8]

Beyond this valuation problem, framing an ecosystem as a 'natural capital stock' does not exonerate the **need for social and ecological analyses.** In order to draw meaningful conclusions from changes in natural capital stocks, it is indispensable to understand the ecological processes that 'produce' or constitute benefits to society, and the social processes that shape the demand for such benefits. For example, estimates of green space in cities is a measure of natural capital stock, but only the ecological characteristics (e.g. plant composition) and an understanding of the urban livelihood situation (e.g. population density and social setting) determines the importance of such green space for tackling air pollution, providing cooling effects or offering recreation.

To operate under conditions of complexity, various concepts have been proposed as complementary principles to NCV, including 'thresholds', 'tipping points' and 'safe operating spaces'. For example, population viability thresholds rather than absolute numbers of vultures in Central India determine their pest control capacity in the long run (Dillmann and v. Bertrab, 2017).

In light of these concerns, NC (and NCV) could be discarded as a narrow economic concept. However, in our view, this would neglect the huge potential of the NC concept. Consequently, we recommend interpreting NC (and NCV) in a broader sense: **Natural capital refers to the bio-physical basis of societies** (with their respective economies and cultures). **NCV describes a broad range of approaches that can be used to examine diverse aspects of human dependence on this bio-physical basis.**

We propose the following criteria for a broad NCV definition:

- A systematic effort to examine, describe, measure, and/or articulate one or various environmental benefits to humans, that
- relies on a clear methodological foundation, and
- is transparent about its assumptions, applicability, and validity limitations

8 *Several Latin American countries have established the precautionary principle 'in dubio pro natura' in their legislation (Russo and Russo, 2009), as safeguards against short-term thinking, but this principle is found difficult to operationalize (In the absence of absolute certainty, when exactly do we have a situation of doubt?).*

3 Different approaches to valuing natural capital

Table 1 shows that, beyond economic perspectives, there is a range of established approaches for examining environmental benefits. This indicates that a broad understanding of NC and NCV is well suited to capture and reflect environmental benefits in diverse policy settings and cultural contexts.

Table 1: *Overview of different approaches, selected frameworks, and metrics for NCV*

Example Framework	Characteristics	Example value enumerators, metrics or outputs
SOCIO-ECOLOGICAL APPROACH		
Millennium Ecosystem Assessment (MA)	*Synthesized research to present status and trends in ecosystem service supply. Used scenarios to make qualitative projections on future supply/demand combinations. Systemic perspective.*	*Scoring cards for describing causal links. Arrows to describe trends. Quantitative and qualitative value metrics. Scenario descriptions.*
IES Approach (GIZ)	*Builds on TEEB steps to purpose-driven assessments. Elicits stakeholder views and expert knowledge for initial screening of the ES supply/demand situation and for scoping those knowledge gaps which are relevant for decision making.*	
System of Environmental-Economic Accounting (SEEA) (UN and others)	*Official statistical standard for natural capital accounting (NCA) compatible with GDP calculations. Systematic framework to organize economic and environmental statistics into accounts that allows for periodic measuring and reporting. This is e.g. to inform a society's footprint, or to follow up on policy commitments.*	*Quantitative (and in parts spatially explicit) metrics describing ecological and environmental-economic attributes and policy response measures.*
SPATIAL MODELLING APPROACH		
InVEST (Natural Capital Project)	*Comprehensive suite of different models which can be combined and calibrated to specific questions and to regional contexts. Considers data on land-use, economic and demographic trends, hydrology, meteorology and others*	*Scenarios, maps and narratives of modelling results*

Example Framework	Characteristics	Example value enumerators, metrics or outputs
ECONOMNIC APPROACH		
Total Economic Value (TEV)	*Taxonomy of different economic value categories (e.g. direct use value, and option value (for future use)) which are then approximated, using a range of different methods (e.g. Market prices, damage cost methods, production function, and stated or revealed preference methods).*	*Monetary value estimates*
Deliberative economic valuation	*Alternative approach that combines fair and issue-focused discussion (i.e. 'deliberation') with a monetary value metric: Participants exchange views, concerns, opinions, preferences, prior to agreeing to a certain monetary value estimate for an environmental attribute or function*	*Monetary value estimates in combination with qualitative arguments*
ECOLOGICAL APPROACH		
Key Biodiversity Areas (KBA)	*Designates priorities for conservation, based on ecological criteria and biophysical processes. Can be used in conjunction with economic analyses but is 'stand-alone'.*	*Maps, quantitative indicator values*
Critical Natural Capital (CNC)	*Identifies priorities for conservation and helps determine environmental protection standards: Combining an assessment of environmental benefits with analyses of human pressures that affect their provision.*	*Maps, threshold values*
DEVELOPMENTAL APPROACH		
Sustainable Livelihoods Approach (SLA)	*Places human vulnerability (exposure to risks and coping capacity) at the centre: their environmental conditions and livelihood strategies. NC is one of the various types of capital that shape human livelihoods.*	*Qualitative descriptions, in combination with socio-economic data*
SOCIO-CULTURAL APPROACH		
Ethnographic approaches	*Examine cultural expressions and cognitive/practical 'interactions with nature'. These shape the knowledge about species and ecological processes, but also the meaning which is bestowed unto them.*	*Narratives, ethnographic documentation*
VALUE PLURALISM APPROACH		
IPBES: Diverse conceptualisations of multiple values of nature	*Emphasizes the need to explicitly recognize that different stakeholder groups may have divergent worldviews, which may value nature differently. Thus, values have to be understood in their context and bridged across worldviews.*	*Not clear yet, probably combinations of qualitative and quantitative value descriptions, and 'value bridging'. (tbc in upcoming IPBES methodological assessment)*

4 Six controversies related to NCV in conservation

A large body of critical literature on ecosystem service valuation is directly applicable to NCV (see: Hansjürgens et al., 2017; Schröter et al., 2014; Kill, 2014; TEEB Foundations (Chapter 4), 2010; Norgaard, 2010; Hull, 2006; Martinez-Alier, 2004; and our own thinking).

Table 2 summarizes six issues that have been controversially debated, which can be classified into the following critique areas: conceptual clarity, heuristic strength, normativity, and bias and side effects of (using) NCV.

Table 2: *Six controversies related to NCV in conservation*

Area of critique	Controversy
Conceptual clarity	*1. Is NCV a suitable concept for both policy making and scientific advice?*
Heuristic strength	*2. Does NCV provide an appropriate knowledge and decision-basis for dealing with the dynamics and complexity of biodiversity?*
Normativity	*3. Does NCV strengthen ethical choices for nature conservation?* *4. Can NCV recognize non-economic values and arguments relevant for conservation?*
Bias and side effects	*5. Does NCV enhance the commodification of nature?* *6. Does NCV turn a blind eye on equity and social justice?*

These six controversies are shortly explained with critiques and counter-arguments summarized.

Conceptual clarity

1. Is NCV a suitable concept for both policy-making and scientific advice?

Critique: NCV is too unspecific to serve as a paradigm for sustainability policy. NCV overlaps with the concepts of 'ecosystem services' (ES) and 'nature's contributions to people' (NCP). Its economic connotation ('natural asset' and 'capital stock') is emphasized by its use in accounting initiatives. But its conceptual vagueness leads to confusion.

Counter-argument: The term NCV is less obscure than NCP, and less 'green' than ES. It is also a relatively fresh term, and it connects well with 'green infrastructure' and 'nature-based solutions'. For these reasons, it is suitable to reach audiences beyond the 'environmental sector'.

Heuristic strength

2. Does NCV provide appropriate knowledge and a sound decision-basis for dealing with biodiversity's dynamics and complexity?

Critique: The discrete categories of different ecosystem services (which appear independent from each other) do not reflect the dynamic, interdependent, and complex ecology of many ecosystems. It is therefore uncertain or difficult to determine whether NC-motivated conservation favours biodiversity.

Counter-argument: If NC is understood as the 'stock' which generates a variety of benefits (and provided that not only one benefit is being maximized), then NC-motivated conservation will very likely also protect biodiversity: Multiple benefits can be better generated by more biodiverse ecosystems. Nonetheless, further research and monitoring is needed to clarify the relationship between NC and biodiversity.

Normativity

3. Does NCV strengthen ethical choices for nature conservation?

Critique: Nature conservation should be based primarily on the ethics that life (in its diverse forms) should not be destroyed. NCV arguments are utilitarian and therefore weaken this ethical position by introducing the 'utility' as a principal decision criterion. Also, NCV cannot properly capture nature's intrinsic value.

Counter-argument: NCV bundles valid anthropocentric arguments to complement and support ethical arguments for nature conservation. Trade-offs are part of a decision-maker's reality and should not be disregarded by recurring to a dogmatic 'ethical conservation stance'. Also, in the 'cultural ES' domain, NCV (somehow) captures 'existence values' of nature.

4. Can NCV recognize non-economic values and arguments relevant for conservation?

Critique: NCV is predominantly an economic concept which favours narrow economic motives for conservation (expressed as cost-benefit-ratios). NCV can hardly capture qualitative value expressions which are highly relevant for nature conservation.

Counter-argument: The NC idea of stocks and flows comes from systems thinking (not from economics). It can certainly be applied without monetary value estimates: by using biophysical or socio-economic quantitative indicators. Also, the concepts of 'ecological thresholds' or 'safe operating space' can be used in broadly conceived NCV – they reflect a systemic perspective on sustainability issues. But yes, qualitative value expressions do not fit well within NCV (e.g. bio-cultural, or rights-focused arguments).

Bias and side effects

5. Does NCV enhance the commodification of nature?

Critique: The focus on NC promotes an exploitative human-nature relationship. Its utilitarian framing suggests nature to be a 'bundle of goods and services', and not e.g. a place to respect and live in harmony with. Also, NCV can be applied to reveal further opportunities to intensify the use of nature's benefits and privatize benefits that were formerly considered public or collective goods. This has been evidenced e.g. in the transformation of seed production and seed-sharing networks.

Counter-argument: NCV can also re-connect society to nature by showing the different ways (i.e. ecosystem services) in which people depend on ecosystems. The huge lack of general awareness (of the diverse benefits nature provides) is a much bigger problem than the possible stimulus for further commodification. Also, whether highlighting NC leads to its commodification depends on the economic and legal system. In many areas, market forces establish themselves regardless, such as e.g. in the case of the growing urban demand for wild-harvested medicinal plants in Sub-Saharan Africa.

6. Does NCV turn a blind eye on equity and social justice?

Critique: Aggregate economic value estimates (such as a return-on-investment ratio for a national park) are popular within the NCV domain. They can disguise that different stakeholder or community (sub-) groups may differ strongly in their share of these benefits. Also, the privatization of formerly public environmental goods and services (e.g. fuelwood, medicinal plants, grazing rights) typically puts marginal population groups at a further disadvantage.

Counter-argument: While these critical points are correct, they are by no means a necessary implication of using NCV. There are established safeguards in valuation methods, interpretation of results, and their use in political/management processes, which can ensure that NCV has no negative social side effects. The issues mentioned are general challenges of contexts marked by poor governance.

PART B: NCV IN DIFFERENT POLICY AREAS

5 NCV in biodiversity policies

SDG Target 15.9:
By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts.

International reports and CBD documents differ in their conclusions on the progress towards achieving the Aichi targets. Globally, less than 10% of current NBSAPs contain information suggesting Target 2 is on track to be met.[9] For African states, integrating biodiversity in Poverty Reduction Strategy Plans seems unclear (UNEP-WCMC, 2016); therefore, we assume including NCV in these documents is equally uncertain.

Since the CBD COP in Nagoya in 2010, NCV and NCA at the national level have been advanced by initiatives like TEEB, SEEA, and WAVES – often with high-level political backing. For example, the African Ministerial Summit on Biodiversity (November 2018) affirmed NCA as one of Africa's biodiversity priorities.[10] International efforts related to NCA have focused on identifying indicators, developing valuation and accounting methods, and building the capacity of government agencies. These efforts create awareness about the relevance of biodiversity and ES for national economies and for measuring national progress towards Sustainable Development Goals (SDGs).

Aichi Target 2:
By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.

Apart from being a goal in itself (SDG Target 15.9 and Aichi Biodiversity Target 2), NCV is of direct relevance to informing other goals of the CBD's Strategic Plan 2011–2020 and 2030 Agenda for Sustainable Development. The protected area target (Aichi Biodiversity Target 11) mentions areas of particular importance for ecosystem services and Aichi Biodiversity Target 14 aims to restore and safeguard ecosystems that provide essential services – both of which directly relate to NCV. In addition, NCA (and in particular, SEEA) supports 40 indicators for nine SDGs. It is also important to note the indirect relevance of NCV to sectoral and other mainstreaming targets.

9 *See UNEP/CBD/COP/13/8/Add.2/Rev.1*

10 *UNSD and UNEP-WCMC side event at CBD COP 14: https://seea.un.org/news/cop14-seea-support-post-2020-biodiversity-framework*

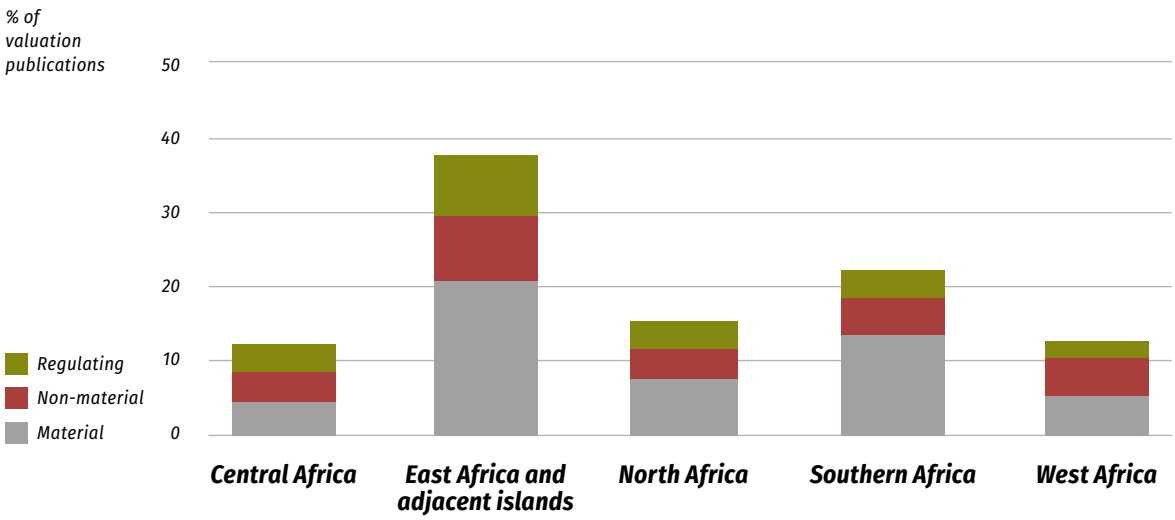
NCV in IPBES reports

IPBES reports[11] seek to synthesize current academic thinking on biodiversity, including on its status, trends, drivers, and possible solutions. IPBES intends to make academic knowledge count in decision making. Therefore, IPBES outputs are a key input to the preparation of the post-2020 global biodiversity framework.

While IPBES reports do not use NCV language in a narrow sense, the underlying message of ES and human dependency is well represented (see Table 3). If NCV is mentioned, the presented monetary estimates come with strong warnings as to their suitability for comparison, generalization, or application out of context ('benefit transfer').

The bulk of literature considered within the IPBES African regional assessment report (IPBES, 2018) shows material or provisioning ES (see Figure 5). Report sections raise a diverse range of issues, which describe current knowledge gaps; however, these cannot be meaningfully synthesized here. It is characteristic that recent IPBES reports no longer call for more comprehensive/systematic assessment and monitoring of ecosystem services (as e.g. GBO-4[12] in its recommendations for progress on Aichi Target 2).

Figure 5: *Percentage of valuation publications by (African) subregion.*



11 https://ipbes.net/assessing-knowledge

12 https://www.cbd.int/gbo/gbo4/publication/gbo4-en.pdf

Table 3 shows selected key messages of various IPBES reports which relate to (i) knowledge gaps or to (ii) NCV. Limited use of NCV terms and concepts, especially in these IPBES reports' politically endorsed 'Summaries for Policymakers', which undergo extra rounds of revision and scrutiny, are indicative that **voices within IPBES do want to move away from NCV framing.**

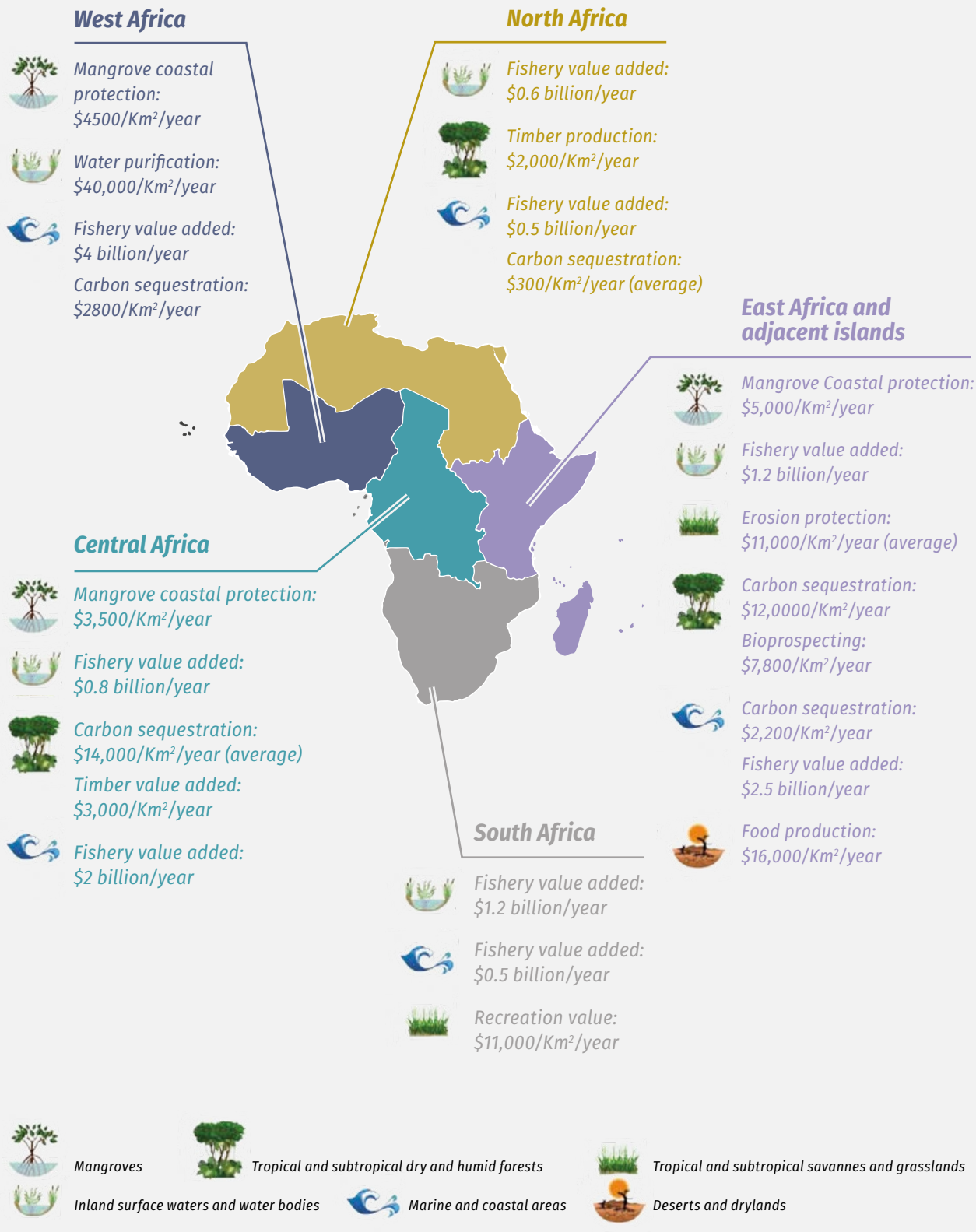
Table 3: *Selected key messages (in-)directly related to NCV and word counts of associated terms ('natural capital', 'valuation', 'economic values') mentioned in the 2018 IPBES Regional Assessment Reports' Summaries for Policy Makers (ipbes.net/assessing-knowledge)*

Report	Key findings/ conclusions related to NCV
IPBES African Regional Assessment *– Summary for Policymakers* *Use of the terms 'natural capital', 'valuation', or 'economic value': < 10 (total pages: 42)*	*A3. The true value of biodiversity and nature's contributions to human well-being tend to be under-appreciated in decision-making processes in Africa, in particular for non-material and regulating contributions. Existing studies on the valuation of biodiversity and nature's contributions to people in Africa are few and limited in both geographical scope and the types of ecosystems covered (established but incomplete).* *D4. […] There is also generally limited accessible peer-reviewed and grey literature to support a comprehensive assessment of policy and governance options for Africa. This creates challenges when identifying policy options but presents an opportunity for more frequent and comprehensive ecosystem assessments.*
IPBES Regional Assessment Report for the Americas *– Summary for Policy Makers* *Use of the terms 'natural capital', 'valuation', or 'economic value': < 10 (total pages: 34)*	*A2. The economic value of terrestrial nature's contributions to people in the Americas is estimated to be at least $24.3 trillion per year, equivalent to the region's gross domestic product.* *E5. Knowledge gaps were identified in all chapters. The assessment was hampered by the limited information (a) on the impact of nature's contributions to people to quality of life, in particular because there is a mismatch between social data related to quality of life produced at the political scale and ecological data produced at a biome scale; (b) on nature's non-material contributions to people that contribute to quality of life; (c) for assessing the linkages between indirect and direct drivers and between the drivers and specific changes in biodiversity and nature's contributions to people; and (d) on the factors that affect the ability to generalize and scale the results of individual studies up or down.*
IPBES Regional Assessment for Asia and the Pacific *– Summary for Policymakers* *Use of the terms 'natural capital', 'valuation', or 'economic value': < 15 (total pages: 32)*	*A4. […]. There are some significant valuation data gaps so caution needs to be applied during interpretation. While people across the region value nature for its contributions to their spiritual, cultural and physical well-being, these contributions have been measured to different extent with respect to their economic value. Studies of valuation estimates of nature's contributions to people in the Asia-Pacific region show that, in addition to provisioning services, regulating services are also significantly valued, and their contribution to a good quality of life is acknowledged. But the number of such studies is small, and drawn mostly from North-East Asia and Oceania.*

Report	Key findings/ conclusions related to NCV
IPBES Regional Assessment for Europe and Central Asia – *Summary for Policy Makers* *Use of the terms 'natural capital', 'valuation', or 'economic value': < 5 (total pages: 38)*	*The highest valued regulating contributions to people in Europe and Central Asia include: the regulation of freshwater and coastal water quality (estimated to have a median value of $19653 per hectare per year) (established but incomplete); habitat maintenance ($765 per hectare per year) (unresolved); the regulation of climate ($464 per hectare per year); and the regulation of air quality ($289 per hectare per year) (established but incomplete) {2.3.5.2}. Monetary values for regulating contributions to people, however, are site-specific and vary significantly [...].* *[...] Agricultural production across the 28 Member States of the European Union generates profits ranging from $233 per hectare per year (cereals) to $916 per hectare per year (mixed crops), [...]* *Nature's non-material contributions to people, which include physical and psychological experiences linked to tourism and recreation, are estimated to have a median monetary value of $1,117 per hectare per year (unresolved) {2.3.5.2}. Other non-material contributions, such as cultural heritage and identity, may be valued using non-monetary approaches (established but incomplete)*
IPBES Report on Land degradation and restoration *– Summary for Policymakers* *Use of the terms 'natural capital', 'valuation', or 'economic value': < 5 (total pages: 48, laid out version)*	*B1. Widespread lack of awareness of land degradation as a problem is a major barrier to action. Perceptions of human-environment relationships have a strong influence on the design and implementation of land management policies. Land degradation is often not recognized as an unintended consequence of economic development.* *C2. More relevant, credible and accessible information is needed to allow decision makers, land managers, and purchasers of goods to improve the long-term stewardship of land and sustainability of natural resource use. Effective monitoring strategies, verification systems and adequate baseline data—on both socioeconomic and biophysical variables—provide critical information on how to accelerate efforts to avoid, reduce and reverse land degradation and conserve biodiversity.*

Figure 6: *Indicative lists of economic values of nature's contribution to people in Africa (IPBES 2018)*

Sample values of some ecosystem services in selected ecosystems (freshwater, marine and coastal areas and forests) in Africa. Data come from various sources, with methodological differences, which means that comparisons of values between subregions or ecosystems is not currently possible. For further explanation on the methodology for Figure SPM.2, see supporting material Appendix 1.1 available from https://www.ipbes.net/supporting-material-e-appendices-assessments



Within IPBES networks, there are those who are in favour of monetary valuation, but also those who doubt its credibility and usefulness. This is in line with debates within IPBES to replace the term 'ecosystem services' with 'nature's contribution to people'. For example, Figure 6 identifies some monetary values but then warns against ANY type of comparison between them. This is not very convincing, because it leaves the reader without orientation on how to interpret the given estimates.

For future NCV, one way ahead is to make use of indicators and metrics which are less reliant upon economic assumptions and more easily processed for further comparison. Thus, deforestation, degradation, overfishing, or soil loss rates are indicators which can be combined with proxies for human needs (e.g. population density or growth), and thereby produce socio-economic arguments which can be more easily replicated, compared or upscaled, without the substantial methodological challenges associated with economic valuation studies. This substantiates the broader understanding of NCV introduced earlier in this report.

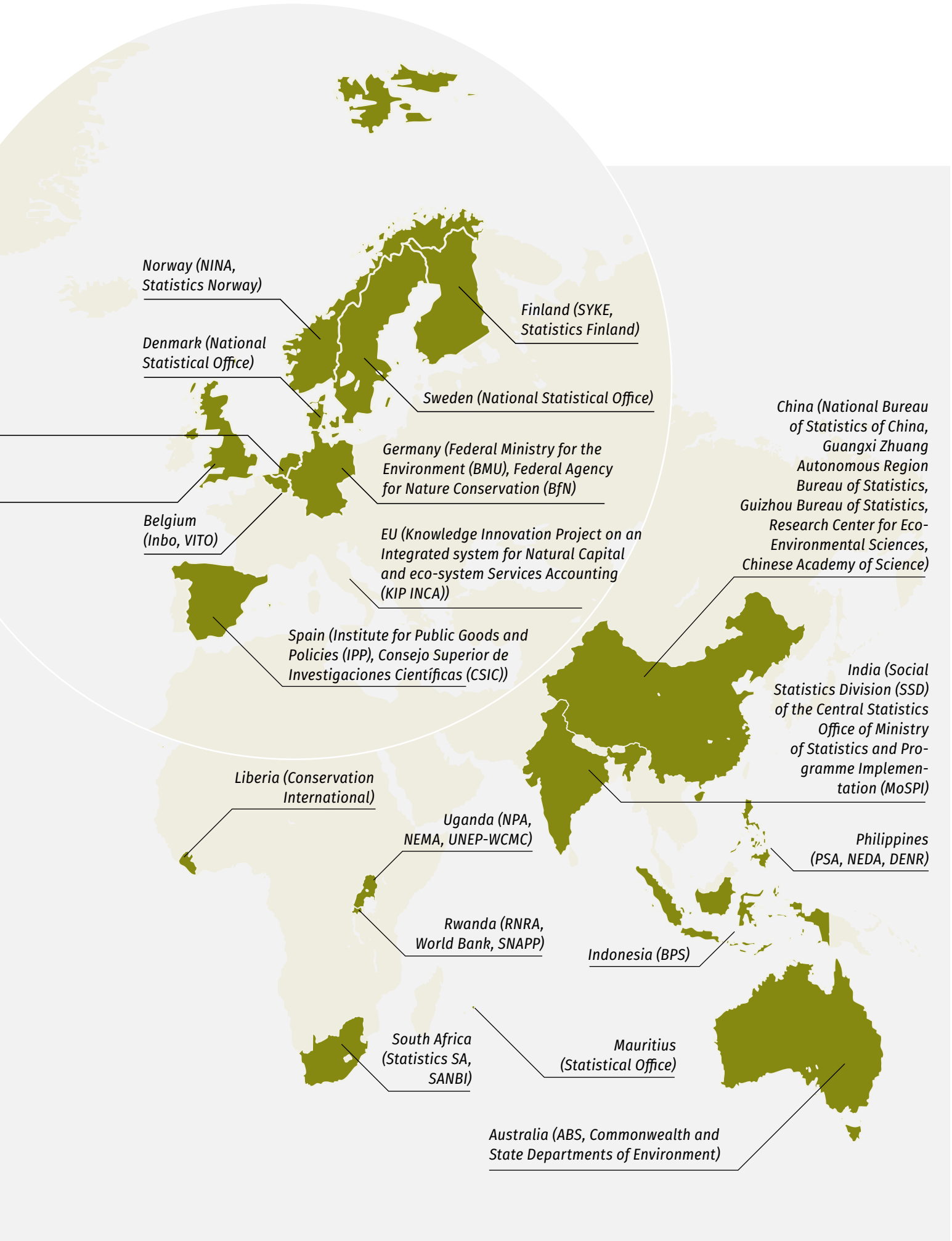
NCV in SEEA – System of Environmental-Economic Accounting

The System of Environmental-Economic Accounting (SEEA) is the internationally recognized UN-statistical standard for natural capital accounting. In 2012, the SEEA Central Framework was published with the intent of providing guidance for the "compilation of consistent and comparable statistics and indicators for policymaking, analysis and research". A 2017 assessment found that 69 countries were implementing the SEEA and the majority of remaining countries were planning on beginning their environmental-economic accounting program by 2020.

While the SEEA Central Framework focuses on natural resources (timber, water, soil, fish), the SEEA Experimental Ecosystem Accounting (EEA) takes an ecosystem perspective (forests, lakes, agricultural land and others). The SEEA EEA can provide valuable information for measuring and aligning Aichi Target 2 and SDG Target 15.9 and also complementing other global efforts, such as IPBES. It is currently under revision to elevate it from an experimental framework to a fully endorsed statistical standard by early 2021.[13]

13 *A pre-edited report (subject to official editing) on the technical recommendations for SEEA Experimental Ecosystem Accounting (EEA) is already available and provides insights into technical advancements required for improving NC accounting*

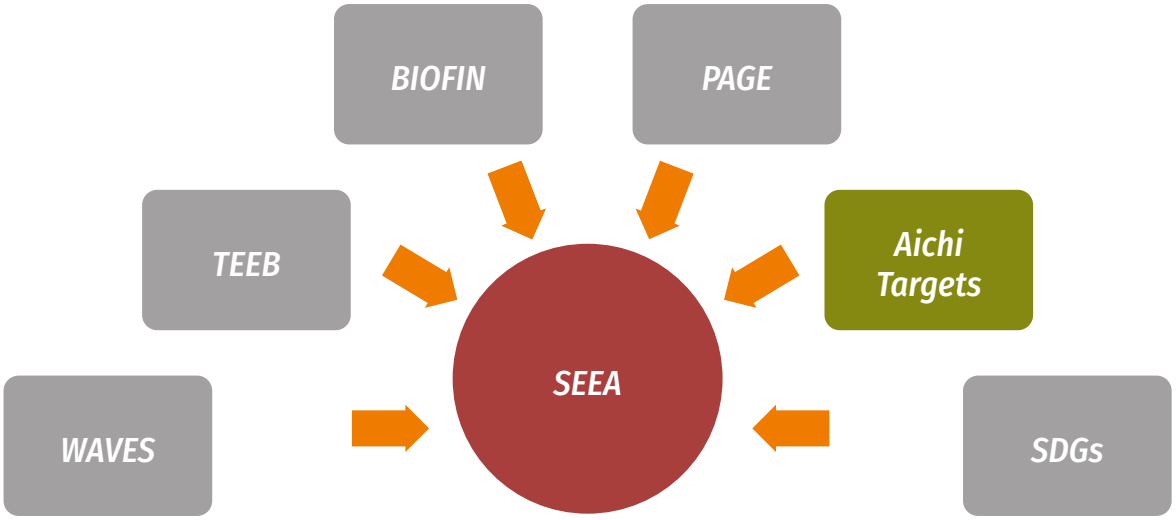
Figure 7: *Countries with ongoing or planned SEEA EEA based ecosystem accounting activities*


Norway (NINA, Statistics Norway)
Finland (SYKE, Statistics Finland)
Denmark (National Statistical Office)
Sweden (National Statistical Office)
Germany (Federal Ministry for the Environment (BMU), Federal Agency for Nature Conservation (BfN)
Belgium (Inbo, VITO)
EU (Knowledge Innovation Project on an Integrated system for Natural Capital and eco-system Services Accounting (KIP INCA))
Spain (Institute for Public Goods and Policies (IPP), Consejo Superior de Investigaciones Científicas (CSIC))
China (National Bureau of Statistics of China, Guangxi Zhuang Autonomous Region Bureau of Statistics, Guizhou Bureau of Statistics, Research Center for Eco-Environmental Sciences, Chinese Academy of Science)
India (Social Statistics Division (SSD) of the Central Statistics Office of Ministry of Statistics and Programme Implementation (MoSPI)
Liberia (Conservation International)
Uganda (NPA, NEMA, UNEP-WCMC)
Philippines (PSA, NEDA, DENR)
Rwanda (RNRA, World Bank, SNAPP)
Indonesia (BPS)
South Africa (Statistics SA, SANBI)
Mauritius (Statistical Office)
Australia (ABS, Commonwealth and State Departments of Environment)

The SEEA is the main statistical framework for major projects and policy frameworks including: the World Bank-led Wealth Accounting and Valuation of Ecosystem Services (WAVES) partnership, the EU project on Mapping and Assessment of Ecosystems and their Services (MAES), the UNDP Biodiversity Finance (BIOFIN) initiative, the Convention on Biological Diversity's Aichi Biodiversity Targets (in particular, Aichi Biodiversity Target 2), the Sustainable Development Goals (in particular, Target 15.9), and the Partnership for Action on Green Economy (PAGE). In turn, these initiatives' feedback is helping shape SEEA's further development.

Notably, further research needs on SEEA EEA include a range of issues that have already been clearly established or resolved in ecosystem service research communities. This indicates that SEEA application challenges can either not be directly resolved by ES science – or ES research has not been sufficiently considered. Challenges identified by SEEA experts include: classification of ecosystem types, indicators for ecosystem conditions, and valuation concepts and methods (see SEEA, 2018).

Figure 8: *The SEEA is the main statistical framework for major initiatives, projects, and policy frameworks (Vardon et al 2017)*



Key lessons learnt from SEEA and the EU-funded NCAVES project[14]:

» Importance of involving policy makers and targeting policy needs: Engagement of "… policy makers in every step of developing accounts …" for natural capital is important to ensure the NC accounts "… effectively meet policy needs".

» NCV and establishing NC accounts promote partnerships across stakeholders and sectors: The process of developing NC accounts has potential for establishing "partnerships across key groups of stakeholders" and sectors needed for reducing biodiversity loss and measuring progress. Example: in Brazil, Mexico, and South Africa, the work on SEEA and the NCAVES project promoted partnerships "… between national statistical offices, ministries of environment, ministries of planning and finance and other line ministries".

» NCV can promote a common understanding across disciplines: The work on NC accounts also promotes stakeholders to work across different disciplines and to find "… a common footing and a common language".

» Coherent indicators for NC contribute in measuring progress toward sustainable development: Developing indicators for natural capital that are based on sound methodological approaches also contributes to the development of a coherent set of indicators for measuring sustainable development (e.g. through the work of SEEA).

» SEAA can create policy coherence for a post 2020 Biodiversity Framework: NC accounts can help to better understand drivers of biodiversity loss and to measure progress in reducing biodiversity loss.

14 *UNSD and UNEP-WCMC side event at CBD COP 14: https://seea.un.org/news/cop14-seea-support-post-2020-biodiversity-framework*

NCV in WAVES – Wealth Accounting and Valuation of Ecosystem Services

WAVES is led by the World Bank and supports countries in developing natural capital accounts, which are used in decision-making and monitoring SDGs and national and sectoral development plans. Botswana, Colombia, Costa Rica, Guatemala, Indonesia, and the Philippines graduated from WAVES with institutionalized and resourced natural capital accounting systems. Some of these countries went on to provide mentoring to other countries in their regions. Egypt, Morocco, Rwanda, Uganda, and Zambia are currently receiving support from the program to establish their NCAs. Based on the experience gained in WAVES, the World Bank developed the Global Program of Sustainability to support NCA and ecosystem services assessments in the public and financial sector. The World Bank also produced the third edition of the "The Changing Wealth of Nations Report 2018", which includes natural capital (including oil, gas, coal, minerals, agricultural land, forests, and protected areas) in the assessment of the wealth of nations (Lange et al, 2018).

Lessons learnt from the WAVES Initiative include the need to shift focus more towards the actual information needs in decision making (Vardon et al, 2017):

Table 4: *NCA must shift from a supply-side emphasis toward a demand-side, decicion-centered approach*

FROM	TO
Technical focus – get NCA methods and data right	*Decision focus – get natural capital policy right*
Supply side – NCA production is separate from policy production; NCA struggles to get policy uptake	*Demand side – policy players engage with NCA players, and thus shape NCA purpose/focus*
Government focus on policy – as a government domain, that is, "what government wants"	*Stakeholder view of policy – what business, civil society, and government want, and how they agree*
Focus on formal policy decision –NCA trying to change one policy decision or plan	*Enable policy discourse by many – NCA helping debate and review as well as making decisions*
Data provision – NCA producers putting out raw data and hoping they will be used	*Information demand – "policy entrepreneurship," or getting policy-relevant information to many users*
NCA is a "magic bullet" – promoted on its own	*NCA works with complementary tools*
Experimental – one off approaches	*Mandated – comprehensive and routine NCA system*

6 NCV in land-use sectors

TEEB for Agriculture and Food (TEEB, 2018) outlines a sophisticated systems approach addressing the full value chain of products (production, manufacturing, distribution and consumption), all four capitals (natural, produced, human and social capital) and the flows or impacts (agriculture, fishery and forest outputs; purchased inputs; ecosystem services; pollution and waste). Such a systems approach is required for informing management options and policies on the 1) multiple benefits biodiversity and ecosystem services provide to agriculture, fisheries, and forestry; 2) cross-sectoral impacts and trade-offs; and 3) cross-sectoral synergies for overcoming silos in decision making and governance required, for example, for achieving the SDGs. TEEBAgriFood demonstrates agriculture's link to 12 global sectors with the largest impact on biodiversity and 12 of the 17 SDGs.

Implementing such a systems approach to NCV for informing decision making poses challenges as it is a complex task requiring expertise and resources typically not included in the planning, budgeting, and decision making of companies and governments (e.g. combining information on biophysical and socio-economic processes with NCV at local to global scales). Furthermore, it requires cross-sectoral collaboration. It is also critical to include an assessment of cultural values in agriculture, forestry, and fisheries. For example, a TEEB study in Mexico showed that the high productivity of smallholders in Mexico is intrinsically linked to cultural values and not driven by profit alone. Overall, TEEBAgriFood identified the critical role smallholders play in global food supply.

Based on insights from NCV studies for informing decision making (sources: own observations and IISD TEEB Bulletin, 2019 from the TEEBAgriFood Global Symposium), **NCV can help:**

- compare pathways for agricultural intensification;
- support arguments for multifunctional landscapes with high biodiversity and multiple ES;
- show consequences of degradation (e.g. soil degradation);
- show side effects of agricultural transformations towards internationalized agri-food systems;
- show the urgency of needed action and the costs of policy inaction.

Yet, information is only part of a larger puzzle in addressing established interest structures in agriculture, forestry, and fisheries. Inclusive NCV processes seem at times more important than results because they facilitate learning among key audiences.

Challenges to NCV in agriculture (as in other sectors) include:

- Balancing between scientific robustness and the limited resources and time available;
- Drawing the right conclusions from results to enable targeted interventions;
- Building a community of practice that generates information on natural capital that is relevant for policy and practice (including businesses);
- Including multiple value dimensions in NCV and in decisions;
- Quantifying "invisible" stocks and flows in agroecological systems – such as savings in use of inorganic fertilizers and pesticides;
- Including further externalities (e.g. impacts of pesticides on health and pollination);
- Balancing between private benefits and public costs of agricultural benefits and impacts;
- Accommodating agricultural intensification while conserving critical ecosystems.

Table 5: *Principal initiatives with relevance to NCV for agriculture, forestry and fisheries*

Initiative	Focus related to NCV
AGRICULTURE AND AGROFORESTRY	
The Economics of Ecosystems and Biodiversity (TEEB) for Agriculture and Food. *(www.teebweb.org/agrifood)*	*"The TEEBAgriFood initiative seeks to provide a **comprehensive economic** evaluation of the "eco-agri-food systems" complex, and demonstrate that the economic environment in which farmers operate is distorted by significant externalities, both negative and positive, and a lack of awareness of dependency on natural, human and social capital."* *Examples on: cattle and soy production in the Amazon (Brazil), livestock (Tanzania), cocoa (Ghana), coffee (Ethiopia), rice (Senegal); Land-water-energy management at the c atchment scale (Colombia, Kenya, Tanzania); organic products (Thailand).*
Natural Capital Coalition *Natural Capital Protocol Food and Beverage Sector Guide* *(www.naturalcapitalcoalition.org/food-and-beverage)*	*Sector guide to the Natural Capital Protocol encompassing all businesses operating in the production, processing, or retailing of food and beverage products.*
FORESTRY	
REDD+ monitoring, reporting, verification (MRV) and safeguards information system (SRS)	*NCV allows assessing multiple forest benefits, informs project design, and helps targeting REDD+ activities to areas with potential for co-benefits. It is optional for countries to report co-benefits as part of their Nationally Determined Contributions (NDCs).*

Initiative	Focus related to NCV
FORESTRY	
Bonn Challenge on landscape restoration *(www.bonnchallenge.org)*	*"... a global effort to bring 150 million hectares of the world's deforested and degraded land into restoration by 2020, and 350 million hectares by 2030."* *The Restoration Opportunities Assessment Methodology (ROAM) includes guidance on economic valuation of carbon, biodiversity and livelihood benefits from forest landscape restoration (IUCN and WRI, 2014).*
Natural Capital Coalition *Natural Capital Protocol sector guide for food and beverage* *(www.naturalcapitalcoalition.org/natural-capital-protocol/forest-products)*	*The Forest Products Sector Guide offers a standardized decision-making framework to support businesses along the forest products value chain in identifying, measuring, and valuing their impacts and dependencies on natural capital.*
LANDSCAPES (CROSS-SECTOR)	
Economics of Land Degradation *(www.eld-initiative.org)*	*Uses NCV within a holistic framework for assessing the costs of degradation and the benefits of restoration for informing decision making on options for sustainable land management including:* • *impact pathway framework (investment opportunities and options);* • *capital asset framework (human-wellbeing);* • *ecosystem service framework (total economic value TEV of landscape);* • *decision-making framework based on TEV for assessing beneficial pathway (ELD Initiative 2015).*
OCEANS	
Why Value the Oceans? *(www.teebweb.org/areas-of-work/biome-studies/teeb-for-oceans-and-coasts)*	*This publication provides a summary of policy relevant questions to be addressed as part of NCV for Oceans. It highlights the importance of ocean habitats such as the deep ocean and coastal ecosystems, in particular coral reefs, for multiple benefits including carbon sequestration (blue carbon) and food supply. However, a full TEEB assessment on oceans has not been undertaken (TEEB 2012).*
The Nature Conservancy (TNC 2016) Mapping Ocean Wealth *(www.oceanwealth.org)*	*Atlas on the multiple benefits of oceans with a focus on fish, coastal protection, carbon sequestration, tourism, and existence value together with policy options for sustainable management and conservation. It has been prepared with input from The Nature Conservancy (TNC), World Resources Institute (WRI), The World Bank, and WAVES, and others.*
Natural Capital Coalition *Natural Capital Protocol Ocean Supplement* *(www.naturalcapitalcoalition.org/wp-content/uploads/2019/01/Natural-Capital-Protocol-for-the-Ocean_Overview.pdf)*	*A supplement to the Natural Capital Protocol is being developed for valuing oceans (Natural Capital Coalition (2019).*

7 NCV in private sector manufacturing and supply chain management

There is an increasing wealth of information, data, and tools available for assessing the impact of production and consumption on natural capital (including ecosystem services) along globalizing value chains (see Table 6). For example, a study by True Cost (2013) on selected sectors concluded that land use causes global externalities of US$1.8 trillion: "Due to both magnitude of land use for cattle ranching in Brazil, and the high value of ecosystem services of the virgin land used, the impact of cattle ranching in South America is especially high."

However, governments set many policy targets with little relevance for businesses. For example, the UN Environment Life Cycle Initiative identified 169 irrelevant SDG indicators for business: For instance, none of the indicators underlying the Climate goal have business relevance, but rather focus on policies, subsidies, etc. According to a Business and Sustainable Development Commission's report, the re-interpretation of the indicators to link them to business and especially to decisions around product strategy and development is the first hurdle that needs to be overcome.

Table 6: *Overview of private sector initiatives in which NCV plays a key role*

Initiative/Report	Focus related to NCV
Natural Capital Coalition *(www.naturalcapitalcoalition.org/natUral-capital-protocol)*	*Natural Capital Protocol: using natural capital thinking for better decision making in public and private business sectors. The protocol helps in assessing dependencies and risks related to natural capital. It provides also guides for specific sectors (apparel, food and beverage, forest products, finance). The coalition also helped to establish the Government Dialogue on Natural Capital and other initiatives. According to the Coalition more than 300 businesses have applied natural capital thinking in their decision-making among them Olam, Coca-Cola and Kering.*
Life Cycle Initiative *(www.lifecycleinitiative.org)*	*Members include governments, businesses, science, and civil society; The publication, "Global Guidance for Life Cycle Impact Assessment Indicators" identifies "current best practice" and recommends characterization factors in a variety of impact areas including: climate change; health impacts of fine particulate matter; water use impacts; and land use impacts on biodiversity. It is currently working toward linking the SDGs to life cycle impact pathways.*
Global Footprint Network *(www.footprintnetwork.org)*	*Provides a calculator that can be customized to individual requirements for assessments of the ecological footprint (use of natural capital) including carbon footprint, use of cropland, grazing land, forest land, and fishing ground. It is used for assessing the ecological footprint of countries, regions, cities, and individuals. It can also be applied to the finance sector.*

Initiative/Report	Focus related to NCV
World Business Council for Sustainable Development (WBCSD) *(www.wbcsd.org)*	*Among other activities, WBCSD is helping businesses, cities, energy sectors, land use sectors to assess pathways for contributing to achieving the SDGs. With regards to food and nature, the focus is on nutrition security, smallholder livelihoods, natural resource efficiency, including water management, climate change impact and adaptation. Sectors include among others agriculture (crops & livestock), forestry, fisheries, and aquaculture.*
Natural Capital at Risk: The Top 100 Externalities of Business: *(www.trucost.com/publication/natural-capital-risk-top-100-externalities-business)*	*Companies and investors can use information on the Natural Capital Cost of sectors to assess possible direct, supply chain and investment risks; Trucost also developed the Environmental Profit and Loss account for PUMA* *"This study monetizes the value of unpriced natural capital consumed by primary production (agriculture, forestry, fisheries, mining, oil and gas exploration, utilities) and some primary processing (cement, steel, pulp and paper, petrochemicals) [...] in the global economy through standard operating practices, excluding catastrophic events. For each sector in each region (region-sector), it estimates the natural capital cost broken down by six environmental key performance indicators (EKPIs), and a ranking of the top 100 costs is developed from this." (True Cost 2013).* ***Key findings:*** • *"... the world's 100 biggest risks are costing the economy around $4.7 trillion per year in terms of the environmental and social costs of lost ecosystem services and pollution" with unpriced natural costs being from GHG emissions (38%), water use (25%), land use (24%), air pollution (7%), water pollution (5%), waste (1%);* • *"... no high impact region-sectors generate sufficient profit to cover their environmental impacts" including coal power generation, wheat farming and cattle ranging;* • *"Many of these natural capital costs are found in the developing world, but the resulting goods and services are being consumed by resource intensive supply chains around the planet";* • *"... 3 billion new middle-class consumers by 2030 will cause demand to continue to grow rapidly, while supply will continue to shrink";*
Private consultancies using NCV for public and private clients	*A number of companies offer services for cost-benefit analysis including ecosystem services (e.g. Earth Economics) and the assessment of product life cycles and their impact in terms of carbon footprint and impact on natural capital (e.g. Ernst & Young (EY), Pricewaterhouse Coopers (PwC), KPMG, BSR, Earth Economics).*

8 NCV in the banking and finance sector

Banks or other institutional investors have due diligence processes to determine eligibility for lending or investing in corporate activities. Due diligence includes financial and risk analysis (which may include environmental risk), but in many cases also an assessment of social and environmental criteria. NCV can be part of the information that banks or other investors demand from recipients of capital (i.e. companies or corporate project consortia) to assess environmental performance. There are two types of environmental assessments: (i) identifying the minimum requirements to avoid or mitigate impacts and associated risks within (standard) corporate activities or projects (e.g., mining projects, new infrastructure), and (ii) estimating the environmental performance of explicitly "green" projects or corporate activities.

Requirements for companies to receive loans for standard projects

Many banks, including large development banks, demand sustainability standards within their due diligence procedures, i.e. to decide whether a client company or project is eligible for receiving a loan. Ninety-four financial institutions in 37 countries have adopted the Equator Principles[15], which covers more than 70 percent of international project finance debt in emerging markets. The rather broad principles are connected with the more specific Performance Standards of the World Bank's International Finance Corporation (IFC, 2012).[16] Development banks such as the French Agency for Development (AfD), German KfW, the European Bank for Reconstruction and Development (EBRD), as well as the European Investment Bank (EIB) all comply with IFC Performance Standards.

Table 7 shows how **NCV plays a role within a broad set of IFC criteria and indicators. Several IFC performance standards refer to the assessment of ecosystem services impacts.** Obviously, the procedures and content of such impact assessments are related to Environmental Impact Assessment (EIA) policies and obligations for large infrastructure projects. Guidance for corporate offsetting of residual impacts (see Performance Standard 6 in the table) developed by the Business and Biodiversity Offsets Programme (BBOP, 2009 & 2012) involves assessment and (economic) valuation of ecosystem services.

15 *See URL: https://equator-principles.com/members-reporting/*

16 *For instance, Equator Principle 3 (Applicable Environmental and Social Standards) includes the following statement: "For Projects located in Non-Designated Countries , the Assessment process evaluates compliance with the then applicable IFC Performance Standards on Environmental and Social Sustainability (Performance Standards) and the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines)" (Equator Principles, 2013, p. 21).*

Table 7: *Role of NCV in the International Finance Corporation (IFC 2012)*

Selected performance standards	Required protocols	Role of NCV
1: Assessment and Management of Environmental and Social Risks and Impacts	• *Environmental & Social Assessment, Management System* • *Policy* • *Identification of Risks & Impacts* • *Management programs* • *Organizational Capacity and Competency* • *Emergency Preparedness & Response* • *Monitoring & review* • *Stakeholder Engagement*	*Projects are supposed to assess direct and indirect negative effects of the intended activities, including "(iii) indirect project impacts on biodiversity or on ecosystem services upon which Affected Communities' livelihoods are dependent." (p.8).*
2: Labour and Working Conditions	• *Working Conditions & Management of Worker Relationship* • *Protecting the Work Force* • *Occupational Health & Safety* • *Workers Engaged by Third Parties* • *Supply Chain*	*Direct impacts on priority (provisioning and regulating) ecosystem services that may result in adverse health and safety risks and impacts to Affected Communities are to be identified and avoided or mitigated (p.33).*
6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	• *Protection and Conservation of* • *Biodiversity* • *Management of Ecosystem Services* • *Sustainable Management of Living Natural Resources* • *Supply Chain*	*Clients are required to sustainably manage and mitigate impacts on biodiversity and ecosystem services throughout the project's lifecycle (p.40).* *Projects are required to adhere to the mitigation hierarchy and to off-set residual impacts according to a no-net-loss principle. This involves assessing all relevant ecosystem service impacts, in particular "the determination of priority ecosystem services in accordance with the stakeholder engagement process as defined in Performance Standard 1" (p.45).*

Environmental performance indicators for (green) investments

A growing number of "green", "impact", and "conventional" **investors not only want to avoid negative impacts related to their investments but seek to support activities with an explicitly positive environmental return** alongside a financial return. Such "green" investments can be made in the form of lending (e.g. via "green bonds") or by providing equity to private enterprises or projects with a measurable positive environmental impact. Green investments with an impact on biodiversity conservation are typically in the areas of sustainable agriculture, fisheries, agro-forestry, eco-tourism, or green infrastructure. To make informed decisions and to avoid criticism and accusations of greenwashing, green investors ask for verification of the environmental impact within the due diligence process and as part of performance monitoring (Rode and Favero, 2015).

Establishing and monitoring the sustainability standards and their consequences is frequently delegated to a third-party, which can be an NGO such as WWF or a consulting company as "approved third-party verifiers" (e.g., Bureau Veritas, Ernst&Young (EY), KPMG, Trucost, Sustainalytics, and TÜV Nord Cert are among the verifiers approved by the Climate Bond Initiative – CBI[17]).

At a smaller scale, banks can provide "green" (micro-)credit, for instance to support small-holder farmers in switching to more sustainable agricultural, forestry, or fisheries management. These transactions also require setting certain standards and developing due diligence and monitoring processes to verify the positive environmental impacts. The challenge for these small volume financial transactions is that processes should not be too costly for either the finance provider or client. Hence, a balance has to be struck between environmental effectiveness and feasibility in terms of time, effort, and costs for compliance. For sustainable coffee production, for instance, BMZ co-developed the Common Code for the Coffee Community (4C) certification, which serves to ensure eligibility and monitoring requirements for financial credit.[18]

NCV in the form of calculating carbon emission reductions helps demonstrate the carbon benefits from avoided deforestation or reforestation (e.g. via Verified Carbon Standard or the Gold Standard). **Beyond carbon, however, NCV or ecosystem service valuation is not very prominent in the literature on private sector conservation finance** (see e.g. reports on private investments in conservation by Hamrick, 2016; Huwyler, et al 2016). A publication on lessons from "Unlocking Forest Finance" in the Amazon concluded that **"ecosystem services valuation does not easily attract investors"** (Rode et al, 2019) because institutional and individual private **investors tend to prefer simple indicators** (e.g. area of forest protected) and usually rely on labels from a trustworthy third party to "tick the box" on environmental project performance. Consultancies such as Trucost have developed methods for determining corporate NC impacts.

A more in-depth conclusion on the role of NCV in environmental performance measures for green investments would require going into the protocols and methods used by the different verifying institutions. **Valuation of ecosystem services will only be one aspect among a broader set of methods and indicators for environmental performance.**

17 *cf. Approved Verifiers under the Climate Bond Standard. https://www.climatebonds.net/certification/approved-verifiers*

18 *Documents can be accessed at URL: https://www.4c-services.org/process/documents-summary/*

Table 8: *NCV initiatives in the finance sector*

Initiative	Description
Equator Principles	*The Equator Principles is a risk management framework, developed and adopted by financial institutions to determine, assess, and manage environmental and social risk in projects. It is primarily intended to provide a minimum standard for due diligence and monitoring. The principles have been revised several times, the latest version from 2013 is available at URL: https://equator-principles.com/wp-content/uploads/2017/03/equator_principles_III.pdf (www.equator-principles.com)*
United Nations Environment Programme Finance Initiative (UNEP FI)	*A partnership between the United Nations Environment Programme (UNEP) and the global financial sector. UNEP FI works closely with over 200 financial institutions that are signatories to the UNEP FI Statement on Sustainable Development and a range of partner organisations to develop and promote linkages between sustainability and financial performance. Through peer-to-peer networks, research and training, UNEP FI carries out its mission to identify, promote, and realise the adoption of best environmental and sustainability practice at all levels of financial institution operations. (www.unepfi.org)*
Natural Capital Finance Alliance (NCFA)	*The NCFA was launched at the UN Conference on Sustainable Development (Rio+ 20 Earth Summit) in 2012 by UNEP FI and the UK-based non-governmental organisation, Global Canopy Programme (GCP). It is a worldwide finance led initiative to integrate natural capital considerations into financial products and services, and to work towards their inclusion in financial accounting, disclosure and reporting. (www.naturalcapital.finance)*
Coalition for Private Investment in Conservation (CPIC)	*A multi-stakeholder initiative focused on enabling conditions that support a material increase in private, return-seeking investment in conservation. The steering committee consists of Cornell University, Credit Suisse, IUCN, and The Nature Conservancy's NatureVest. CPIC aims to facilitate the scaling of conservation investment by creating models ("blueprints") for the successful delivery of investable priority conservation projects, connect pipeline providers of such projects with deal structuring support, and convene conservation project delivery parties with investors to execute investable deals. (www.cpicfinance.com)*
Conservation Finance Alliance (CFA)	*The CFA is a global professional association for conservation finance experts. The network's mission is to promote knowledge and the effective use of conservation finance tools in their activities across the planet. (www.conservationfinancealliance.org)*
Climate Bonds Initiative (CBI)	*The Climate Bonds Initiative is an international, investor-focused not-for-profit that works on mobilising the bond market for climate change solutions. (www.climatebonds.net)*
Natural Capital Financing Facility (NCFF)	*Halting the loss of biodiversity and adapting to climate change requires increasing investment in natural capital. The European Investment Bank (EIB) and the European Commission therefore have partnered to create the NCFF, a financial instrument that supports projects delivering on biodiversity and climate adaptation through tailored loans and investments, backed by an EU guarantee. At the same time projects financed through the NCFF need to generate revenues or demonstrate cost savings. (www.eib.org/en/products/blending/ncff/index.htm)*

PART C: NCV APPLICATIONS TO SUPPORT PROTECTED AREAS

NCV can pursue at least four different purposes to support protected areas (PAs)[19]:

- Make the case for stronger government commitment and for building alliances;
- Inform PA planning and management;
- Support the resolution of PA-related conflicts;
- Identify and developing PA finance solutions.

In the following, each of these NCV purposes is explored with examples and field experiences that illustrate associated challenges and lessons.

9 NCV for alliances and stronger government commitment to support PAs

NCV has perhaps been used the most prominently to make the case for increased PA funding and political support. There is substantial evidence that PA systems and individual PAs in developing countries lack high level political support and are generally significantly under-funded. For example:

- The 2010 "Financial Sustainability of Protected Areas in Latin America and the Caribbean: Investment Policy Guidance" commissioned by UNDP and TNC (Bovarnick, et al 2010) used official data from 19 countries to estimate a funding shortfall of $314 million/year for PAs (excluding Venezuela) to simply address basic management. This shortfall increased to $700 million/year under an optimal management scenario.

- Most recently, using the conservation needs of lions as a proxy for those of wildlife in general, Linsey et al. (2018) compiled a dataset of 2015 funding for 282 state-owned PAs with lions in 23 African countries. They found that PAs with lions require a total of $1.2 to $2.4 billion annually yet received only $381 million (i.e. a shortfall of $0.9 to $2.1 billion). Approximately 88% to 94% of individual PAs with lions were insufficiently funded.

Many factors beyond budget needs influence government budgeting decisions, including intra-government negotiations, external events, and so-called (party) politics. To our knowledge, no large studies have yet identified the relative importance of NCV arguments amongst these other factors. But we assume that they can indeed play a substantial role, especially if they are embedded in and used as part of a strategy.

19 Based on TEEB in Local and Regional Policy and Management, Chapter 7 on Ecosystem Services and PAs (Berghöfer and Dudley 2010).

The Protected Areas Budget Negotiation Support Project (initiated and implemented by UNDP & TNC between 2012–2014) supported the formulation, negotiation, and approval of national PA's budgets in Chile, Guatemala, and Peru. Findings from this project offer detailed insights (which should not however be generalized) on knowledge gaps that NCV can close and on processes which are suitable for 'making the case' (Flores & Bovarnick, 2016):

- PAs budgets are not decision-maker focused, i.e., current budgets cannot be used by the Ministry of Environment (MoE) and the Ministry of Finance (MoF) to make the case for increasing the PAS budget.

- There is a serious lack of adequate data to support the PAS budget cycle, including conservation results and related realistic costs, financial needs, and economic impact and results-based indicators.

- To consider budget increases, the MoF, which approves all budgets, needs to see how the PAS supports local and national economic development and that they are a cost-effective investment; therefore, PAs budgets must include clear information on conservation results, cost efficiencies, and a development return on investment.

- Although PAS have been working on PA economic valuation in recent years, the formulation and introduction of economic impact indicators have been neglected. PAs still do not use indicators that capture and report their contribution to economic development; hence budgets cannot demonstrate their value to MoF. The MoF welcomes economic development indicators linked to conservation results and supplementary data from PA valuations.

- Currently, the MoF does not require these indicators and does not communicate to PAs which indicators would be useful for budget increases. Conversely, PAs do not reach out to understand what the most important "decision-maker" (the MoF) needs in order to increase budget allocations.

- Revision and negotiation of the PAs budget at the executive level (MoF) is critical, because this is where major cuts or increases to the PAs budget may occur. In such case, the MoE may decide to pass the cut to the PAs budget because the PAs usually ranks lower compared to the priority of other departments of the MoE. Commonly, when the MoE manages protected areas, the PAs budget competes with other departments of the MoE that may have higher priority

- Comprehensive communications campaigns to support the PAs budget approval process may decrease the likelihood of budget cuts at the legislative level and can assist legislators requesting increases. This communications campaign should address both legislators and the public (voters) and be focused on how investments in PAs contribute to economic and social development.

The basic idea of using NCV here is that PA management authorities and their parent ministries should use tools that speak the language of government, finance, and economy ministries in particular who generally exert significant influence over regular government budget allocations. NCV provides the opportunity to do this given its focus on the socio-economic values of PAs.

Some examples include:

- Tourism is a key sector in the Namibian economy and the PA system is a primary attraction for tourists to the country. This contribution was first quantified in a 2004 study, which used NCV and was commissioned as part of the Strengthening the Protected Areas Network (SPAN) project. It found that the total direct and indirect contribution of protected area tourism to national GDP was between 3.1% and 6.3% (Turpie et al, 2004). The study was then also updated in 2008, confirming these figures. The 2012 independent Terminal Evaluation of the SPAN project found that the **studies and associated processes played a key role with annual budgetary allocations to park management, which increased by 310%** between 2008 and 2012 (Chapeyama, 2012).[20]

- Globally, it is estimated that protected areas receive around eight billion visits every year, generating as much as US$600 billion of spending and US$250 billion in consumer surplus (Balmford, et al 2015). The global tourism value of coral reefs, some of which are formally protected, has also been estimated at nearly US$36 billion per year (Spalding et al, 2017). (For guidance on building alliances with tourism see UNEP, 2005).

- In Ethiopia, the Sustainable Development of Protected Area System in Ethiopia (SDPASE) project (funded by BMZ and implemented by GIZ and embedded in the Ethiopian Wildlife Conservation Authority (EWCA)) commissioned an assessment of the protected areas network value in 2009, which was then updated and expanded in 2015. Both of these assessments made extensive use of NCV to make the case for increased investment in the PA network. The 2015 assessment started by estimating the current baseline values associated with the natural capital in PAs under EWCA management using primary and secondary sources. It attached values to grazing, harvesting, watershed and associated soil protection and regulation, carbon sequestration, pollination, pest control, tourism and recreation, and existence value, which totalled an estimated ETB6.5 billion/year (US$325 million/year). It then conducted a cost-benefit analysis of future scenarios in which EWCA was provided with more adequate funding thereby resulting in increased natural capital values on the whole. **The result of the analysis showed that the Net Present Value (NPV) associated with the basic/minimum additional funding scenario would be between ETB16.4 billion and ETB20 billion (US$820 million and US$1 billion) and would have a benefit:cost ratio of between 6.3:1 and 7.8:1.** To provide further arguments for increased funding, the study also benchmarked current EWCA spending on protected areas management relative to that in other similar countries using spending relative to GDP and spending per hectare as indicators (Van Zyl, 2015).

20 *For further details, see the case study on the ValuES website: http://www.aboutvalues.net/data/case_studies/values_case_study_protected_areas_namibia.pdf*

» In response to the Democratic Republic of Congo granting oil concessions in Virunga National Park, WWF launched a campaign to raise awareness of the park's economic value. As part of the campaign, WWF commissioned a study, which made extensive use of NCV. It found that the park's existing natural capital values were relatively low at approximately US$48.9 million per year. However, **in the absence of conflict and with secure access and sufficient resources to protect it from extractive industries and other threats, the park could increase in value to more than US$1.1 billion per year with the potential to provide for the livelihoods of 45,000 people.** In addition, the assessment emphasised the opportunity that Virunga and other PAs provide for diversifying and strengthening the economy instead of resource extraction sectors such as oil (WWF and Dalberg, 2013).

At a global scale, the widely-cited work by Balmford et al (2002) focused on the "Economic Reasons for Conserving Wild Nature" including PAs and other high biodiversity sites. Based on a highly aggregated review, it was found that the overall benefit:cost ratio of an effective global program for the conservation of the remaining wild nature was at least 100:1. Such extremely positive results can be useful in raising awareness. However, they entail risks when presented to decision-makers who are probably justified in questioning their robustness/accuracy.

Next to monetary value estimates, there are a range of methodologies directly geared to assessing ES (see Box on the Protected Areas Benefit Assessment Tool (PA-BAT) and the Toolkit for Ecosystem Services Assessment (TESSA) both of which include scope for a wide range of value metrics).

NCV has been applied, often using a combination of metrics and arguments and elements to make the case for PA funding and support.

The Protected Areas Benefit Assessment Tool (PA-BAT) and the Toolkit for ES Assessment (TESSA)

The PA-BAT developed by the WWF "has been primarily designed for use by protected area managers to work with stakeholders to identify important values and the benefits that they bring to a range of stakeholders, from local to global. Although the PA-BAT includes the option to record economic information (in terms of value and benefit) the primary purpose of the tool is to record the types of benefits provided the protected area and to whom they are provided, and not necessarily to put an economic value on these benefits" (Stolton and Dudley, 2009).

The Toolkit for Ecosystem Services Assessment (TESSA) is focused on "Understanding the impacts on natural capital and ecosystem services of actual and potential changes in state at individual sites to support both biodiversity conservation and ecosystem service delivery. This approach has been relatively little used because it has been assumed that ecosystem services are technically difficult and expensive to measure. This toolkit is designed to overcome this obstacle by providing practical guidance on how to identify which services may be significant at a site of interest, what data are needed to measure them, what methods or sources can be used to obtain the data and how to communicate the results." (http://tessa.tools).

A somewhat more differentiated approach to enhance government commitment to PAs (compared to the above mentioned, hard-to-prove return-on-investment estimates) is to **connect NCV-related arguments to national or international policy objectives.** NBSAPs, urban/rural or sectoral development strategies, or the international SDGs are formalized political commitments. NCV can show how PAs contribute to meeting them. This is increasingly being highlighted to assist in making the case for PAs. Figure 9 shows how this has been done, using **a mix of monetary values and other indicators.**

Figure 9: *Selected examples of how protected areas (PAs) contribute to the Sustainable Development Goals.*

Sustainable Development Goal	***Protected area contribution (selected examples)***
	*More than 1.1 billion people depend on PAs for significant percentage of their livelihoods [128].*
	*The European Natura 2000 network supports important agricultural practices and agroecosystems, representing 38% overall of the total area included in Natura 2000 [156].*
	*Physical activity within Victorian Parks in Australia has resulted in health cost savings of about AU$200 million. The Langtang National in nepal is home to 411 species of medicinal plants [126].*
	*PAs provide a significant proportion of the drinking water for a third of the world's 105 largest cities [119].*
	*Terrestrial PAs are estimated to receive about 8 billion visits per year globally, generating approximately US$600 billion/year in direct in-country expenditure and US$250 billion/year in consumer surplus [13].*
	*Between 2000 and 2005, unprotected humid tropical forests lost about twice as much carbon to deforestation as the same area of protected forest [151].* *The flood prevention value of Mantadia National Park in Madagascar was valued at US$126,700 in 1997 (when per capita GDP was $207) [126].*
	*Conserving 20–30% of global oceans in marine PAs could create 1 million jobs, sustain fish catch work US$70–80 billion/year and provide ecosystem services with a gross value of roughly US$4.5–6.7 trillion/year [157].*
	*In many of the world's major biomes, PAs represent a significant land use – PAs cover almoast 21% of the world's major inland water types, 20% of the world's natural forests, 19% of the world's mountain aream 17% of the world's island area, and 13% of the world's dryland area [2]. The Living Planet Index (LPI) in terrestrial PAs has declined by less than half the rate of decline of the LPI across all terrestrial areas globally [116].*

Source: UNEP-WCMC and IUCN (2016)

A more impactful – albeit less immediate – pathway to stimulating support for PAs is to build alliances and mainstream concern for PAs. NCV can be instrumental here. Alliances are required with sectors or interest groups that can support PAs:

- Efforts to build partnerships with the **tourism sector** have been particularly prominent, especially where it seems the tourism industry may only be vaguely aware of the importance of PAs to their tourism products and therefore viability. NCV can be used to show them the extent of the importance of PAs and build alliances with them that could lead to joint lobbying efforts for greater investment in PAs, greater acceptance of the need for tourists to pay entrance and other PA user fees, and direct assistance from the tourism industry.

- The **water supply and hydroelectricity** sectors may need convincing of the link between watershed protection in PAs and healthy ecosystems even if this link is well-established. In essence, natural habitats support natural water flows, which ensures low levels of sedimentation and better water quality. They also regulate or smooth out flows over time, thereby reducing peak flows associated with higher flood risks while increasing low flows, which ensures greater water supply during dry seasons. Through these mechanisms, natural habitats play a key role in adaptation to climate change.

- **Agriculture's** dependence on key ecosystem services and biodiversity – also from nearby PAs and natural areas – is particularly strong / inter-connected (Power, 2010). PAs provide 'spill-over effects' to surrounding agriculture, including genetic biodiversity for crops and livestock, soil formation nutrient cycling, water regulation, and regional climate- and pest-control. To forge an alliance with agriculture, the **NCV perspective would typically argue that regulating and supporting services provided by natural habitats and PAs are more valuable (i.e. to a larger area and to more people) than if these areas were also converted to agricultural land.**

- For the **fishing industry,** the role of marine protected areas (MPAs) in allowing fish stocks to recover and thereby increase sustainable catches outside of MPAs is also clear. Haines et al (2018) recently reviewed the economic benefits of MPAs for the European Union using NCV elements.

For all the above described pathways, our experience suggests that the process for making the case exercises (by doing an NCV) are easily as important as eventual project outputs (i.e. study results). The closer different government departments (including Treasury) are involved, the more an NCV process can be used as a vehicle to familiarize partners with NCV concepts and to nurture interest and buy-in into subsequent results.

See also the following for further details and guidance: Neugarten et al, 2018; Berghöfer et al, 2016; Kettunen and ten Brink, 2013; World Bank Group, 2010. See also IIED & UNEP-WCMC, 2017 on building alliances with NCV-perspectives.

10 NCV for informing PA planning and management

PA planning and management is a relatively broad and established field. It includes the use of mapping and other tools to prioritise areas for protection and identify new land to target for formal conservation. PA management plans, stakeholder engagement, and relationship building are also important elements along with financial management.

The achievement of biodiversity conservation goals, including habitat and biodiversity representivity within PA systems, has tended to be the key driving force behind PA planning and management. Natural capital and ecosystem services values have, however, become a more prominent consideration in management since their emergence as concepts driven by the need to place great emphasis on PAs' socio-economic benefits.

NCV can be used in a participatory way to identify natural capital and associated ecosystem services and create a better shared understanding of their importance – e.g. across various public and private sectors in landscapes surrounding PAs. This information can then help to inform PA planning, including the determination of zones with associated management and use protocols.

NCV can play a significant role in integrating PAs into their surrounding landscapes. Integrating protected areas into wider landscapes involves incorporating protected area design and management into a broader framework of national and regional land-use plans and natural resource laws and policies (Ervin et al, 2010). NCV can be used for these wider landscape planning exercises. For example, spatially explicit NCV can inform the zoning of buffer zones or areas with specific protection regimes (e.g. catchment protection).

On the whole, it is our impression that NCV is not yet widely used for these purposes. Technical aspects, such as how to use NCV and integrate it into PA spatial planning tools like MARXAN, still need to be resolved given these applications' newness.

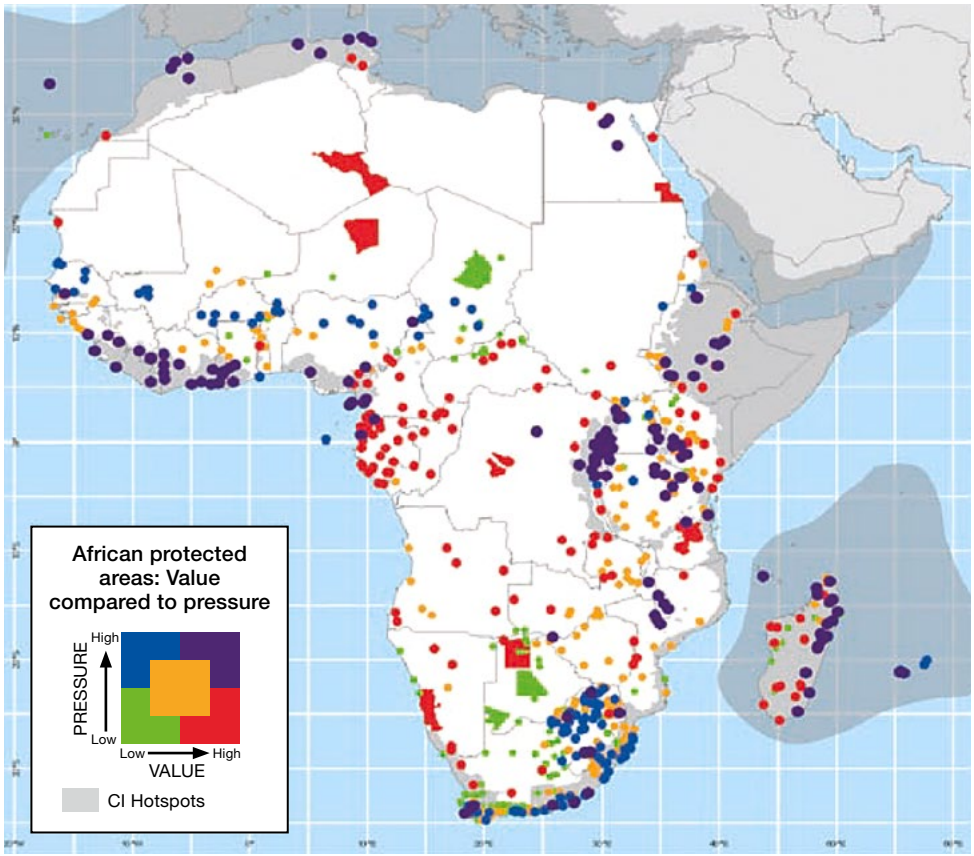
NCV is currently being used in Ethiopia for the Abijata-Shalla Lakes National Park management planning. As part of the management planning, biodiversity importance GIS layers are being generated using species data etc. **Once the biodiversity importance layer has been generated, it will be combined with other map layers that show 'ecosystem service hotspots'.** It is anticipated that the map layers such as Habitat type, Land use, Degradation level / intactness, Slope, Riparian areas, Soil type (potential), and others will provide important information on the NC of immediate use and importance to human residents inside and near the park. The results can then be used to locate priority areas for conservation and rehabilitation efforts: Areas that host high biodiversity and at the same time provide critical NC. The NC perspective appears suitable to effectively support management planning in view of human settlements inside this park.

Following a similar logic, Neugarten et al (2016) developed "a framework for rapid spatial assessment of ecosystem services (…) in order to rapidly identify **sites providing multiple benefits."** This framework was applied in Madagascar to identify the ecosystem services co-benefits of biodiversity priority areas in order to guide the Critical Ecosystem Partnership Fund (CEPF) to focus on areas that display high biodiversity value but also significant ecosystem service benefits.

NCV differs from earlier attempts to guide conservation planning and prioritize areas for intervention: For example, Hartley et al (2007) assessed 741 protected areas in 50 African countries in a study for the European Commission (EC) (see Figure 10). They classified them in terms of (i) a Biodiversity Value index (based on non-economic species and habitat importance indicators), and (ii) an index of Anthropogenic Pressures primarily from surrounding populations and agriculture.

This combination of Value and Pressure indices does not directly address NC, ecosystem services, or values beyond biodiversity indicators. It 'only' allows for the identification of high biodiversity value PAs that are also under pressure where the immediate need for conservation is most urgent.

Figure 10: *Comparison of value and pressure for 741 protected areas in Africa*



(Conservation International's Biodiversity Hotspots are displayed in grey. Protected areas of a size greater than 2.5 million hectares are displayed as a polygon, and below this threshold as a point. Hartley et al. 2007)

Hartley et al (2007) also reviewed the relationship between protected areas that had recently received EC assistance and their Value and Pressure indices to assist future EC funding decisions. Of the 96 protected areas that were receiving or have received EC funding in Africa, they found that 68% had higher than average Biodiversity Value indices. The relationship between funding – biodiversity – pressures varies from country to country, though.

Given the above outcomes, **investing in high biodiversity value PAs that are also under high levels of pressure would be higher risk but also provide the highest potential biodiversity rewards.** The findings from this study do not consider natural capital or 'co-benefits of biodiversity' (as in Neugarten et al, 2016, see above). **Would a conservation planning approach which includes NC in addition to biodiversity values lead to a different list of priority PAs?** Probably yes – and it is unclear whether such a paradigm–shift actually strengthens or weakens PAs.

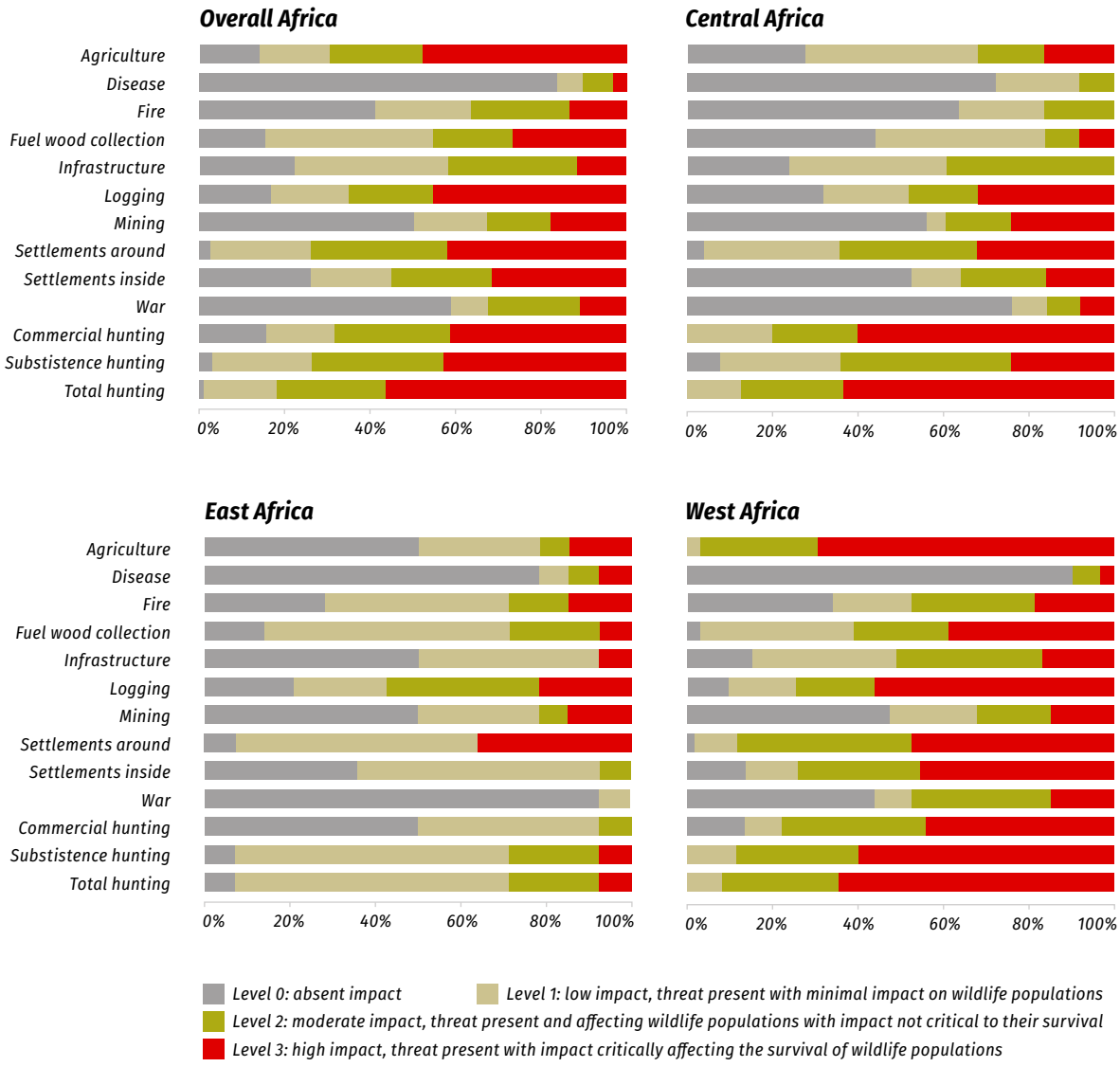
11 NCV for addressing PA-related conflicts

Conflict over access to, and the use of, PA land and resources is relatively common and is likely to increase in the future in tandem with resource scarcity. Understanding the main threats to PAs is a good starting point when considering conflicts given their role as drivers of conflict. Tranquilli et al (2014) assesed these threats for tropical Africa. Figure 11 shows how they assigned impact levels or importance rankings to threats from 0 (no threat) to 3 (high threat). Among the threats with the highest impact across tropical Africa, hunting was the most common for 56% of all PAs. Agriculture and logging were the most common indirect threats at level 3 in 48% and 45% of all the sites, respectively. Human settlements within and bordering PAs also had a high impact for 31% and 41% of the areas.

"A proper understanding of what ecosystem services are available from a PA and who has access to them can therefore be a valuable tool in addressing conflicts both inside and outside PAs". **NCV can thus help to improve relations with communities around PAs: By specifying different benefits from ecosystems, different rights are recognized – this can lay the basis for PA access and benefit sharing initiatives aimed at limiting conflicts.**

Community-based Natural Resource Management (CBNRM) programmes are probably the most prominent examples of access and benefit sharing initiatives in Africa and in southern Africa in particular. In essence, they aim to empower communities to derive benefits from local natural resources, particularly wildlife, offer compensation for the costs of living with wildlife resources, and provide incentives for conservation. In some instances, communities are allocated rights over defined areas such as wildlife management areas (WMAs) or Conservancies that are often adjacent to more strictly protected areas, such as National Parks. The basic workings of CBNRM programmes in Namibia, which is considered more successful, can be contrasted with those in Tanzania as follows:

Figure 11 *Threats impact levels to 98 tropical African protected areas at a continental and regional scale (Tranquilli et al. 2014)*



» The Namibian CBNRM programme focused on the formation and support of Communal Conservancies. Once a community declares a Conservancy (with a sustainable management plan agreed to with the state), they are given substantial autonomy over management and rights over game and tourism opportunities. They can then engage with concessionaires, allocate hunting licences, etc and keep 100% of resultant revenue. At the end of 2014, there were 41 joint-venture tourism enterprises in Conservancies across Namibia and 48 conservation hunting concessions. Cash income to conservancies and members rose from less than N$1 million in 1998 to N$74.3 million (~US$5.5 million) in 2014, reflecting both the increased number of Conservancies and their earning power (NACSO, 2015). Namibia is recognised as a success in ensuring that CBNRM provides biodiversity conservation benefits and benefits to local communities. WBG (2015) provides a summary of successes and lessons, and notes that approximately 20 countries have sent government delegations to learn from the Namibian experience.

» The Tanzanian system is more complex and less favourable to local communities when compared to Namibia and has drawn relatively more criticism. WMAs in Tanzania are managed by Authorised Associations (AAs), which market opportunities for hunting and tourism concessions and select investors through a competitive tender system. Investors pay the agreed concession fees directly to the national government, which then deducts transactions costs and allocates the remaining revenue. For tourism revenue, it is allocated as follows – 20% goes to the Tanzanian Wildlife Authority, 15% to the District Council, and 65% back to the WMAs. There are, however, reports that this distribution does not always happen in practice. The formula has been criticised for being unfavourable to WMAs and concerns have been raised about the motives behind the limited autonomy granted to WMAs (see CCFDR, 2015 and USAID, 2016). Total annual revenues generated by all WMAs in Tanzania from tourism and hunting have risen sharply over time from approximately US$130,000 in 2007 to just over US$1 million in 2012 (WWF, 2014).

Further review information on the impacts, challenges, and future directions of CBNRM in Africa is provided in Roe et al (2009). The review emphasizes the **diverse range of community involvement in natural resource management that have emerged.** It provides a number of recommendations where improvements could be made and makes the distinction between what is ideally needed from key stakeholders such as governments, donors, civil society, and the private sector.

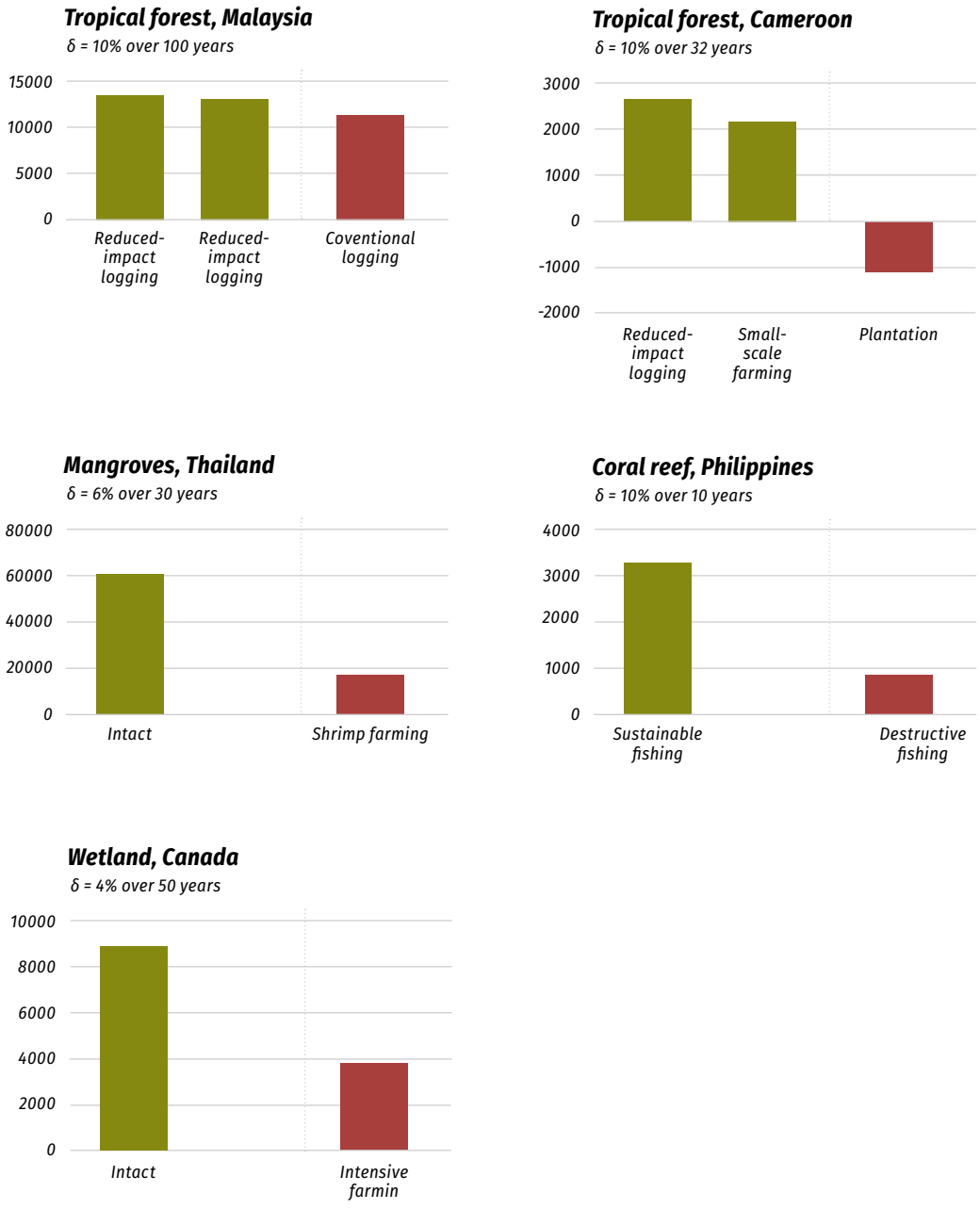
NCV has also been used in lobbying against infrastructure, mining, and other projects that pose risks to PAs or in statutory decision-making processes focused on such projects (such as EIAs, SEAs feasibility studies, CBAs). In this way, NCV can be used to better understand and resolve difficult trade-offs or conflicts between PAs and development projects.

» The Conservation Strategy Fund (CSF) and International Gorilla Conservation Programme (IGCP) compared the proposed upgrade of the existing road through the Bwindi Impenetrable National Park (BINP) with two alternative routes outside the Park. Using NCV in a costs-benefit analysis framework, they found that both road alternatives outside BINP would have been preferable to upgrading the route through the Park. This was primarily because of the lowered risk to the gorillas upon which lucrative tourism activity depends (a possible loss of some US$214 million over the next 20 years in Net Present Value terms would be associated with upgrading the road through the Park).

Without NCV, it is highly unlikely that PAs would stand much of a chance in situations where they have to defend continued protection against other land use alternatives, such as conversion of PAs to agriculture. Even with rigorous NCV informed by good primary data, the task is often a difficult one in the face of the basic survival needs of surrounding communities in some areas.

Figure 12 shows a few comparisons of the benefits of retaining and converting natural habitats such as those in PAs expressed as NPV. In these assessments, retaining natural habitats had higher overall benefits which support conservation. However, it is often the case that a large proportion of these benefits do not accrue to local communities that are relied on to support conservation.

Figure 12 *The marginal benefits of retaining and converting natural habitats expressed as NPV (in 2000 US$/ha); calculated using the discount rates and time horizons presented (Balmford et al, 2002)*



12 NCV for identifying and developing additional PA finance solutions

NCV can be used to support the development of new finance mechanisms for PAs, such as PA entrance fees and other tourism charges, concessions, Payments for Ecosystem Services (PES) schemes, biodiversity offsets etc, through the identification of beneficiaries and the valuation of the magnitude of the benefits that accrue to them.[21] For example:

- The business planning process for Namibia's Dorob National Park focused on reviewing visitor access to the Park and understanding existing tourism operator activities. As the majority of such activities were being undertaken on Park land without the payment of fees, a primary consideration was recommending reasonable fees for entrance, tourism activities, tourism accommodation, filming and photography, etc. As the Park area is extensive and not fenced in with fixed entrance gates, it was also important to consider alternatives to entrance fees paid at a gate in favour of vehicle permit fees.

- NCV in the form of willingness to pay surveys have been carried out to assist in the process of determining appropriate entrance fees for PAs in Africa and elsewhere. Management authorities are increasingly relying on consumer research to determine which fee levels can achieve a balance between public expectations and revenue maximisation. This can also provide information about the potential to introduce other fees, charges, or voluntary levies in addition to entrance fees (see review in Spenceley, 2017 for examples). Benchmarking against entrance fees in other countries is also a very useful and widely applicable tool in setting fess and is less time consuming and resource intensive when compared to surveys (see Van Zyl et al, forthcoming for a global review of National Park entrance fees with a focus on affordability to locals).

- With respect to PES, Berghöfer and Dudley (2010) note that: "Coca Cola outside Bogotá in Colombia pays a fee to maintain natural páramo vegetation in Chingaza National Park above its bottling factory because of the clean water it provides. Similarly, in Ecuador, Quito's water supply company pays residents in two national parks to maintain the forest cover in order maintain water purity and reduce treatment costs." **PES schemes, especially voluntary schemes involving restoration, remain relatively rare for PAs** notwithstanding these examples and efforts to establish other schemes. Among other factors, this is probably a function of PAs being protected by law, which means that society (including potential ecosystem services buyers) expects the state to ensure adequate management without additional payments.

NCV can help identify new financing opportunities for PAs, but it is only a small piece in a much larger effort to strengthen the financial base for conservation. The South African National Parks Board (SANParks) provides an instructive case study on successful financial and commercial management in

21 For details on which finance mechanisms are most commonly used for Pas, see chapter 4 in UNDP, 2012.

growing various self-generated incomes and government grants over time. Their success is partially because the 21 National Parks under their management include some of the most attractive tourism assets among the country's protected areas, including Kruger National Park and Table Mountain National Park. It is also very much a function of increasingly embracing their role as tourism service providers and SANParks' ability to manage their tourism assets and optimise their commercial potential. For example, they have a Commercialisation Strategy and a Business Development Unit in three parts of the country, staffed by appropriately commercially oriented and skilled people who are able to identify, develop, and manage commercial opportunities.

Public Private Partnerships (PPP)[22] are a key tool that allows them to focus on their core competencies (e.g. lower- and middle-income accommodation) and still take advantage of other non-core opportunities (e.g. high-end luxury lodges) by leveraging private sector capital and expertise. They have more than 40 PPPs currently operating and success is a function of their familiarity with PPPs and their capacity to implement them (SANParks, 2016). Approximately R1.4 billion (US$100 million), or 52%, of their budget came from self-generated revenues in 2015. Between 2009 and 2015, SANParks were able to strongly grow self-generated revenues at annual rates of 4% to 6% above inflation.

SANParks have also been successful in **using NCV with a focus on tourism to argue for increased government budget allocations.** They have also successfully insisted that NCV and the consideration of biodiversity offsets be part of the evaluations (usually through EIA processes) of infrastructure, mining, and other projects that may have a negative impact on their Parks. By contrast, Lindsey et al (2014) point out that self-generated revenues from national parks in Zambia have remained low compared to their [NC] potential. A number of mostly political and institutional reasons are put forward for this, along with initial underfunding. This indicates that NCV by itself is insufficient for strengthening PA finance.

In line with this mixed evidence, **NCV plays only a complementary or supportive role in international conservation finance programmes and initiatives:**

» The UNDP's Biodiversity Finance Initiative (BIOFIN) is being implemented in 31 countries, 7 of which are in Africa (Rwanda, Botswana, Zambia, South Africa, Uganda, Seychelles, Mozambique).[23] The ultimate aim for each country is to develop and start to implement finance mechanisms for biodiversity conservation. Most, if not all, of these countries have included finance mechanisms focused on specifically improving PAs' finances in their Biodiversity Finance Plans (BFPs). **NCV is often included in the overall motivation for implementing the BFP** (i.e. NCV is used to make the case for the overall BFP and for individual finance mechanisms contained in the BFP). The BIOFIN website[24] provides relatively comprehensive outlines for a large number of potential finance mechanisms, including those with relevance to PAs.

22 *PPPs are used in this context primarily as commercial revenue sharing contracts between private sector operators of lodges, restaurants, shops and other tourism facilities and the government.*

23 *Note that Namibia is also implementing a Resource Mobilisation programme for biodiversity with support from GIZ that has a similar structure and objectives to BIOFIN.*

24 *https://www.biodiversityfinance.net/finance-solutions*

» The WWF's Project Finance for Permanence (PFP) initiative focuses specifically on trying to facilitate fully sustainable funding for PAs. The PFP approach relies on a single major deal with funds and long-term commitments from all relevant actors. WWF has helped create such funds in Brazil and Bhutan and is in the process of doing so in Peru and Colombia[25]. A core element is to diversify the portfolio of donors and funding sources jointly engaging in PFP commitments. Here, one would expect NCV to be applied to better identify who benefits from NC, i.e. potential new donors. However, WWF's recent report with lessons on PFP does not refer to NCV (or similar concepts) (WWF 2015). For the diverse donors (incl. government, NGO, multilateral, philanthropy, and private sector), motivations vary but do not seem to relate to NC.

» Various UNDP/GEF country programmes have been and continue to be focused on PA strengthening. For most of these programmes, there is an element that is focused on strengthening the financial sustainability of PAs. Often, this includes support for **NCV to make the case for greater investment and in support of finance mechanisms through business plans and financial sustainability strategies.**

In terms of guidance, the Conservation Finance Alliance (CFA) established a database of PA business plans in 2017 and currently hosts dozens of plans, including 13 from Africa.[26] The CFA also hosts the online Conservation Finance Guide[27], which includes business planning and sustainable financing strategy guidance that draws on elements of NCV.

The IUCN's "Sustainable Financing of Protected Areas: A global review of challenges and options" provides an overview of key issues and practical guidance (see Emerton et al, 2006). It contains a number of case studies that used NCV and makes clear **the need for NCV to either make the case or to inform the identification and/or design of new financing options.** Figure 13, adapted from Emerton, indicates where NCV has different roles and foci, depending on the type of PA financing mechanism[28].

25 *See https://www.worldwildlife.org/initiatives/permanently-protecting-forests*

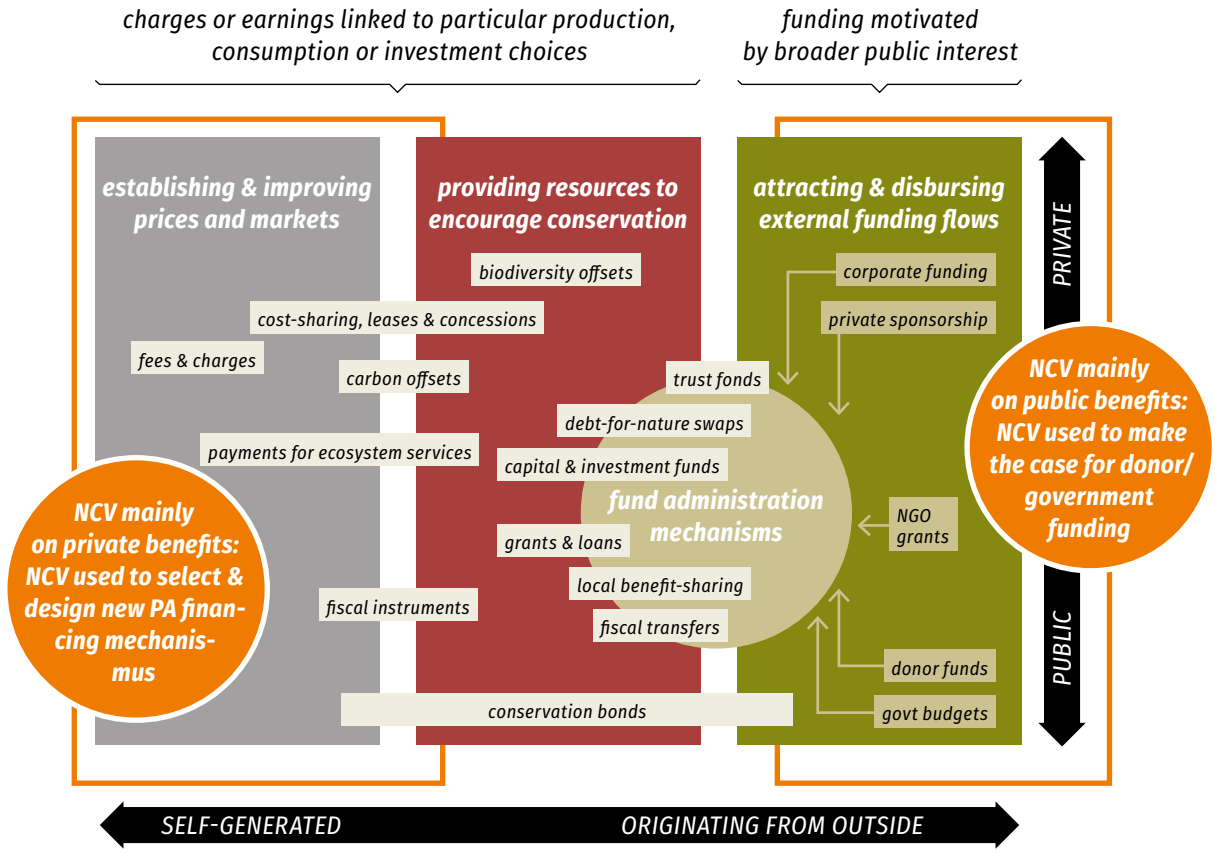
26 *The Conservation Finance Alliance (CFA) is the most prominent voluntary global professional association for Conservation Finance Experts. It acts as the IUCN WCPA Specialist Group on protected area finance. Its mission is to promote sustainable financing for biodiversity conservation worldwide. https://www.conservationfinancealliance.org/news/2017/9/1/new-database-of-protected-areas-business-plans*

27 *http://conservationfinance.info/Guide/index.htm*

28 *There is also other guidance available on business planning, tourism development and tourism concession planning and development in partnership with the private sector (see, for example, Spencely et al, 2017b).*

Berghöfer et al (2017) reviewed the experiences of German development cooperation working towards improved biodiversity finance in eight countries. They conclude: "We need to move from a focus on innovative financing mechanisms towards thinking 'innovation' more broadly. **Financial resource mobilisation needs to go hand in hand with efforts to slow the drivers of conservation costs and to improve effective spending capacity.** For this, the constraints to financial sustainability of biodiversity conservation need to be better understood at country level. Innovative financing mechanisms can be part of the solution and deliver multiple benefits only if their design is carefully fitted to context....." This indicates that interventions with a priori focus on a specific financing mechanism (e.g. a new PES) may not adequately consider the multiple conditions which shape PA operations. Furthermore, new finance mechanisms that generate additional funds or revenues will only be beneficial to conservation if those new revenues are used for conservation purposes. Thus, **NCV needs to be complemented by governance analyses and an appraisal of PA operational conditions in order to allow for meaningful conclusions and recommendations for PA finance.**

Figure 13: *Categorizing PA financing mechanisms according to how funds are raised and used – and NCV's role. (Based on Emerton et al, 2006)*



PART D: RECOMMENDATIONS

13 Recommendations for NCV in international environmental cooperation

KEY MESSAGE: International Environmental Cooperation should support the integration of Natural Capital Valuation and Accounting in policy and decision making

A: Increase political relevance of natural capital valuation – Environmental cooperation should recognize the huge potential of NCV and increase support to a broadly understood NCV approach. In the future, NCV should in turn prove measurable policy impacts and develop convincing success stories to increase international political visibility and relevance.

» NCV has a critical role to play in the effort to raise awareness on the importance of nature conservation by uncovering nature's hidden values and overcoming its economic invisibility. To do so, NCV results must be translated, framed, and communicated in a manner that can be easily appropriated politically and integrated into decision-making.

» NCV's principal potential lies in providing a conceptual framework and shared language, which can connect diverse policy areas and sectors by pointing them to their dependence on the same, limited bio-physical base. Beyond informing concrete policies and investment decisions, its main promise is to change decision-makers' perceptions of nature – by bringing about a paradigm shift so that conservation is perceived as being a key ingredient for economic prosperity and safe and resilient societies, rather than an obstacle to development. In order for NCV to play this role, convincing cases must be made, based on reliable and transparent valuation analyses, whose narratives must address the respective target groups or sectors in their own language and logics.

» A narrow focus of NCV on environmental (business) risks is useful in some areas, but does not reflect NCV's potential. NCV should be interpreted broadly so as to encompass a broad range of methods, including ecological, socio-cultural, and economic approaches. In this way, NCV can be aligned with diverse issues and socio-cultural contexts as well as a spatial perspective.

B: Leverage natural capital valuation through international agendas – NCV should build on its already existing mandate as part of standalone targets in international agendas (SDG 15.9 and Aichi Target 2). To ensure uptake in future agendas such as the post-2020 global biodiversity framework, NCV should seek to clearly establish how and why NCV is thought to contribute to biodiversity conservation and how it informs the implementation of other targets.

» The role of NC (and NCV) in biodiversity policy is somehow contested due to different societal perspectives of nature's contribution to people and societies. However, to increase its relevance in the international biodiversity debate, NCV should be seen as a key enabling condition for achieving biodiversity goals and promoted as a cross-cutting issue to mainstream biodiversity into the economic sector. Furthermore, NCV is a prerequisite to argue for mobilisation of adequate financial resources. In addition, NCV should link up to the implementation of NBSPAs, NDCs, and other national frameworks of action.

C: Address economic sectors and policy areas – Future work on NCV should continue to make NCV applicable for economic sectors and policy areas, as well as create a regulatory enabling environment such that economic actors, business, and finance integrate NCV in their decision-making.

» NCV is an important vehicle to mainstream nature into sectoral and policy decision-making. The continued emergence of private sector measurement frameworks and case studies suggests a rising interest from the business and finance end of biodiversity policy. To support this, it is necessary to differentiate and concretize how specific sectors and actors should assess and value their natural capital impacts and dependencies. NCV should continue to produce guidance and frameworks and encourage piloting and diffusion.

» NCV has great potential for the financial sector – but still plays a rather limited role in standards and protocols. Environmental cooperation could increase its collaboration with financial institutions to support advancing environmental standards, developing cost-effective due diligence and monitoring tools and procedures, and providing technical assistance related to green financing. Finance institutions and other donors should make stronger use of NCV's potential to pool public with private resources through blended finance solutions and creating finance mechanisms that encourage investments in natural capital.

D: Further develop the Natural Capital Accounting approach – The biodiversity community and governments should capitalize on the huge opportunity to create a shared language through natural capital accounting; however, pitfalls and risks must be carefully considered in its development.

» Natural capital accounting and valuation that solely relies on monetary estimate risks does not adequately reflect changes in the quality of ecosystems (assets) and their services (flows) so as to indicate or flag risks of ecosystem degradation or loss. As a result, critical thresholds of ecosystem degradation or loss might be missed or ignored. To draw the correct conclusion, a full suite of NC accounts, which includes a complementary systems perspective, is required. Information (indicators) on biodiversity (e.g. species composition and ecosystem processes) can indicate risks of ecosystem degradation or loss. This is particularly critical for ecosystems used for resource extraction (e.g. forest composition, abundance of species related to pests and pest control, age composition of fish stocks, etc.) in order to track thresholds before populations or ecosystems reach a tipping point.

» Natural capital accounting can provide important insights and support developing a more comprehensive picture of environmental-economic conditions. NC accounting should be further integrated with other monitoring approaches, e.g. those geared to social welfare and social wellbeing impacts (for example, health and education). NC accounting should also be more sensitive in reflecting particularly vulnerable population groups. This could help to better track progress towards sustainable development (e.g. the Human Development Index, the UN Environment's Inclusive Wealth Report, and the World Bank's Changing Wealth of Nations Report).

» NCA promises a long-term change in countries' decision-making through the provision of regularly updated and institutionalized data and the engagement of finance, planning, and other non-environment ministries. At the same time, setting up and maintaining natural capital accounts requires considerable investments in terms of resources and capacities. Environment cooperation should therefore ensure fast-track information for policy advice with preliminary results, invest in capacities, and create enabling conditions with regards to institutional settings and human resources.

E: Close knowledge gaps – International environment cooperation should invest in closing the remaining knowledge gaps on natural capital and ecosystem services, particularly in regards to regulating services and public goods.

» Huge knowledge gaps exist around the world and particularly in developing countries on natural capital, especially in regards to regulating services and public goods. These gaps are due to methodological challenges in measuring these services and also the lack of available data. With regards to NCV, the aforementioned constraints plus small budgets and limited time often leads to using the benefits transfer technique. However, reliance on benefit transfer can result in weak cases that do not stand up to significant scrutiny by motivated opponents. Investment in primary data gathering and research should therefore be encouraged and resourced.

F: Ensure credible implementation – Practical implementation of NCV should follow criteria to ensure impact and avoid pitfalls.

» Science-driven NCVs that aim to provide highly comprehensive, precise, and/or certain valuation results do not per se enhance the usefulness of NCV for decision-making and policy implementation. In order to be practically relevant, NCV should therefore be geared to its specific purpose and initial scoping of the knowledge gaps to be addressed – how much, how soon, and how detailed information is needed? – must be substantially invested in.

» Next to actual NCV results, the process of developing an NCV study can be instrumental for familiarizing key audiences with the concept and how it works. At the same time, those conducting NCV need to decide whether scarce time and resources should instead be invested in improving results than in facilitating a highly interactive process. The trade-off between focusing on NCV's scientific credibility and nurturing the policy relevance and interest in its results needs to be carefully considered by those in charge of the NCV.

» Monetary valuation (exchange/market values, monetary satellite accounts) can be misleading and ignore values critical for reflecting the socio-economic and politico-cultural situation of a country or region. In particular, concern for rights and social justice are insufficiently established within many NCV. Procedural safeguards can play a role here; additionally, explicit distinction between benefit flows to different beneficiary groups is useful. There is also potential in pursuing efforts to include multiple value dimensions, or value pluralism. Within IPBES, this pathway is being explored. Nonetheless, care needs to be taken that any concept is not overloaded with overly ambitious expectations. Methods for operationalising multiple value dimensions are still in their infancy.

» Interpreting NCV results needs careful consideration and back-stopping to avoid the risk of miscommunication. Jointly developing key messages and arguments with credible scientific back-stopping is one way to avoid these risks.

» NCV project management components are often the source of failures. This is not unique to NCV projects, but is particularly problematic for them given their non-linear nature and need for flexibility. NCV projects that we have been involved in are often structured in an inflexible manner (making it difficult to change them if circumstances change or opportunities develop) with unrealistic timelines and under-resourced relative to the task's complexity and difficulty. Recommended remedies to this include:

- Ensuring that there is genuine demand for a project among project recipients. Co-funding can help to ensure commitment but is not a panacea.
- Recognising that scoping phases generally will have a significant influence on what comes next. This means for example, that budget and time allocation beyond scoping can only be indicative at the start of scoping and not fixed.
- Ensuring that projects are thoroughly scoped, including meaningful interactions with the eventual recipients or users of studies or other project outcomes.

14 Recommendations for NCV in support of protected areas

KEY MESSAGE: International Environmental Cooperation should support the application of Natural Capital Valuation and Accounting in protected area planning, management and implementation

A: Support protected areas in implementing NCV to make their natural capital contributions to economic sectors and societal goals visible. Collecting and presenting NCV evidence allows PAs to speak the language of finance and economic sectors and to realign with development goals. To our knowledge, there has not been a continent-wide or global NCV support programme for PAs.

B: Close knowledge gaps on ecosystem services provided by PAs – at the local, national, and global level. International reports such as the Protected Planet report confirm that there is little to no information available of PAs' ES, particularly at the global and continent-wide level. However, huge data gaps remain also at the national and local levels. Multiple research questions are relevant and should be addressed, e.g.: Why should natural capital be protected? How much natural capital should be protected? Where should it be protected? How much would it cost to protect it? Who should pay?

C: Commit to longer-term support programmes for the use of NCV and advance institutionalised measurement frameworks. These have far more chances of sustainable success. Supporting national and local PA authorities and management entities to apply NCV is so far often done on a one-off or short-term basis and fragile in terms of long-term capacity development. In addition, there are no internationally agreed measurement frameworks or guiding documents on conducting NCVs for PAs.

D: Acknowledge the role of PAs in conserving natural capital and ecosystem services beyond biodiversity conservation. Biodiversity conservation should rightly remain the most important consideration or informant in PA planning and management. In any event, areas with higher biodiversity tend to also have higher natural capital values. In view of growing human needs, one can argue that PAs that provide for such needs will likely receive more support than more restrictive conservation approaches, even if the latter were more effective in protecting biodiversity.

E: Use NCV to better incorporate ES from PAs in national budget allocations. National planning and budgeting processes very often lack environmental information and the long-term socio-economic role PAs and their protected ecosystems play for the society. NCV tools can provide the basis for the formulation and introduction of economic impact indicators, which are linked to conservation results, cost efficiencies, and return on investment.

F: Carefully consider private finance and investments to close finance gaps and create enabling environments for private sector engagement. NCV can help open new funding streams for conservation. However, just because something has value, doesn't mean money will flow to protect it. Many benefits are valuable public goods for which beneficiaries will not, cannot, or should not pay.

G: Recognize that different NCV policy purposes in support of protected areas have their own challenges and requirements for implementing assessments by:

1. Making the case for strong government commitment and building alliances

» When developing an NCV, carefully devise your strategy. NCV serves to substantiate your arguments. Clarify what type of arguments you want to present and to whom before engaging in an NCV.

» Jointly consider message, argument, and NCV evidence. The message draws on the argument(s), which in turn build on the evidence produced by the NCV exercise. Sometimes, other arguments may be more effective than those relying on NCV information.

» Follow a broad and flexible approach. Often, a case needs to be made more than once and to different stakeholders. Consider designing the NCV in such a way that different arguments can be drawn from it.

» Use disaggregated results rather than aggregate values (e.g. total economic value) – this makes a more transparent and convincing case.

» Ensure high credibility by e.g. explaining your assumptions, documenting the study process, referring to widely accepted frameworks, making conservative claims/estimates, or pointing to the study's shortcomings. Strong arguments become very weak if an assessment's credibility is questionable. Be careful with using values from other studies and study areas ('benefits transfer').

» Combine study results with policy recommendations. Rather than merely stating a value or a problem, assessment results should go further and provide the grounds for possible solutions.

» Seek the right person to speak. Think about whether it is possible or desirable to get a "champion" on board to present your arguments – someone who has credibility and authority with the target audience you want to influence.

2. Informing PA planning and management

» Fit NCV to PA planning procedures. NCV is one of several inputs to PA planning. Be clear on which aspects should be covered by the NCV. Small specific analyses may be more useful than complete assessments that mainly reiterate what is already known.

» Tend towards assessing marginal changes rather than average changes or values. This often provides more specific information that is more useful to planning.

» Consider both availability and distribution or access to natural capital. Two zoning/planning alternatives may provide the same total amounts of natural capital but differ in their accessibility among beneficiaries.

» Decisions on which individual PAs to invest in can benefit from a portfolio approach that spreads risk. For example, a two-thronged approach could focus on investing in both high biodiversity value PAs (under varying levels of pressure) and high 'Natural Capital' value of PAs that meet critical societal needs.

3. Supporting the resolution of PA-related conflicts

» Clarify the NCV's role within the conflict resolution process. You provide input to a dynamic and contested process – influenced by various factors beyond your control.

» Carefully consider the right NCV approach for this purpose. Information can be used as 'ammunition' in conflicts or it can provide new space for finding compromises. In other words, assessments can fuel the conflict or support conflict resolution.

» Often, your information will not be used neutrally. Results may be re-interpreted or re-formulated to represent a particular interest group or argument. While this cannot be prevented, the NCV design determines much of the possibilities for misinterpretation.

» Clarify how to proceed for acceptable and credible results. Agreeing with contesting parties, through e.g. open participatory processes, on the NCV design (incl. e.g. scope, method, units, data, time horizon) can significantly enhance acceptability of results.

» Assess at the conflict scale. If your NCV is at a higher or lower scale, the interpretation at the right scale becomes difficult. In particular, the focus on distributive effects (Who is affected by a decision? Who bears which costs?) requires precise scoping.

4. Identifying and developing PA finance solutions

» NCV reveals the local, regional, and higher scale benefits that better conserved ecosystems can deliver. This can also motivate funders and donors beyond the established conservation administrations. Convince new funders with a range of arguments. Relate to the interests, positions, and metrics that are relevant and familiar to those you want to 'win'.

» NCV can help open new funding streams for conservation. However, just because something has value, doesn't mean money will flow to protect it. Many benefits are valuable public goods for which beneficiaries will not, cannot, or should not pay.

» Remember that conservation financing is a means to an end – more effective and equitable conservation. (i) Maintaining existing income streams, (ii) opening up new income sources, and (iii) enhancing cost-effective spending are often equally important pathways to this end goal. NCV applications for conservation finance should be examined through this lens.

» Monetary as well as non-monetary arguments can be important to motivate funders; often, NCVs with a range of metrics are most effective. (Example metrics: number of people affected, degree by which an environmental risk is lowered, degree by which a conservation status is improved, number of jobs generated).

» NCV can help identify potentially new financing mechanisms, e.g. PES schemes (payments for environmental services), increased entrance fees/user license fees, or sponsorships by companies that benefit from a conserved area. Local opportunity costs and impacts however need to be included in the analysis.

» It is often difficult to convince beneficiaries to pay for PA protection or rehabilitation through a voluntary PES scheme. PAs are generally protected by law, which means that beneficiaries often expect the PA to be adequately managed using general tax payer money.

» Buyers in PES schemes will look for proof of concept at some point (e.g. proof that a given action, such as ecosystem restoration that will lead to water benefits for particular downstream users, can be cost-effectively achieved) and is generally needed in order to sustain commitments. Setting up monitoring and evaluation programmes with the agreement of all parties early on is particularly important.

ANNEX

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Addendum

This addendum is a literature overview on diverse natural capital topics as they pertain to the four sections in Natural capital valuation in international environmental cooperation: experiences and options. Literature is listed in chronological and then alphabetical order, with the most recent publication at the top as of 2019.

PART A: NCV APPROACHES

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PART B: NATURAL CAPITAL VALUATION IN DIFFERENT POLICY AREAS

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Abbreviations

AfD	French Agency for Development
BINP	Bwindi Impenetrable National Park
BIOFIN	UNDP Biodiversity Finance
BMZ	Federal Ministry for Economic Cooperation and Development
CBD COP	Convention on Biological Diversity Conference of the Parties
CBD	Convention on Biological Diversity
CBI	Climate Bonds Initiative
CFA	Conservation Finance Alliance
CNC	Critical Natural Capital
CPIC	Coalition for Private Investment in Conservation
CSF	Conservation Strategy Fund
EC	European Commission
EIA	Environmental Impact Assessment
ELD	Economics of Land Degradation
ES	Ecosystem services
GPS	Global Program for Sustainability
IGCP	International Gorilla Conservation Programme
KBA	Key-Biodiversity Areas
KfW	Kreditanstalt für Wiederaufbau
MA	Millennium Ecosystem Assessment
MAES	Mapping and Assessment of Ecosystems and their Services
MoE	Ministry of Environment
MoF	Ministry of Finance
MPA	Marine protected areas
NC	Natural capital
NCA	Natural capital accounting
NCAVES	Natural Capital Accounting and Valuation of Ecosystem Services
NCFA	Natural Capital Finance Alliance
NCV	Natural capital valuation
PA	Protected areas
PAGE	Partnership for action on green economy
PES	Payments for Ecosystem Services
PFP	Project Finance for Permanence
PPP	Public Private Partnerships
SANParks	South African National Parks Board
SDGs	Sustainable Development Goals
SLA	Sustainable Livelihoods Approach
TEEB	The Economics of Ecosystems and Biodiversity
TESSA	Toolkit for Ecosystem Services Assessment
TEV	Total Economic Value
UNDP	United Nations Development Programme
UNEP FI	United Nations Programme Finance Initiative
WAVES	Wealth Accounting and Valuation of Ecosystem Services

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