

2nd Policy Forum on Natural Capital Accounting for Better Decision Making Applications for Sustainable Development

PART 1

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Ministry of Foreign Affairs of the
Netherlands



2nd POLICY FORUM ON

Natural Capital Accounting for Better Decision Making

Applications for Sustainable Development

Edited by Arjan Ruijs and Michael Vardon

WAVES is a World Bank-led global partnership that aims to promote sustainable development by ensuring that natural resources are mainstreamed in development planning and national economic accounts.

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Preface

It is with great pleasure that we present this publication that has resulted from the discussions and written contributions to the 2nd Policy Forum on Natural Capital Accounting for Better Decision Making, co-hosted by our respective organizations and held in The Hague in November 2017.

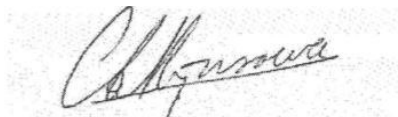
The Forum brought together users and producers of natural capital accounts for the second time, providing a platform for lesson sharing and for identifying ways to improve policy decisions through natural capital accounting (NCA). The subsequent process of analyzing the discussions and contributed papers by the editorial team has provided a focus for the ongoing engagement of account producers and users.

This publication highlights the many uses of NCA drawing from the experience of many countries, including those supported by the WAVES programme and UNSD, with well-established NCA programmes, as well as those that have recently started work on NCA. In particular, the 2nd Policy Forum discussed how NCA as an integrated measurement framework is able to support the 2030 Agenda for Sustainable Development and its accompanying Sustainable Development Goals.

The 2nd Policy Forum brought together a large number of people and organizations wanting to understand and use natural capital accounting in government and business decision making. The Natural Capital Coalition and IFC presented use of NCA by the business sector. This highlighted a variety of work as well as the many opportunities to use NCA. This publication brings together this material and builds the evidence base needed to embed the use of NCA in decision making around the world.



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PART 1 - Takeaways from the 2nd Policy Forum on Natural Capital Accounting for Better Decision Making

1. Report of the 2nd Policy Forum on Natural Capital Accounting for Better Decision Making (The Hague, 22-23 November 2017)

By Steve Bass¹

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1.1 Introduction

On 22 and 23 November 2017, the World Bank, the United Nations Statistical Division (UNSD) and the Dutch Ministry of Foreign Affairs co-hosted the *2nd Policy Forum on Natural Capital Accounting for Better Decision Making* in The Hague. This report summarizes the main lessons learned during the Forum. It briefly explains the background of the Forum, presents the main highlights of the presentations, and summarizes the discussions and conclusions of the Forum. The presentations can be obtained from <https://www.wavespartnership.org/en/forum-natural-capital-accounting-better-policy>.

Background to the 2nd Forum on Natural Capital Accounting for Better Policy:

The 2nd NCA Policy Forum built on the successful 1st Forum, held one year previously in November 2016 in The Hague and co-hosted by the Dutch Ministry of Foreign Affairs (MFA) and World Bank. That 1st Forum had concluded that:

- Natural Capital Accounting (NCA) helps the whole policy cycle – dialogue, decision making and implementation - and not just the monitoring that has been the dominant use to date.
- There are good cases of NCA influencing policy in countries rich and poor alike.
- More needs to be done to link NCA producers with a wide range of policy users.

A highly collaborative spirit was engendered by Forum participants. They drafted 10 “living principles of policy-fit NCA.” Their papers, presentations and discussions on what NCA has done in 12 countries and globally, were edited and published.¹

A 2nd Forum was held in 2018, given how the topic of integrating natural capital in policy decisions is increasingly important, with major policy and business decisions being increasingly sensitive to natural capital scarcity and risk. Prior consultations with Forum participants identified the major policy challenge to be grasped by countries was achieving the interconnected UN Sustainable Development Goals (SDGs).

Objectives of the 2nd Forum:

- NCA users and producers sharing case studies, challenges and ideas for “policy-fit” NCA.
- Focusing on the SDGs and how NCA can support their planning, implementation and monitoring

¹ Forum on Natural Capital Accounting for Better Policy Decisions: Taking Stock and Moving Forward: <https://www.wavespartnership.org/en/knowledge-center/forum-natural-capital-accounting-better-policy-decisions-taking-stock-and-moving>

- Combining the learning and energies of business and government in NCA
- Consolidating findings, testing the “living principles” for policy-fit NCA, and scoping possible guidance material
- Discussing future collaboration, including a possible 3rd Forum

Participation and approach:

More co-hosts joined WAVES and MFA in 2017 – the United Nations Statistical Division (UNSD), Gesellschaft für Internationale Zusammenarbeit (GIZ, the German development agency) and the Natural Capital Coalition. Sponsors included the European Commission and DFID (the UK development agency). Sixty participants came from 20 countries and covered NCA users and producers as well as representing various sectors.

As with the 1st Forum, the agenda was demand-driven. Participants were offered a menu in advance – and there was good consensus on the options chosen (see annexed agenda). The “meat of the agenda” was country and thematic case studies, with discussion groups generating an ever-expanding “talking wall” of issues and ideas. This informed final working sessions for four themes: business roles, guidance material, communications, and research.² Session highlights follow below.³

1.2 Session 1: Welcome and opening

The Netherlands welcomed participants, noting the recent policy interest in NCA to inform the complex challenge of planning, achieving and monitoring the SDGs. The World Bank agreed there is “a world of opportunity” for NCA in the SDGs, as well as climate action and green growth; and that this was urgent, too: per capita wealth reduction in 24 poor countries was primarily due to natural capital (NC) depletion.⁴ New co-host UNSD noted its ambitious target of 100 countries using the System of Environmental-Economic Accounting (SEEA) by 2020; and that the growing experience of ecosystem accounting will, in the next few years, enable it to lose its “experimental” handle and become mainstream.

A country news panel revealed new uses of NCA:

- In fiscal policy and generating macro-economic indicators for sustainability (Botswana)
- Beginning to assess depreciation of natural capital and costs of inaction for “green GDP” (Brazil)
- Target-setting for green growth, as well as reinvigorating land use master planning (Rwanda)
- Institutionalizing NCA, with ministers asking for a national environmental-economic accounting (EEA) strategy to embed NCA in a consistent way across jurisdictions and many areas of decision making (Australia)

² A non-attribution policy was agreed; with participants happy to use social media (#naturalcapital, #SEEA, #GlobalGoals)

³ 2nd Policy Forum on Natural Capital Accounting for Better Decision Making:

<https://www.wavespartnership.org/en/2nd-forum-natural-capital-accounting-better-policy>

⁴ The World Bank also noted a new global program in which NCA is integral, linking 1. information (benchmarking country sustainability across capitals); 2. implementation of NCA through technical assistance to countries and global knowledge sharing (WAVES+); and 3. incentives (filling information gaps in green financial markets and de-risking green investments).

Indeed, institutionalizing NCA – especially interpreting accounts beyond statistics and environment authorities and engaging ministries of finance and planning - was agreed as a common challenge in all countries.

The session concluded with participants forming a “human spectrum” – positioning themselves to reveal that, in about half the countries, the SDGs are a top policy priority, and NCA was about mid-way in becoming institutionalized in most countries.

1.3 Session 2: NCA and the SDGs – Overview

Two presentations, from UNCEEA and the Netherlands, and a panel discussion addressed the topical challenge of using NCA to improve decisions aimed at the SDGs. With the caveat that “both NCA and SDGs are pretty young” (but at least are designed for new contexts), the session explored how NCA helps, as an integrated information system that does not divide the “indivisible” SDGs, putting very different types of information together on the same page, showing their interactions and the cost-benefit implications, and feeding analysis and modelling.

The SDGs need to involve many agencies, yet they suffer from institutional fragmentation and the “indivisible” goals are often divided. NCA calls for a high degree of interaction between sector agencies, and offers consistent and objective standards that can ensure no SDG, and no interaction between SDGs, is neglected.

NCA has been used to help monitor achievement of sustainable development (if not yet the SDGs), correlating economic and environmental changes. It is beginning to be used to help shape comprehensive decisions – the big challenge and the big “prize” being informing the entire national development plan, as in Indonesia. There is an immediate need for some “missionary work” to communicate what NCA can and should do for the SDGs. NCA case studies, such as the links between cattle production and CO₂ in the Netherlands, or forest management and water security in Guatemala, could be more widely shared.

Though NCA is by nature backward-looking, and decisions are forward-looking, using NCA data in policy tools like modelling was thought to be a good way to support decision making (further developed in Session 7).

1.4 Session 3: The role of business

The opening presentation explained the increased business demand for trusted, credible and actionable information on NC, that would “make nature easier to understand in the boardroom.” Business thinking has begun to shift:

- From business concern about impacts on the environment, to concern about dependence on natural capital (and securing and conserving natural capital stocks)
- From measurement of NC to valuation (using values that make sense for decisions)
- From individual types of NCs to a systems approach (ecosystems and assessment of cumulative impacts, thresholds, etc.)

The Natural Capital Protocol has enabled business to progress (there are sector guides, and soon supplements on biodiversity and mining). NCA tends to be used for internal business decisions rather than for generic public disclosure (usually because NCA is new), so rarely appears in business reports.

Participants discussed three case studies of businesses applying localized natural capital assessments, and using the results to inform decisions, especially on natural resource (NR) management regimes – namely, work by:

- Agricultural company Olam in Indonesia to inform alternative coffee plantation management
- Tea co-operative The Wood Foundation in Rwanda to manage flood risk
- Efttec in UK to identify how urban green space correlates with health, to influence health and green space budgets

These were strong business cases for the private sector to better manage its impacts and dependencies on natural capital, to avoid risks, and to grow its opportunities. These risks and opportunities can be operational (resource scarcity, supply chain efficiency, etc.), fiscal (emissions taxes, competing for permits, etc.), reputational (consumer preference, media coverage, etc.), legal and regulatory (ensuring compliance, staying ahead of regulatory trends, etc.) or societal (securing license to operate, positive contribution to society, etc.).

Discussion groups concluded that government needs to interest and incentivize business to produce and share NCA, asserting that sustainable investment will be facilitated if companies and/or government have a consistent NC policy and accounting framework. Governments could work with accountancy boards and financial investors to leverage businesses to do NC assessments and share data. An NC risk register could help since risk is a common concern of government and business. Building NCA up spatially could create additional information of benefit to business and government, e.g. the distributional information which national NCA often lacks.

The challenge is to integrate government and business policy work, not merely to share data. Here, the SDGs offer a framing possibility, and perhaps a means for building trust. Participants identified the following “starting points” for productive government-business dialogue:

- **Decision making:** Corporate NC assessments are often done to answer a specific question, or to inform a specific decision. In contrast, national NCA is often done to identify general environmental states and trends, which may be applied to decision making. Bringing both together around a specific issue, or a decision that needs to be made, could realize synergies.
- **Sector focus:** Many countries are developing detailed accounts for water, energy, forest and others. There may be an opportunity to engage regulated industries such as water and energy supply, which are exposed to natural capital risks and opportunities.
- **Spatial/distributional focus:** Our response to the SDGs could be made more efficient and effective if we can understand in greater detail where the need is greatest, and who is affected; this requires more spatially explicit data and modelling. Businesses most often collect data and information at the site, project or catchment scale. There is an opportunity to leverage this in national NCA.
- **Data:** Often there is a lot of data that could support decisions. But the existence and accessibility of data are different things. There could be a productive conversation around the accessibility and format of NCA data available to businesses, and how business can contribute data in confidential contexts.

1.5 Session 4: Poverty and green growth

This session began with a challenge. Green growth aims to deliver the full economic potential of natural capital on a sustainable basis – NC being both a direct source of economic growth and supporting other capitals’ productivity. Poverty eradication involves increasing wealth and

reducing deprivation, in circumstances where poor people are highly dependent on NC and vulnerable to its loss. How can NCA make these policy aspirations more achievable and more transparent?

An introductory presentation from the United Nations explained how the challenge of achieving inclusive green growth has united many of its agencies in a joint Program of Action for Green Economy (UN-PAGE). The World Bank offered early insights from its imminent study on “the hidden dimensions of poverty.” This reveals how considerable national progress on poverty reduction has come with a significant cost to NC, and highlights the risk of a poverty trap when NC-dependent people become deprived of NC. With 65 countries already having green growth strategies, it is time to think how NCA can help, especially where green growth strategies seem to be fixated on carbon. In part it is to show the environmental underpinnings of poverty: Zambia explained how its seventh national development plan aims to “leave no-one behind,” and all five pillars of the plan have a poverty reduction component – but SDG1 gets more attention than the NC-related SDGs 13 and 15 that underpin SDG1.

Separate working groups then discussed the roles of NCA in poverty reduction and green growth:

Poverty – one key issue is *distribution* of NC, of poverty, and of the impacts of poverty eradication programs. The other is *communication*: there is a persistent perception that “green” is anti-poverty, or irrelevant to poverty. NCA can help by:

- Informing on how NC contributes to wellbeing and local economies over the long term
- Improving the spatial impacts of poverty programs – linking to scenarios/modelling
- Informing community and adaptive NR management, landscape and livelihood programs
- Interrogation of donor policy and activities on poverty reduction
- Improving information quality, access and transparency for poor groups

Poverty reduction is rarely solved just by technocratic “planning” – it’s a *highly political* process involving business and civil society, too. Thus, NCA should not engage government alone.

Green growth – the key questions include: the costs of transition/adjustment from brown to green, both stranded assets like coal and livelihood changes; the effectiveness of taxation, subsidies and other economic policies in optimizing NC; and the NC implications of different sectors and economic scenarios/trajectories. NCA appears to have potential to answer such questions, combining information to show where NC is critical for (a) directly driving economic growth; and (b) indirectly supporting other sources of growth.

Participants recommended linking the green growth community with the NC(A) community. Green growth is a good way to take NC concerns “upstream”; and NCA a good way to handle the economy-nature links of green economies.

1.6 Session 5: Life on land

This session comprised five valuable new case studies, followed by Q&A:

- **England’s** forest authority has built an asset register of forests, showing changes in stock and quality. A balance sheet estimates diverse contributions of the forests to private and public value covering timber, carbon, recreation, etc.: £22.4 billion of net present NC value is delivered, compared to only £1.6B in cash value. These numbers have “rebalanced”

board-level discussion on forest priorities, comparing well to maintenance costs and current government budget.

- **Australia's** timber, water, biodiversity accounts feed into analyses and projections that inform forest management trade-offs (e.g. new timber concessions and expanding national parks). Communication strategy has been important, including a background document to feed government process, a scientific publication for credibility, and a popular article to secure political attention.
- **South Africa's** accounts are based on ecosystem types and land cover. They are used for spatial planning (municipality level); water security (decisions on strategic water source areas under land use pressure, e.g. from coal mining and forestry); investments in ecosystem restoration (estimating returns); and protected area expansion (how well areas are protected).
- **Uganda's** ecosystem accounts have informed debates about the status of protected areas, budget allocations for protected areas, monitoring ecosystem degradation, relations with economic growth, and progress towards Aichi (and potentially SDG) targets. Stock accounts have been made for economically important species like shea butter nut trees and chimpanzees.
- **Brazil's** current work on water and ecosystem accounts is used to define critical areas, planning, management, regulation and inspection of water resources. Good infographics have helped people to understand how the water cycle works, who uses the most water, and water availability.
- *Participant discussion noted:* the need to better inform trade-offs and synergies between services and conservation objectives; and when to use exchange values and when welfare values.

1.7 Session 6: NCA for government processes

This session explored four case studies of NCA use in government decision making processes:⁵

- **Botswana** – NCA has been used for both water governance and development planning. Accounts have been used to derive policy indicators that track goals for water access and managing water supply and demand. Many of the accounts directly relate to SDGs 2, 6, 12, 13, and 15.
- **Indonesia** – The NCA process is linked to the national development plan and intends to add value by greening the economy and reducing carbon. A system-dynamics model requires stock and flow information from the accounts and is used to analyze policy options. The information is being transferred to inform a spatial model as well.
- **Rwanda** – Since 2015, NCA has been informing the National Strategy for Transformation, with land and water accounts influencing the land use master plan and water allocation, as well as public expenditure and green investments.
- **Australia** – With environmental-economic accounting in place for more than 25 years, the country is now working on a common national strategy to get reliable environmental-economic accounts for national and state governments, communities and business, and is doing a user needs assessment. NCA has been used for state of environment reporting and could be used for strategic regulatory assessments and intergenerational reporting.

⁵ In addition to the four presentations, four additional papers contributed to the sessions' theme: <https://www.wavespartnership.org/en/2nd-forum-natural-capital-accounting-better-policy>

Discussion in groups revealed that:

- Assessing policy options for achieving the SDGs takes place in central agencies for budgeting and finance, but most are unaware of NCA (an exception being New Zealand where NCA was used to assess the impact of implementing a carbon tax to curb greenhouse gas emissions).
- The SDGs and SDG targets that NCA can monitor are clear but need wider explanation. International work (e.g. by UNSD and the Netherlands) on linking SDG indicators to SEEA can help.
- NCA brings an important long-term perspective on policy through its focus on assets underpinning production and consumption.
- Data sharing, data gaps, and resources for monitoring the SDGs and producing accounts are challenges for all countries.
- NCA is not the only tool, and we still need regulatory frameworks for the environment.

There is now much interest in how NCA could be used for budgeting, investment and finance, but as yet few specific cases of it. A number of suggestions were made:

- Committees to monitor or achieve the SDGs (and committees for NCA) should have representatives from the central agencies responsible for budgeting and finance.
- These agencies need to better understand NCA, its roles, and examples where NCA informed past decisions – the Netherlands can do this for energy and the circular economy.
- Investments in environmental protection need to be better correlated with measurement of outcomes. Classifications of expenditure need to separate out management and protection costs from investment for restoration.
- NCA has an umbrella function and could build on and regularize other projects and tools, such as public environmental expenditure reviews that link environment and the economy.

1.8 Session 7: NCA for assessing trade-offs

This session looked at how economic modelling using NCA can assist decision making. In particular, it examined how such modelling helps to consider synergies and trade-offs and the multiple effects of past, present and future government policies. Such considerations are essential for determining the policy mix needed for achieving the SDGs. The session showed how NCA can provide consistent data for standard modelling approaches credible to statisticians, accountants, economists, natural scientists and decision makers.

General types of analysis ranging from simple trend analysis, to integrated assessments and cost-benefit analysis were briefly highlighted before moving to presentations and discussion of model types. Input-output and partial and full computable general equilibrium (CGE) models were mentioned.

The main focus was on the environmentally extended CGE developed by the Inter-American Development Bank, known as *Integrated Environmental Economic Modelling (IEEM)*. A normal CGE model has firms and households linked through production and consumption within an economy, with external links through imports and exports. IEEM integrates environmental data using the SEEA data structures into the model – water, energy, forests and ecosystem services. This includes not just the provisioning ecosystem services but also regulating services.

The application of the IEEM model to Guatemala was presented in some detail and it showed the synergies and trade-off within and between different SDGs. For SDG 2 (zero hunger) the

model showed that expanding irrigated agriculture would increase agricultural production and rural income but would fall short of targets. The modelling also showed how achieving SDG 2 would have synergies with SDG 1 (eliminating poverty), lifting 2.4 million people out of poverty, and SDG 8 (promoting sustainable economic development), with GDP estimated to increase by USD 1.37 billion. However, the model showed there would also be trade-offs with SDG-15 (sustainable use of forests) and SDG-13 (action on climate change).

The process of development and, in particular, the process of engaging with countries and regional partners (e.g. UN Economic Commission for Latin America and the Caribbean) and the development of local capacity was also featured. This showed that countries with accounts, such as the WAVES partners Rwanda, Colombia and Costa Rica, can adapt and apply the model to their policy needs and data availability.

The Central Bank of Costa Rica's application of the *IEEM model* was presented in some detail. This was partly driven by Costa Rica's efforts to accede to the OECD and to achieve its carbon neutrality goal by 2021. The exercise included "shock scenarios" to see where best to apply a carbon tax (from 15 economic activities), e.g. on highest polluting products or highest polluting industries, or to change energy efficiency/substitution in the transport system. The latter was found to be the best choice, being less socially damaging than tax increases on imported fuels.

Countries and organizations appreciated the insights that the modelling could offer, particularly for estimating the effects of different policy options. While the SDGs were particularly highlighted, it was noted that the tool could be applied to other issues, e.g. climate change, water and financing.

1.9 Session 8: Ways forward

The previous sessions had generated a "talking wall" of points in four areas where NCA could progress: 1) business-government links; 2) communications strategy; 3) guidance; and 4) research. Four "ways forward" working groups began with a synthesis of messages from the "talking wall." Participation was voluntary and very intensive, concluding with these observations and ideas:

Business – linking private and public natural capital accounting

- **A convening platform:** Participants voiced the need to create platforms of expertise, to match-make the necessary skills, data and experience needed to implement better NC management across government and business. These platforms could be hosted by in-country representatives, with support from external bodies like the WAVES partnership and Natural Capital Coalition. Joint participation in events like the Policy Forum and the World Forum on Natural Capital can start to get both communities in the same room.
- **Need for more case studies:** Both policy and business practitioners could benefit from successful, illustrative examples of how national-level and business-level work can complement each other, and how this can result in real implemented solutions in different contexts.
- **Need for small and medium enterprise (SME) engagement:** A persistent challenge is how to make NC-related considerations relevant and accessible to SMEs. In many developing countries, SMEs represent the majority – the critical mass. It is possible that the value-chain approach presents the most practical option to "trickle down" best-practice management insights from larger businesses to the smallholders in the chain.

- **Need to make progress through engaging large multinational corporations (MNC):** NCA can be a much-needed source of information for government to have influence in discussions with powerful MNCs, especially when looking at monetary aspects. Examples discussed were: assessment of the how much resource rent is being taxed (or not) by governments; and assessment of both on- and off-budget subsidies for corporations (such as lower electricity or water pricing schemes for industrial users that might be environmentally damaging).

Communication and engagement on NCA

Many challenges relevant to communication and engagement were mentioned throughout the two days. In Indonesia and Brazil, accounts must respond to policy demands and be user-led, e.g. to inform Nationally Determined Contributions to climate change action (NDCs). In South Africa, there was much thinking about how to package the information coming out of the accounts to make it relevant to other policy developments. In Botswana, a special quarterly economic bulletin was shared with Cabinet and Members of Parliament to raise awareness of sustainability issues. And in Australia, the forest accounts were communicated differently to specific audiences.

Participants also noted that communication is often *ad hoc* or left to the end of an NCA process. Instead, there should be a communications strategy with specialist expertise engaged in every NCA process, to take people on a journey from understanding what NCA is and means, to realizing the value that NCA can bring to what they are doing. Participants suggested:

- Communications must be demand-led to resonate with diverse audiences and be effective.
- NCA communicators need to know how NCA is relevant to public and private actors – and to all those with strategies for realizing the SDGs.
- Messaging is critical. We need to know the language – the terminology – that we should be using with our audiences. The right sort of language can engage and incentivize. The wrong sort can alienate and intimidate.
- Timing matters. We need to know the best time to engage – the best opportunities and entry points - as well as when the timing is not right.
- We should therefore scope audience politics, timing and language, and tailor our messaging accordingly. We must engage with detractors as much as with champions, responding to their concerns with a consistent, evidence-based story. We may need to develop “killer facts” and infographics and other material to be compelling, e.g.:
 - A fact sheet to explain what NCA is⁶
 - A fact sheet to link NCA to the SDGs, as well as other policy briefs on NCA⁷
 - A “mash up” PowerPoint presentation from all the presentations from the 2016 and 2017 NCA Policy Fora, covering theory, country experience, and plenty of practical examples
 - Case studies of where NCA has been used to inform policy decisions. There are many case studies showcased in the WAVES website, but we need to collect and compile more.
 - Ongoing learning and sharing: perhaps a roster of communications experts we can contact to provide *ad hoc* support; occasional webinars to exchange communications experience and knowledge; and at the prospective 3rd NCA Policy

6 A helpful starter page is: <https://www.wavespartnership.org/en/natural-capital-accounting>

7 <https://www.wavespartnership.org/en/knowledge-center/natural-capital-accounting-and-sustainable-development-goals>

Forum, a session for participants who want to go more in depth on practical communications.

Developing guidance on NCA for better decision making

The 2016 NCA Policy Forum produced much evidence on *what NCA can do* for better decisions right throughout the policy cycle. Participants at the 2017 Forum added to this evidence and agreed there is now an appetite for guidance on *how NCA can do this*, notably for making decisions on the SDGs. While guidance is strongly needed – for countries, businesses and international organizations – it was recognized that “official” guidance invariably takes much more time to develop and be agreed. So, three complementary responses were suggested:

1. *Materials on website*: The presentations, written contributions and discussions from the 2nd Policy Forum reflect a broad expertise and knowledge base on how NCA could contribute to achieving the SDG. They will be available immediately on the Forum webpage.⁸
2. *2nd Forum papers collated*: The written contributions to the Forum will be collected together into a single document, put into a common format, with a short introduction added, and again made available on the Forum webpage.
3. *Brief shared learning document offering informal “guidance”*: The achievements and lessons explored in the 1st and 2nd Fora will be distilled into a short document (20-30 pages) to be available online by June 2018. This document would build on the policy cycle and the 10 living principles of the 1st Forum, and SEI’s “wedding-cake diagram” connecting the SDGs to NCA. The document will recognize the different roles in the SDGs of business, government, international organizations and academia. It will, in effect, offer informal “guidance” on what works in key areas: governance and institutional structures; finance; biodiversity; communications and stakeholder engagement; resources (time and money) needed; and technical issues (data, scale, etc.). It will draw on the examples made known to the Forum with one-page country or issue-based story boards.

The Forum Organizing Committee will convene a small group to develop this document, and Forum members will be invited to provide inputs.

Research, knowledge gaps and learning

While we have enough material from the 1st and 2nd Fora to develop informal guidance, three further things could nicely complement this:

- Further case studies of NCA linked to actual decisions, showing which policies and SDGs have been affected
- Facilitating learning and exchange between current practitioners, nurturing and expanding the community of NCA practitioners (both compilers and users)
- Research into knowledge gaps, notably ways to institutionalize NCA in the machinery of government and business, as well as in education curricula

In the future, the NCA Policy Forum might also have a regional focus, perhaps by organizing regional exchanges of technical people and policy makers, alongside the research and educational communities. South-South mechanisms and tailor-made regional support mechanisms can help to ensure policy makers better understand what NCA can do, while

8 <https://www.wavespartnership.org/en/forum-natural-capital-accounting-better-policy>

compilers better understand what decisions NCA is needed for. “Better achieving the SDGs” could be a way to bring them all together.

1.10 Session 9: Summary and next steps

The facilitator reflected on the two days, concluding that:

- NCA continues to pioneer new ways to tackle complex environmental and economic policy challenges, with innovations in many countries, rich and poor, and both top-down and bottom-up policy regimes.
- NCA is a strong enabler for the integrated policy making demanded by the SDGs and inclusive green growth. Without it, the SDGs’ complexities can induce “policy paralysis.”
- The 1st Forum’s “living principles” of policy-fit NCA were largely validated by the experience of the 2nd Forum.⁹
- The choice of language and framing is critical for getting NCA understood and used, and quick gains could be had through more communications efforts.
- The spatial potentials of NCA hold promise for many sectoral and livelihood decisions, and for engaging many governmental levels (city, regions) and businesses.
- Some “upstream” work often needs to be done – on NC policy, strategy, multi-stakeholder committees, etc., and communications – rather than fixating on NCA.
- The Forum has a strong sense of purpose, and it values collaboration. The shared learning at the Forum offered confidence and inspiration to newer players in NCA. And the excellent co-working during the conference, and participant diversity, particularly involving business this year, are real assets. The Forum therefore has much potential to help countries achieve the SDGs in future.

Next steps

Participants expressed interest in continuing their good collaboration by taking part in working groups. In this way, a possible 3rd Forum would be informed by the community working together. Possible themes for a 3rd Forum were aired, including:

- Moving from plans to budgets: informing expenditure decisions, involving finance/tax actors
- Moving from national-level NCA to:
 - Distributional issues: poverty, vulnerability, equity and indigenous peoples’ issues
 - Urban and local NCA: for urbanization, decentralization and infrastructure decisions
- Complements to NCA and its actors: expanding the toolkit with complementary instruments, and the NCA community with other disciplines

The 3rd Forum’s learning objectives, community of practice objectives, and policy influence objectives will be defined well in advance, again through a demand-driven approach. A refreshed organizing committee will again be put together for this. Participants greatly appreciated the Netherlands’ tentative offer to host a 3rd Forum. Several other countries also expressed their willingness to host the Forum, which was also appreciated, and considered to be a good sign of strong demand for a continuing Forum.

⁹ There could be a validation/enrichment process seeking participants’ input to the principles, as the 10 principles may structure the informal “guidance.” One principle to add might be a communications strategy, including getting the “language” right.

Annex 1.1 Agenda for the 2nd Policy Forum

Wed 22 Nov		
9.00 am to 10.30 am	Session 1. Welcome and opening	
9.00 am	Welcome from MFA On behalf of the Forum collaborators MFA, WAVES and UNSD/DESA	<ul style="list-style-type: none"> Carola van Rijnsoever Director, Inclusive Green Growth Department, Netherlands Ministry of Foreign Affairs
9.20 am	Recap from last year and aims of this year's Forum Objectives, outcomes, house rules	<ul style="list-style-type: none"> Steve Bass, Senior Associate, IIED, UK Salvador Sanchez-Colon, Project Director "NCA and Valuation of Ecosystem Services" - Mexico, UNSD
9.30 am	WAVES <ul style="list-style-type: none"> Current focus and the way forward 	<ul style="list-style-type: none"> Raffaello Cervigni, Lead Economist, World Bank
9.40 am	UNCEE <ul style="list-style-type: none"> Work program SEEA and the SDGs 	<ul style="list-style-type: none"> Gerard Eding, Director National Accounts, Statistics Netherlands - on behalf of UN Committee of Experts in Environmental-Economic Accounting
9.50 am	News panel Countries reflect on: <ol style="list-style-type: none"> Looking back: where NCA has successfully improved policy, investment or other decisions Looking forward: what are the major opportunities to improve decisions? 	<ul style="list-style-type: none"> Peter Katanisa, Advisor, Ministry of Natural Resources, Rwanda Beth Brunoro, Dept. Environment and Energy, Australia Kelapile Ndobano, Deputy Secretary, Macroeconomic Policy, Min. Finance and Development Planning, Botswana Rosanna Ovalle Vengoechea, Director, Sustainable Environmental Development, Department of National Planning, Colombia
10.20 am	Welcome 'Icebreaker' – getting to know our evolving community and its aspirations	<ul style="list-style-type: none"> Steve Bass, Senior Associate, IIED, UK
10.30	Morning tea	
11.00 to 12.30 pm	Session 2. NCA and the SDGs - Overview	
11.00 am	2.1 Decision making with NCA for synergies and trade-offs <ul style="list-style-type: none"> Presentation 	<ul style="list-style-type: none"> Arjan Ruijs, Senior Researcher, PBL, Netherlands
11.15 am	2.2 Monitoring SDGs targets with NCA <ul style="list-style-type: none"> Presentation 	<ul style="list-style-type: none"> Bram Edens, Senior Statistician, UNSD
11.30 am	2.3 Panel discussion	<ul style="list-style-type: none"> Henry Vargas Campos, Central Bank Costa Rica Pak Medrilzam (Indonesia), Marisol Rivera (DG Planning, SEMARNAT, Mexico) Salman Hussain (TEEB Coordinator, UNEP)
12 noon	2.4 Table discussions and report back	
12.30	Lunch	

1.30 pm to 3.00	Session 3. NCA and the SDGs Goals – the role of business	
1.30 pm	Introduction and welcome. <ul style="list-style-type: none"> • Introduction to Natural Capital Protocol 	<ul style="list-style-type: none"> • Hannah Pitts, Relationships Director, Natural Capital Coalition, UK
1.45 pm	Case studies from business <ul style="list-style-type: none"> • Rwanda - tea • Indonesia - coffee • UK - urban accounting 	<ul style="list-style-type: none"> • Petri Lehtonen, Indufor, Finland • Chris Brown, Vice-president, Olamnet • Ian Dickie, eftec, UK
2.15 pm	Reflections on the case studies re the SDGs	<ul style="list-style-type: none"> • Carl Obst, Director, IDEEA, Australia
2-25 pm	<ul style="list-style-type: none"> • Roundtable discussion on linkages between business and policy. 	
2.55 pm	Summary and close	
3.00 pm – 3.30 pm	Afternoon tea	
3.30 pm to 5.00	Session 4. NCA for SDGs – exploring poverty reduction and green growth	
3.30 pm	Outline of session	<ul style="list-style-type: none"> • Steve Bass, Senior Associate, IIED, UK
3.40 pm	<ol style="list-style-type: none"> 1. Green growth, UNEP 2. Poverty reduction, World Bank 3. Real world policy decisions, Zambia 	<ul style="list-style-type: none"> • Salman Hussain, Coordinator UN TEEB • Raffaello Cervigni, Chief economist Africa, World Bank • Richard Lungu, Principal Planner, Min. Development Planning, Zambia
3.55 pm	Breakouts on poverty and green growth	
5.15-7.00	Cocktail function	

Thu 23 Nov		
8.30 am	Arrival	Tea and coffee
9.00 am to 10.30 am	Session 5. NCA for SDG15 Life on land	
9.00 am	Introduction to the session	<ul style="list-style-type: none"> • Rocky Harris, Defra, UK • Bram Edens, UNSD
9.10 am	Country experiences (10 mins each) <ul style="list-style-type: none"> • UK - Forest Policy • Australia - Revealing trade-offs timber, water and biodiversity • South Africa – tbc • Uganda – NCA for Aichi and NBSAPs 	<ul style="list-style-type: none"> • Miranda Winran, Forest Enterprise England • Michael Vardon, ANU, Australia • Amanda Driver, SANBI, South Africa • Steve King, UNEP-WCMC, UK
10.00 am	Table discussion	
10.30	Morning tea	

11:00 am-12.30 pm	Session 6. NCA for government processes	
11.00 am	6.1 Botswana – Importance of water and NCA for sustainable development	• Edwin Itshekeng, Botswana
11.15 am	6.2 Indonesia – National Development Planning and NCA	• Dr Medrilzam, Indonesia
11.30 am	6.3 Rwanda – NCA as input to the mid-term National Strategy, 2018 to 2023	• Claudine Uwera, WAVES Rwanda
11.45 am	6.4 Australia – Developing strategy and action plan for environmental economic accounting	• Sarah-Jane Hindmarsh, Director, Environmental-economic accounting, DoEE, Australia
12 noon	Table discussions and report back	
12.30 pm	Lunch	
	Session 7. NCA for assessing trade-offs	
1:30 pm	Accounting and modelling complex trade-offs	• Onil Banerjee, Natural Resource Economist, IAB
1:50 pm	Country experience, Costa Rica.	• Irene Alvarado-Quesada, Central Bank, Costa Rica
2.00 pm	Questions and discussion	
2:30 pm-4:30 pm	Session 8. The way forward	
2:30	NCA and WAVES - the way forward Building NCA into World Bank processes	• Raffaello Cervigni, World Bank
2.50	UNSD – reflections on way forward	• Bram Edens, UNSD
3:00 pm	Afternoon tea	
	Session 8, cont. Toward Forum recommendations	
3:30 pm	1. Research on NCA for SDGs use	• Bram Edens and Sofia Ahlroth
3:35 pm	2. Linking business and country accounting	• Hannah Pitts
3:40 pm	3. Development of guidance material	• Michael Vardon
3:45 pm	4. Communications on NCA for SDGs	• Rosalind Goodrich
3.50 pm	Table discussions on 1 – 4	
4.30 pm to 5.00	Session 9. Summary and close	
4.30 pm	Summary of key messages	• Steve Bass, IIED
4.45 pm	Closing remarks	• Sofia Ahlroth • Bram Edens • Omer van Renterghem
5.00 pm	Close of Forum	

Annex 1.2 Forum participant list

Name	Designation	Institution	Country
Jakub Wejchert	Policy Officer	European Commission (EC)	EC
Edwin Itshekeng	Chief Economist/Permanent Secretary	Ministry of Finance and Development Planning	Botswana
Dr. Ir. Medrilzam	Director for Environmental Affairs	BAPPENAS (Ministry of National Development Planning)	Indonesia
Kelapile Ndobano	Deputy Secretary of Macroeconomic Policy, SC Chair	Ministry of Finance and Development Planning	Botswana
Carl Obst	Director	IDEEA	Australia
Onil Banerjee	Natural Resource Economist	Inter-American Development Bank (IDB)	USA
Steve Bass	Senior Associate	International Institute for Environment and Development (IIED)	IIED
Michael Vardon	Visiting Fellow	Australia National Univ/WB	WB
Sjoerd Schenau	Project Manager Environmental Accounts	Statistics Netherlands	Netherlands
Pierre Bertrand	Senior Program Associate	Global Development Network	India
Michael Nagy	Statistician	UN Economic Commission for Europe (UNECE)	UNECE
Arjan Ruijs	Researcher environmental and Resource Economist	Netherlands PBL	Netherlands
Sarah-Jane Hindmarsh	Director, Environmental-Economic Accounts	Department of the Environment and Energy	Australia
Beth Brunoro	First Assistant Secretary, Knowledge & Technology Division	Department of the Environment and Energy	Australia
Rosanna Ovalle Vengoechea	Director, Sustainable Environmental Development	Department of National Planning	Colombia
Steven King	Environmental Economist	IUCN-WCMC	IUCN
Petri Lehtonen	Senior Partner	Indufor Oy	
Ruud Jansen	Executive Secretary	Gaborone Declaration for Sustainability in Africa	Botswana
Goodson Sinyenga	Assistant Director	Central Statistical Office	Zambia
Richard Lungu	Assistant Director	Ministry of Development Planning	Zambia
Cor Graveland	Researcher Environmental Accounts	Statistics Netherlands	Netherlands
Bianca Nijhof	Global Sustainability Program Manager	Arcadis	
Johannes Kruse	Advisor	GIZ	Germany
Omer Van Renterghem	Theme expert on land, water and ecosystems	Ministry of Foreign Affairs	Netherlands

Irene Alvarado-Quesada	Coordinator of Environmental Statistics	Central Bank of Costa Rica	Costa Rica
Henry Vargas Campos	Director of Macroeconomic Statistics	Central Bank of Costa Rica	Costa Rica
Salman Hussain	Coordinator, The Economics of Ecosystems and Biodiversity (TEEB)	UNEP	Switzerland
Peter Katanisa	Advisor	Ministry of Natural Resources	Rwanda
Claudine Uwera	Country Coordinator	World Bank	Rwanda
Glenn Marcelo	Chief of Planning	Mines and Geo-Science Bureau	Philippines
Ir. M.C. Lok MA (Martin)	Program Manager	Ministerie Economische Zaken	Netherlands
Bram Edens	Senior Statistician	UNSD	Netherlands
Elsa Begne de Larrea	Statistics Assistant	UNSD	
Viktor Pirmana	PhD student	The Institute of Environmental Sciences (CML)	Netherlands
Rocky Harris	Director	Defra	UK
Rosalind Goodrich	Head of Research Communications	IIED	UK
Raffaello Cervigni	Lead Environmental Economist	WB	NA
Sofia Ahlroth	Senior Environmental Economist	WB	NA
Juan Pablo Castaneda Sanchez	Environmental Economist	WB	NA
Miranda Winram	Head of Strategy and Insight	Forest Service	UK
Salvador Sanchez-Colon	Project Director	Natural Capital Accounting and Valuation of Ecosystem Services in Mexico	Mexico
Lars Hein	Professor	Wageningen University	Netherlands
Stefan van der Esch	Policy researcher	PBL	Netherlands
Marcel Kok	Senior Researcher	PBL	Netherlands
Mikkel Kallesoe	Senior Sustainability Advisor	FMO	Netherlands
Maarten Biermans	Innovation Specialist	Rabobank	Netherlands
Gerard Eding	Director National Accounts	Statistics Netherlands	Netherlands
Ian Dickie	Director	eftec	UK
Hector Tuy	Senior Researcher	IARNA	Guatemala
Silvia Montepeque Moncrieff	Director of Strategic Studies	Secretariat of Planning	Guatemala
Hannah Pitts	Relationships Director	NCC	UK
Franziska Eckhardt	Senior Policy Officer	BMZ	Germany

Ivone Lopes Batista	Coordinator of Natural Resources, Directorate of Geoscience	Fundação I B G E	Brazil
Carlos Scaramuzza	Director, Department of Ecosystem Conservation	Ministry of Environment - Ministério de Meio Ambiente (MMA)	Brazil
Andre Luiz Campos de Andrade	Assessor, Subchefia de Análise e Acompanhamento de Políticas Governamentais (SAG) - Advisor, Executive Office of the Brazilian Presidency	Casa Civil da Presidência da República	Brazil
Liu Xiaoxue	Deputy Consultant of Division of Balance Sheet, Department of National Accounts	National Bureau of Statistics	China
Rakesh Kumar Maurya	Director, Social Statistics Division, Central Statistics Office	Ministry of Statistics and Programme Implementation	India
Gerhardt Bouwer	Chief Director, Economic Analysis	Statistics South Africa	South Africa
Mandy Driver	Senior Biodiversity Policy Advisor	South Africa National Biodiversity Institute (SANBI)	South Africa
C. Palpandi	Scientist C	Ministry of Environment, Forest and Climate Change	India
Chris Brown	Vice President	Olamnet	UK
<i>Contributors, unable to attend</i>			
Jeremy Webb		UCL	NZ
Kate Auty		ACT Commissioner for Environment and Sustainability	Australia
Adam Tipper		Stats NZ	NZ
Jane Carter Ingram		Ernst&Young	USA
Ben Milligan		UCL	UK
Daniel Juhn		CI	USA

2. Natural Capital Accounting for the Sustainable Development Goals: Current and potential uses and steps forward

By Arjan Ruijs,¹ Martijn van der Heide² and Jolanda van den Berg²

¹ PBL Netherlands Environmental Assessment Agency

² Wageningen Economic Research, The Hague

Summary

This chapter provides a brief overview of current and potential uses of natural capital accounts (NCAs) in national policy processes for the Sustainable Development Goals (SDGs). Natural capital accounting can provide a practical framework, valuable elements, lessons, and practices that can be used to develop and implement the policies or governance arrangements needed to attain the SDGs at a country level. From the literature about the SDGs and examples discussed during the 2nd Policy Forum, we distil three general lessons about how natural capital accounting can help countries address these SDG challenges. First, we observed most attention being directed to using NCAs for the monitoring of status and trends. Natural capital accounting is seen as a useful integrated information framework used for informing the SDG policy process and ensuring integration and consistency between several of the SDG indicators. Secondly, NCAs are also helpful for policy preparation. There is a growing attention for this but, thus far, we observed limited attention for the potential role of NCAs with regard to their use in the policy-making process. This is despite the fact that NCAs may provide important input for the analytical methods in designing, implementing and reviewing evidence-based SDG policies, such as trend analysis, forecasting, footprint analysis, integrated assessment, and general equilibrium analysis. Thirdly, setting up NCAs can be helpful for building institutional coordination, and natural capital accounting and national SDG processes can benefit from one another as both use a systems-based policy framework. The SDG policy process may give a boost to setting up a process to render NCAs.

2.1 Introduction

This study was conducted in preparation of the *2nd Policy Forum on Natural Capital Accounting for Better Decision Making*, on 22 and 23 November 2017, which was held in The Hague. The report provides a brief overview of how natural capital accounting is currently being used, and describes how it could contribute to attaining the Sustainable Development Goals (SDGs).¹⁰ The SDGs are the core of the “2030 Agenda for Sustainable Development,” adopted at the United Nations Sustainable Development Summit in September 2015. The 2030 Agenda is a broad sustainability action plan for all countries, focusing on the poverty–development–environment nexus and with an overarching objective of leaving no one behind. It contains 17 SDGs – see Figure 2.1 and the Appendix –consisting of 169 sub-targets, including ending

¹⁰ This Forum was jointly organized by the World Bank WAVES partnership, the United Nations Statistics Division, the Dutch Ministry of Foreign Affairs and PBL Netherlands Environmental Assessment Agency.

poverty and hunger, improving health and education, combating climate change, environmental sustainability, and inclusiveness (United Nations, 2015). These goals, along with their targets and indicators, provide a detailed dashboard for the transition to sustainable development (Costanza et al., 2016).

Figure 2.1 The Sustainable Development Goals



Bron: sustainabledevelopment.un.org

Governments, businesses and others are working on the 2030 Agenda. Individual countries are called upon to translate global ambitions into long-term visions with clear targets and integrated policy agendas based on national circumstances (Gable et al., 2015). This process is multifaceted, with work being done to create awareness, set targets, design and implement policies, and monitor progress. So far, internationally, there is much emphasis on developing a solid framework of indicators and the underlying data needed to monitor progress of the SDGs and inform policy.

UNSD (2015) states that “the SDGs represent a step towards closer integration of policy frameworks and programmes, requiring more integrated information on the interlinkages between the economy, the environment and society.” Hence, designing and implementing the SDGs also requires an understanding of these interlinkages. This includes the impact of the economy on the long-term health of natural systems. After all, economic prosperity and human well-being are underpinned by natural capital (e.g. biodiversity, including ecosystems that provide essential services like water, food, fibres, carbon sequestration, and soil fertility).

Natural capital accounting provides such an integrated approach.¹¹ It measures the changes in the stock of natural capital, on various scales. But perhaps more importantly, it integrates the value of ecosystem services into accounting and reporting systems at a national level (rather than maintaining a strict borderline between the economic sphere and the natural environment). As such, natural capital accounts (NCAs) provide insights into the economic

¹¹ NCA is short for *natural capital account*, following the System of Environmental-Economic Accounting Central Framework (SEEA) and SEEA Experimental Ecosystem Accounting (SEEA EEA). NCAs include physical and monetary accounts, but also thematic and economic accounts as described in United Nations et al., (2014a,b).

importance of natural capital in wealth creation, employment, livelihoods, and poverty reduction. Through NCAs, the contribution of natural capital to economic development as well as SDGs can be made explicit (Bann, 2016) – see also the text box “Natural capital accounting and the System of Environmental-Economic Accounting.”

Box 2.1 - Natural capital accounting and the System of Environmental-Economic Accounting

The internationally agreed methodology for natural capital accounting is the System of Environmental-Economic Accounting (SEEA). SEEA is a central framework that contains the standard concepts, definitions, classifications, accounting rules and tables for producing internationally comparable statistics on the environment and its relationship with the economy. It guides the compilation of consistent and comparable statistics and indicators for policymaking, analysis and research (United Nations et al., 2014a).

The SEEA allows for compiling physical and monetary accounts for a range of natural resources, such as minerals, timber, and fisheries, and linking these to the System of National Accounts. It distinguishes between physical flow accounts, functional accounts, and asset accounts. The physical flow accounts record the flows of natural inputs, products and residuals within the economy and those between the environment and the economy. These include water and energy used in production, and waste flows to the environment. The physical flows are placed within the structure of a physical supply and use table, showing which products are supplied and used by the various industries and households. Functional accounts record the many transactions between industries, households and governments that concern the environment. Examples include green investments, environmental restoration, and recycling. Asset accounts in physical and monetary terms measure the natural resources available and changes in the amount available due to extraction, natural growth, discovery and other reasons. They include, for example, mineral, timber, aquatic, soil, water and land resources. In addition, the SEEA Experimental Ecosystem Accounts (SEEA EEA) present a framework for integrating biophysical data and linking changes in ecosystems to human activity (United Nations et al., 2014b). The ecosystem accounts summarise information about the extent and quality of ecosystems, their changing capacity to operate as a functional unit, and their delivery of benefits to humanity.

The World Bank-led WAVES partnership and the work programme by the United Nations Statistics Division (UNSD) promote sustainable development by mainstreaming the value of natural capital accounting in development planning and national accounting systems. WAVES and UNSD use the SEEA to produce NCAs in countries as an important tool to inform economic decision making on natural resources. Both organizations work to build capacity in individual countries to implement the SEEA and to demonstrate its benefits to policymakers. Next to this, UNSD in conjunction with the UNEP TEEB office, UN regional commissions, and the CBD initiated pilot testing of the SEEA EEA and ecosystem valuation in a number of countries.

See also www.wavespartnership.org, under Natural Capital Accounting resources, and unstats.un.org/unsd/envaccounting/eu_project/.

A growing number of countries are compiling NCAs to inform economic decision making on natural resources. Many countries also want to use the accounts as a basis for compiling indicators to monitor progress of sustainability policies and for assessing *ex ante* the possible effects of new policies related to for example the SDGs. Natural capital accounting in itself does not create mechanisms to achieve the SDGs. Yet, it can provide a framework for information, valuable elements, lessons, and practices that can be used to develop and implement the policies needed to achieve the SDGs.

For this study, we investigated the design and implementation of evidence-based SDG policies – new or existing policies linked to or embedded in the 2030 Agenda – and the report outlines their current use of NCAs. It also identifies and describes opportunities for NCAs to fill gaps in information, in current SDG policy processes. In addition, we examined the institutional hurdles that prevent the creation of an environment in which NCAs could improve national policies towards achieving SDGs. In such an environment, NCAs may help to create systems-based, integrative governance arrangements spanning multiple departments, involving public and private actors, and on various spatial scales. From these analyses, we were able to derive a number of general observations that may help other countries in evaluating their position and how to use NCAs to improve their SDGs policies.

To identify current and future use of NCAs in policies to achieve the SDGs, this report first identifies four policy challenges in relation to national SDG processes (Chapter 2.2). Subsequently, it focuses on the indicators and analytical methods that are, or could be, used to address these challenges and, in particular, on how NCAs may contribute to this difficult task (Chapters 2.3 and 2.4). Chapter 2.5 illustrates the institutional hurdles countries may experience when shaping an environment in which NCAs may help to improve policies directed towards achieving SDGs. Our methodology comprised desk research, literature reviews and policy analyses, in Chapter 5 complemented by interviews and lessons learned from the 2nd Policy Forum.

It must be noted that the processes of both the SDGs and natural capital accounting are still in their infancy. At this early stage, widespread application of NCAs as a way of providing information for SDG policies cannot be expected, neither in well-developed SDG policy processes, nor in other countries, as the development and integration of the accounts in the decision-making process will take some time to accomplish (Virto et al., 2018). This has also affected which literature could be used for this report. We consulted the scientific literature, international reports (for example, by the World Bank, United Nations and OECD), as well as websites related to SDG indicators and SDG policy analyses. The available literature from any source reporting on national SDGs or natural capital accounting processes is still limited. To stay as close as possible to the SDG policy process and the focus of the 2nd Policy Forum, as well as because of time constraints, we decided not to explore the literature on green growth or sustainable development, which may also provide insights into how NCAs could support more integrated policy-making.

We focused mostly on *national* SDG processes, whereas, internationally, the UNSD (2015), United Nations (2017), World Bank (2017) and OECD (2016, 2017) have put much emphasis on creating coherent *international* indicator databases to measure progress towards the SDGs. Furthermore, for reasons of brevity, our analysis was limited to a macroeconomic perspective. Natural capital accounting for business – here defined in its widest sense as “taking the environment into account in business decision making and reporting” – has not been included explicitly.

2.2 Challenges to achieve the Sustainable Development Goals

To achieve the Sustainable Development Goals (SDGs), countries face many challenges. We distinguish four SDG-related policy challenges for which the natural capital accounts (NCAs) provide relevant information, or for which the process of producing NCAs creates a suitable environment. Of course, more types of policy challenges can be defined, but here we restrict ourselves to those that have a direct link with NCAs. The four SDG policy challenges are:

1. What is the status and trend of the SDGs?
2. What are the interrelationships –trade-offs and synergies – between the SDGs? Not only between achieving different goals, but also between various socio-economic groups.
3. Which policies or forms of governance are available to achieve the goals? This can be a broad range of governance arrangements, such as introducing economic or regulatory instruments, creating institutions, stimulating innovation or instigating transition.
4. How to create the right institutional environment for SDGs to be achieved?

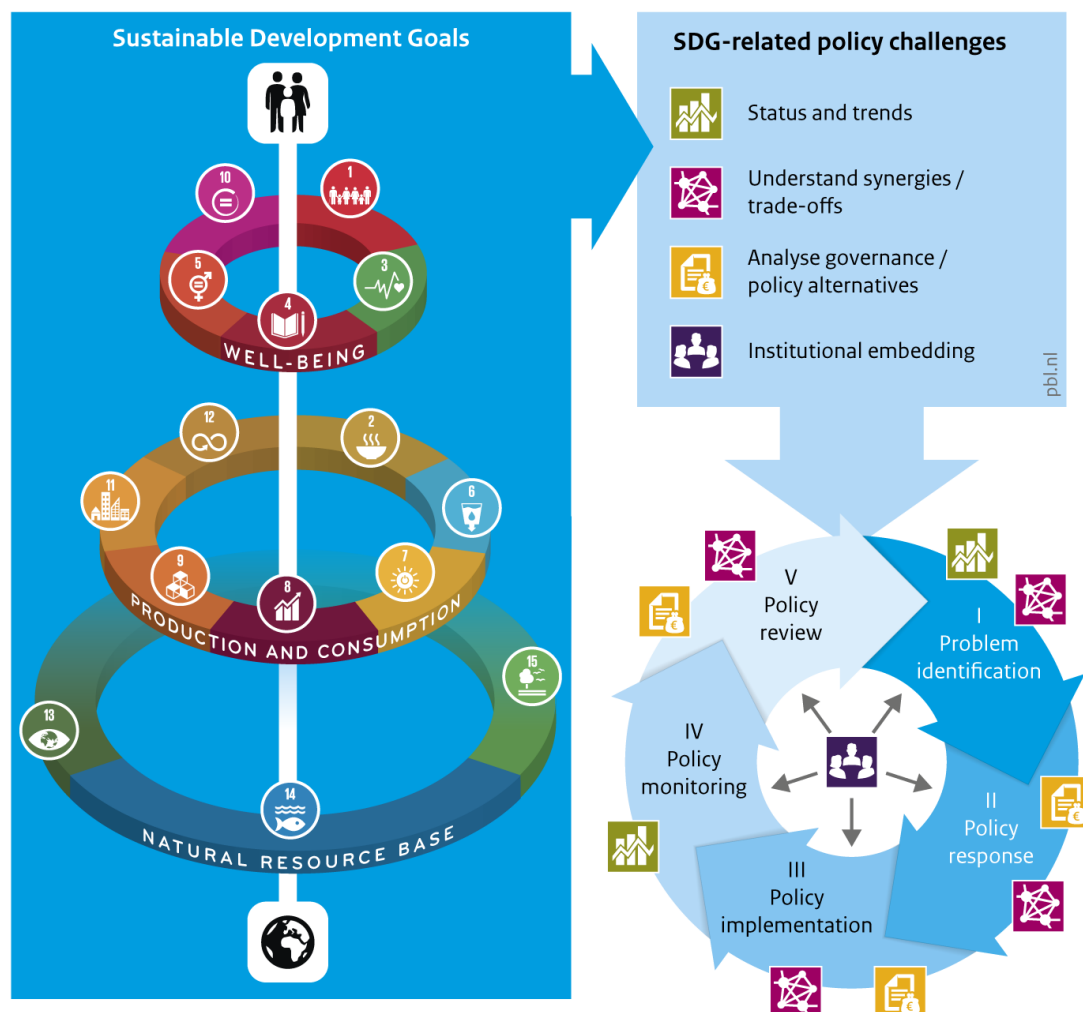
The first challenge relates to all SDGs. The second and third focus on the relationships between the SDGs and the policies and governance arrangements to exploit synergies or prevent trade-offs between SDGs – see Figure 2.2.

Broadly speaking, there are four clusters of SDGs (e.g. Waage et al., 2015; Oldekop et al., 2016; Reid et al., 2017; PBL, 2017), with one cluster of SDGs focusing on social objectives (SDGs 1, 3–5 and 10), one cluster focusing on sustainable production and consumption (SDGs 2, 6–9, 11, 12), and a third cluster addressing the management of the natural resources base (SDGs 13–15). A fourth cluster is more intersecting and contains the goals addressing governance and the institutional perspective (SDGs 16 and 17) (e.g. Waage et al., 2015; Oldekop et al., 2016; Reid et al., 2017; PBL, 2017). The fourth policy challenge relates to this fourth cluster of SDGs.

The four policy challenges may occur at various stages of the policy cycle (Vardon et al., 2017) – see Figure 2.2. Challenge (a) (about status and trends), is especially relevant when problems are identified (i) and progress is monitored (iv). The policy challenges (b) and (c) (about the trade-offs and synergies and the forms of governance) are typically related to policy response (ii), policy implementation (iii) and policy review (v). Interestingly, and as presented in the case studies and synthesis presented by Vardon et al. (2017), NCAs have been or could be used during all stages of the policy cycle. For example, NCAs can be deployed to quantitatively evaluate trends (for issue or problem identification), identify entry points for interventions, and set targets (for policy response), as well as monitor and evaluate the impact of the interventions chosen (for policy monitoring and policy review).

Challenge (d) intersects with all stages of the policy cycle. Thinking only of the policy use of the accounts would risk crucial institutional issues being overlooked. According to Termeer et al. (2017), such crucial institutional risks include rigid and fragmented (instead of systems-based) policy problem frames, lack of leadership and authority to collaborate beyond departmental and organisational boundaries, inadequate resources and skills, lack of involvement from marginalized groups and local communities, inflexible governance processes, and the absence of conditions to foster the transition towards a system of integrated SDG policy-making that addresses path dependence. Challenge (d) deals with the institutional risks so that an environment for improving policies directed at achieving SDGs can be created via NCAs production.

Figure 2.2 SDG clusters and SDG policy challenges throughout the policy cycle



Source: PBL

2.3 Natural capital accounts for developing SDG indicators

SDGs are reflected in more than 200 performance indicators. Together, they form a framework that includes indicators for reporting on an international level, plus a range of national and thematic indicators that may be compiled by individual countries, based on their available capacity and policy priorities. On a national level, indicators are mainly used for monitoring, serving as barometers to gauge national progress towards achieving the SDGs. This chapter discusses three general observations:

1. NCAs may deliver a broad range of SDG indicators, including those that go beyond the natural resource base (SDGs 6, 13, 14 and 15).
2. Most attention, so far, seems to have been paid to measuring progress towards achieving a certain target. Although there is increasing attention for the relationships between SDGs, this is more often related to measurement rather than management purposes.
3. Monitoring the progress towards achieving SDGs by using existing natural capital accounts mainly occurs top-down rather than bottom-up.

Observation 1: NCAs may provide a broad range of SDG indicators, including those that go beyond the natural resource base (SDGs 6, 13, 14 and 15).

As an information system, NCAs provide the data required to determine a broad range of indicators for several SDG targets. Table 2.1 shows that natural capital is an element in most SDGs. Bann (2016) gives examples of how NCAs could support the achievement of SDGs. For instance, for SDG 6 (clean water and sanitation) many of the indicators can be directly measured using the SEEA Water methodology. More specifically, target 6.3 (improved water quality by reducing pollution) can be assessed against a SEEA-Aligned Global Indicator related to the percentage of waste water that undergoes treatment and draws information from the water accounts, namely the physical supply and use tables (PSUT) and the water emission accounts. Similarly, a fisheries account could provide information for the conservation and sustainable use of the oceans and marine resources (SDG 14) by assessing the value of stocks over time, alternative management practices, and employment opportunities. Forest accounts can also provide information for a number of the SDGs — in particular SDG 15.2, which says that, by 2020, a country should promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests, and substantially increase reforestation. Another goal is SDG 15.9, which calls for ecosystem and biodiversity values to be integrated into national and local planning, development processes, poverty reduction strategies and accounts, for which ecosystem and biodiversity accounts provide essential information.

The SEEA central framework (CF) comprises three main types of accounts, with each focusing on a different aspect of the interaction between the economy and the environment: the physical flow accounts (physical supply and use tables); functional accounts for environmental transactions (e.g. environmental protection expenditure accounts); and asset accounts for natural resources in physical and monetary terms. The SEEA Experimental Ecosystem Accounts (EEA) have a number of additional types of accounts, including ecosystem extent and condition accounts. It appears that all accounts are useful for estimating some of the SDG indicators. For some SDGs, the accounts directly related to the resources (e.g. the asset accounts for water, forests and fish) are obviously suitable. However, the usefulness of other accounts extends beyond the obvious examples, such as the material flow and emission accounts (see Table 2.1).

Due to the fact that NCAs produce consistent and internationally comparable statistics, they are useful to guide the development and estimation of any relevant SDG indicators – not only those related to the management of natural resources, but also those connected to other SDG clusters (see Figure 2.2). This is reflected in the experiences in some of the countries participating in the 2nd Policy Forum, such as Rwanda, Botswana, Indonesia, Costa Rica, Brazil, the Netherlands and Sweden, who use their resource and environmental accounts for SDGs related to agriculture, energy, employment, and sustainable production and consumption.¹²

¹² For the presentations prepared for the Policy Forum, see <https://www.wavespartnership.org/en/2nd-forum-natural-capital-accounting-better-policy>.

Table 2.1 Use of NCAs for estimating the SDG indicators and target

Type of natural capital or economic domain	Type of account	SDG 2. Zero hunger (agriculture)	SDG 6. Clean water and sanitation	SDG 7. Affordable and clean energy	SDG 8. Decent work and economic growth	SDG 9. Industry, innovation and infrastructure	SDG 11. Sustainable cities and communities	SDG 12. Sustainable production and consumption	SDG 13. Climate action	SDG 14. Life below water	SDG 15. Life on land (ecosystems)
Land	Asset accounts [#]	% land under sustainable agriculture					-efficient land use -share of built up area			coverage of protected areas	-forest/protected area - sustainably managed forest -green cover index
Energy	PSUT ⁺			-% renewable energy in energy consumption -energy intensity		energy intensity					
	Economic accounts ⁺			-% of population with access to energy				fossil fuel subsidies			
	Asset accounts [#]			-% of population with access to energy							
Water	PSUT ⁺ Economic accounts ⁺		-% of population using water/ sanitation serv. -water use efficiency -time spent on water collection								
	Asset accounts [#]		-% of water resources used								
Materials	Material Flow accounts ⁺				-resource productivity -material efficiency	Intensity of material use per unit of value added		Material footprint			
	Emission accounts ⁺		% of water bodies with good water quality							nitrogen-use efficiency	

Table 2.1 Continued

Type of natural capital or economic domain	Type of account	SDG 2. Zero hunger (agriculture)	SDG 6. Clean water and sanitation	SDG 7. Affordable and clean energy	SDG 8. Decent work and economic growth	SDG 9. Industry, innovation and infrastructure	SDG 11. Sustainable cities and communities	SDG 12. Sustainable production and consumption	SDG 13. Climate action	SDG 14. Life below water	SDG 15. Life on land (ecosystems)
Materials (continued)	Air emission accounts ⁺			carbon intensity		Carbon emissions per unit of value added					
	Solid waste accounts ⁺						-% of solid waste collected	National recycling rate			
Aquatic resources	Asset accounts [#]									% of fish stocks of a sustainable level	
Agriculture, forestry and fisheries	All ⁺ #	Value of production per labour unit								Fisheries as % of GDP	
Environmental activities	Env. protection expenditures accounts ⁺						-% of budget dedicated to both natural heritage and sustainable buildings		Contribution to mitigation funds for developing countries	Research budget for sustainable marine technology	
	Res. managem. expenditures accounts ⁺						-% of budget dedicated to natural heritage				
	Env. taxes and subsidies accounts ⁺							Fossil fuel subsidies		Fishery subsidies	
Ecosystems	Condition [@]										Trends in land degradation
	Ecosystem extent accounts [@]		% change in wetland extent								Plans and processes that integrate biodiversity and ecosystem service values

Table 2.1 continued

Type of natural capital or economic domain	Type of account	SDG 2. Zero hunger (agriculture)	SDG 6. Clean water and sanitation	SDG 7. Affordable and clean energy	SDG 8. Decent work and economic growth	SDG 9. Industry, innovation and infrastructure	SDG 11. Sustainable cities and communities	SDG 12. Sustainable production and consumption	SDG 13. Climate action	SDG 14. Life below water	SDG 15. Life on land (ecosystems)
UN System of National Accounts (SNA)	All	Agricultural Orientation index	water-use efficiency			-energy intensity -carbon emissions per USD		fossil fuel subsidies			
	Value added Tourism			energy intensity	-% of GDP from tourism -tourism employment			Residual flows related to tourism			

Notes:

+ Part of the physical flow accounts

* part of the functional accounts

part of the asset accounts

@ the ecosystem accounts include also other types of accounts.

Source: Based on the “broad-brush” analysis of SEEA-relevant SDG indicators, submitted to the Inter-Agency and Expert Group on the SDGs on 7 September 2015 (<https://unstats.un.org/unsd/envaccounting/ceea/>). Note that we added the column on SDG 13, as the broad-brush analysis did not consider SDG 13 on climate action.

Despite this broad application of NCAs for SDG-indicator development, we would like to make four critical remarks. Firstly, not for all SDG indicators can progress already be assessed quantitatively, and certainly not all can be determined using NCAs. A Dutch report compiled in 2017 by Statistics Netherlands (“Measuring the SDGs: An Initial Picture for the Netherlands”) describes the baseline measurement of Dutch progress in achieving the targets set for the SDGs. This report shows that, currently, 37% of the SDG indicators can be measured using the available data, some of which are based on the Dutch environmental accounts. For many indicators, data must still be collected, while several others cannot be measured quantitatively or have no established methodology or standard (Lucas et al., 2016).¹³ Here, it is worthwhile to note that the SDG process started from the goals to be achieved, and not from the indicators that can be measured or from a common measurement framework. Furthermore, not all goals are equally relevant to all countries. Hence, not all countries translate the global goals into national targets, neither do they use all or the same indicators to monitor progress.

Secondly, NCAs provide just one source of information from which progress of the SDGs can be assessed. There are also other ways to compile data or determine SDG indicators. Despite the positive experiences with NCAs for estimating SDG indicators, knowledge of NCAs and their merits for producing indicators are unknown to the many working on the SDGs. A recent UN report about data requirements for the SDGs does not even mention NCAs as a possible source of information (SDSN and TRENDS, 2017). Raising awareness of NCAs in this community remains one of the key issues.

Thirdly, despite the fact that there is plenty of theoretical work on how NCAs can contribute to SDG-indicator development, and despite the growing number of countries working on it, in practice, users cannot always be certain about how adequately the developed indicators measure the monitored phenomena.¹⁴ The reason for this is that it is ambiguous whether the role of monitoring is merely aimed at describing trends in SDG indicators, or whether the monitoring is to report on accountability with regard to societal and policy developments underlying the trends observed (Lucas et al., 2016).

Fourthly, although NCAs help to create an improved evidence base on the links between biodiversity and ecosystems on the one hand, and economic and human wellbeing on the other, its use concentrates mainly on environmental SDGs, less on economic SDGs, and hardly on societal SDGs. Moreover, a causal relationship between SDG policy action and environmental performance is difficult to establish, which means that providing information for policy decision-making processes through accurate accounting is a challenging task. Natural capital brings an added dimension to our understanding of the economic role of ecosystems and biodiversity and also reveals important gaps in knowledge about how these important assets should be managed to be beneficial for implementing the SDGs.

Observation 2: Most attention, so far, seems to have been paid to measuring progress towards achieving a certain target. Although there is increasing attention to the

¹³ The SDG indicator framework distinguishes three categories of indicators, called Tiers. For Tier 1, methodologies have been established and data are produced regularly. For Tier 2, the methodologies have been established, but data are not regularly produced by countries. For Tier 3, which covers 35% of the indicators, no methodologies or standards have been established yet.

¹⁴ A major consequence of this is that it appears difficult to develop indicators that satisfy the needs of the policymakers, and, hence, are relevant and useful for policy decisions.

relationships between SDGs, this is more often related to measurement rather than management purposes.

Of the challenges mentioned in Chapter 2.2, monitoring status and progress towards achieving the SDGs receives, by far, the most attention in the literature (e.g. SDSN, 2014; UNSD, 2015; Bann, 2016; Graveland et al., 2016, 2017). Supported by the custodian agencies for the various SDGs, many countries produce national reviews and assessment reports on how they are currently performing with respect to the SDG goals and targets.¹⁵ Most national performance reports focus on achieving a target (a report card), and less on developing implementation strategies for achieving the SDGs (policy tools). Moreover, so far, little is documented about the experience with NCAs used in comparing critical trade-offs in ecosystem service provisioning. Perhaps more importantly, there is limited evidence about whether the four environmental SDGs can be achieved simultaneously or whether they conflict, let alone how realizing these environmental SDGs can either promote or detract from the realization of the societal or economic SDGs.

This is in contrast with the basic premise of the 2030 Agenda that “the Sustainable Development Goals and targets are integrated and indivisible” (2030 Agenda for Sustainable Development, Paragraph 55), meaning that they are interrelated and mutually dependent, and must be considered and implemented as a whole. To understand how the SDGs interact, insight into synergies and trade-offs between the SDGs is needed. There are the synergies and trade-offs that may arise between economic, environmental and social goals, as well as between “here” and “elsewhere” and between “now” and “later.” So far, this has remained underexplored in the literature. Only by comparing indicators for various regions or countries, or over a series of years, can trade-offs and synergies be shown. As NCAs are particularly useful for explicitly demonstrating the interdependence between the economy and natural capital in an integrated, coherent framework, they are capable of showing the trade-offs and synergies between the SDGs, over time and between various locations.

Internationally, there is increasing attention to the interrelationships between the SDG targets, with research on interlinkages, for example, in ICSU (2017), Zhou and Moinuddin (2017), Niestroy (2016) and Nilsson (2016a, 2016b). This material shows which SDGs are especially interrelated and reinforce or counteract one another. For example, on the basis of a social network analysis of 108 of the 169 SDG targets, Zhou and Moinuddin (2017) conclude that the targets having the strongest links with other targets are those related to the following subjects:¹⁶

- Agricultural productivity (target 2.3)
- Sustainable food production (target 2.6)
- Access to safe drinking water (target 6.2)
- Access to energy (target 7.1)
- Resilient infrastructure (target 9.1)

¹⁵ See <https://sustainabledevelopment.un.org/memberstates>.

¹⁶ Whether interlinkages are reinforcing, counteracting or something in between is based on a comparison of the correlations between each pair of targets. These targets are the most influential in the sense that they play multiple central roles in terms of having wider connections with other targets by exerting and receiving influences, and place at strategic positions in connecting with other influential targets (Zhou and Moinuddin, 2017). Note that it depends on the scope of your analysis which targets are found to be central targets. For example, the CD-LINKS project focuses on the links between climate change and the SDGs (www.cd-links.org) which results in other dominating targets.

For all these analyses, data were not taken from NCAs but from global data sets, such as those from the UN Sustainable Development Solutions Network, World Bank Development Indicators, Millennium Development Goals Indicators, Global Health Observatory, and the Food and Agricultural Organization statistics.¹⁷

Individual countries may conduct similar analyses to assess which targets are central for their situation, provided that sufficient data are available. For this purpose, the System of National Accounts and various types of natural capital accounts can be used to determine a part of the required indicators - if they are available for a sufficiently long series of years and for sufficient natural resources and ecosystem services. To that end, the extent and condition accounts of the SEEA EEA, and the supply and use tables of the SEEA CF, show changes in the targets over time, such as for targets related to crop production, greenhouse gas emissions, share of renewable energy, protected areas, land cover, water quality, water use intensity, and waste generation.

Measuring interlinkages provides evidence about the policy themes that should be prioritized because of their reinforcing effects on various targets, and about the themes for which attention should be paid to counteract negative effects. Costa Rica is one of the few countries actively promoting the use of NCAs to show the relationships between their national sustainability objectives.¹⁸ These measurements, however, only provide a starting point for learning which policy instruments or governance arrangements are useful for managing these synergies and preventing trade-offs. They do not foster change. For that, further analysis is needed, as for example has been done for the case of the Central Highlands forests in Australia. Here, NCAs helped to find hotspots where environmental protection had to be assessed against competing land uses. In the study, it was found that the contribution to the economy of industries such as tourism, water and carbon far exceed that of native timber (Keith et al., 2016). Additional policy analyses can also be performed to assess the effects of the various policy instruments available – see Chapter 2.44.

Observation 3: Monitoring the progress of SDGs by using existing natural capital accounts is mainly top-down, and less bottom-up.

So far, the bottom-up approach has dominated the formulation of the SDGs. However, the SDGs can also be seen as a top-down international agenda. Achieving the goals requires both a top-down and bottom-up process. As many problems and solutions are probably most pertinent at the regional level, effort is needed to decentralize analysis and data-driven monitoring. Of course, country-specific targets also require country-specific indicators. It is, however, essential that these indicators are developed locally by a participative process to generate more transparent governance and greater accountability. Locally conceived indicators might be the best way forward to achieve the country-specific targets (Fitchett and Atun, 2014). Such a participative and “inclusive” process, however, takes time and is not always an easy task.

SDGs are thus likely to be realized through locally driven plans that reflect the priorities and contexts of individual countries, and which are based on a bottom-up perspective from policymakers and practitioners. As the economist Jeffrey Sachs says in his Kapuscinski lecture

¹⁷ See unsdsn.org, data.worldbank.org/data-catalog/world-development-indicators, mdgs.un.org, www.who.int/gho and www.fao.org/faostat.

¹⁸ See <https://www.wavespartnership.org/en/2nd-forum-natural-capital-accounting-better-policy> for the Costa Rican presentation during the 2nd Policy Forum.

on sustainable development, “There shouldn't be anything top-down in the Sustainable Development Goals. They should inspire actions of individuals, businesses, NGOs, governments, local authorities, everyone.”¹⁹

However, despite some regional applications focusing on, for example, land use in Kwazulu Natal or the management of the Laguna Lake basin in the Philippines, NCAs mainly support national policymakers. It is hardly used for, say, raising awareness among practitioners or private actors (except for natural capital accounting at a corporate level). So, from a bottom-up perspective, NCAs appear to provide less value added than from a top-down viewpoint. Although this observation seems to go beyond the scope of this document – with its emphasis on national governmental use of NCAs – it is important, nevertheless. It is claimed that for monitoring and attainment of SDGs, a multi-stakeholder approach is needed in which “private companies, academia, multilateral institutions and civil society supports governments with the production, cleaning, composition, dissemination and analysis of data” (SDSN & TRENDS, 2017: 4). As such, the information that NCAs reveal, namely the relationship between natural capital stocks and the flows of benefits which they generate, is not only relevant for policymakers or business decision makers. The question, therefore, is how NCAs may contribute positively to changing our *own individual* behaviour so that SDGs come within reach?

2.4 Natural capital accounts for analyzing integrated SDG policies

The previous chapter shows that internationally, most emphasis has gone into analyzing status and trends of the SDGs for awareness raising and monitoring purposes – the first policy challenge identified in Chapter 2 – and that there is limited attention for synergies and trade-offs, the second policy challenge. While NCAs have already been used for developing some indicators for the SDGs, potentially more indicators can be determined from the accounts. In this Chapter, we investigate in more detail the role of NCAs for assessing synergies and trade-offs between the SDGs and designing governance arrangements to achieve the SDGs – the second and third policy challenges identified.

For this, we list methods that are regularly used for economic policy analysis and that could also be used to analytically assess potential SDG policies. This list is not exhaustive but rather is limited to those analytical methods that could potentially use data from NCAs. Using this list, we investigate which methods are currently used or promoted to analyze the SDGs.

Methods to analyze the SDGs

Table 2.2 shows a (not exhaustive) list of analytical methods that are potentially available for analyzing the policy challenges identified in Chapter 2.2. These methods provide useful insights for one or more stages of the policy cycle. They are applied regularly to a broad range of policy analyses and problems, but as the SDG policy process is still in its infancy, their use for analyzing the SDGs has been limited to date. All these methods can use information that can be found in natural capital accounts. However, if accounts are not available, they can also be based on other data sources. That is, for most methods, the required data does not necessarily have to be presented in the form of an account. Only for footprint analysis, input-output analysis and general equilibrium analysis, can the accounts be almost directly incorporated in the analyses.

¹⁹ <http://kapuscinskilectures.eu/lectures/new-age-of-sustainable-development/>

Table 2.2 Overview of phases for which the research methods provide relevant insights and for which the accounts provide relevant data

	Policy cycle	1. Identification of issues <i>Why take action?</i>	2. Policy response <i>How to solve the natural capital problems?</i>	3. Policy implementation <i>What action to take?</i>	4. Policy monitoring <i>What results are achieved?</i>	5. Policy review <i>How to adapt the policies?</i>	Accounts required
<-- Increasing integration of multiple issues <--	Indicators	√			√		All types of accounts
	Interaction / network analysis	√			√		Thematic extent and condition accounts
	Trend analysis	√			√		Time series for thematic extent and condition accounts
	Projections / extrapolations	√			√		Time series for thematic accounts
	Footprint analysis	√			√		Supply and use tables for particular resources or ecosystem services
	Scenario Analysis	√	√			√	Time series for thematic extent and condition accounts
	Integrated assessment	√	√			√	Suite of natural capital extent, condition and supply and use accounts
	Business case		√	√		√	Suite of natural capital and economic accounts
	Cost-Benefit Analysis		√	√		√	Suite of natural capital and economic accounts
	Econometric analysis		√	√		√	Time series analysis of a suite of natural capital accounts
	System Dynamics model		√	√		√	Suite of natural capital accounts
	Environmentally Extended Input Output Analysis		√	√		√	Time series analysis of a suite of natural capital accounts
	Partial Equilibrium models		√	√		√	Full set of NCAs and the SNA
	General equilibrium models		√	√		√	Full set of NCAs and the SNA

From the literature review, three general observations can be distilled about current policy use of NCAs for achieving the SDGs, reported below (observations 4, 5 and 6).

Observation 4: The methods currently promoted for assessing the SDGs seem to pay limited attention to the potential uses of NCAs.

Since the adoption of the SDGs, several UN organisations as well as a number of other consortia have developed models to analyze the SDGs and assess the effects of SDG policies. The common thread among this suite of models is that they all attempt to promote a more systems-based approach in the SDG process and span the boundaries of the SDG process over the various scales and multiple institutions. They can also be used to show the importance of including multiple stakeholders in the process and of adapting existing policies to better consider their system-wide effects. To illustrate this, and to add some concreteness, we briefly present three examples.

First, UN-DESA has developed a suite of tools to address interlinkages that influence trade-offs and synergies between sustainable development policies, including the SDGs.²⁰ These include economic models, environmental models, integrated assessment analyses and system dynamics models that rely on social accounting matrices.²¹ Second, the UN Development Group provides an SDG Acceleration Toolkit, which provides a suite of models and system-level diagnostics for analysing interconnections among SDGs.²² This also contains a tool focusing on the water-energy-food nexus and a dynamic social accounting matrix approach to explore interrelationships between investment planning and economic and environmental SDGs. A third example of an integrative approach, capable of analyzing and elucidating the dynamic effects of interdependencies and that is grounded in systems thinking, is the iSDGS model from the Millennium Institute and the Stockholm Resilience Centre (Collste et al., 2017).²³ This model also uses a social accounting matrix to simulate economic flows and to balance supply and demand. Its “environment modules” track pollution due to production processes and assess renewable and non-renewable natural resource use and environmental degradation.

All three of these modelling approaches are used for national level assessments focusing on development planning and policy questions related to the SDGs. For most of these models, the natural capital accounts can readily be incorporated in the social accounting matrices, or provide otherwise useful information for the models or approaches (e.g. through some of the physical flow or asset accounts on CO₂ emissions, water, energy or materials use). However, most of the models do not mention the potential use of these accounts. It is not that the models do not recognize this potential, but the models were developed without the accounts in the first place and so are not dependant on the accounts. The supply and use tables are especially suitable for the suite of models mentioned above, given their direct link with the System of National Accounts and the social accounting matrix that is the basis of many of the modelling approaches. Yet, as long as countries lack natural capital accounts, or focus on extent, condition or thematic accounts instead of supply and use tables, other sources of

²⁰ See <https://un-desa-modelling.github.io/>.

²¹ A social accounting matrix shows the flows of economic transactions between industries, households and governments. The matrix can be extended to also record the interactions between the economy and the environment. It is based on the system of national accounts and the natural capital accounts.

²² See <http://undg.org/2030-agenda/sdg-acceleration-toolkit/>.

²³ See www.isdgs.org.

information are needed on trends and uses of natural capital by the economic sectors, such as national or international statistics or survey data.

Observation 5: Those analyzing SDG policies seem to pay limited attention to the methods that most closely relate to the setup of NCAs.

Of the methods listed in Table 4.1, footprint analysis, input-output analysis (IO) and general equilibrium analysis (GE) are the methods most closely related to the setup of the natural capital accounts. Their data needs are consistent with the setup of the supply and use tables. However, our literature search shows that currently these methods are little used for assessing SDG policies. The main reason for this is that the SDGs were launched in 2015 and it requires time to gear the models to the sustainability issues presented. Clearly, finding a “match” between appropriate methods and the reality of SDGs in order to solve practical problems is a time-consuming process.

It is expected that more material footprint analyses will emerge in the coming years as SDGs 8 and 12, on economic growth and on responsible consumption and production, have proposed indicators based on the material footprint (e.g. Statistics Sweden, 2016). Besides that, the water, carbon, ecological, and biodiversity footprints are also useful for monitoring targets related to SDG 6 on water, SDG 13 on climate action and SDG 15 on life on land. These footprint indicators show the links between consumption or production and the environment and are helpful for prioritizing and targeting SDG policies (e.g. Hoekstra et al., 2017; Wilting et al., 2017), but their usefulness for SDG monitoring still remains to be seen. For these footprint analyses, the supply and use tables linked to the system of national accounts can be used to relate intermediate resource use and emission to end users (Edens et al., 2015).

Natural capital accounts can also be used for IO and GE models that focus on natural resources. The environmentally extended input-output table or the environmentally extended social accounting matrix used in a GE model is based on the supply and use tables from the natural capital accounts. Moreover, for some of the constraints the models need data from a range of accounts included, land cover, energy and water accounts.

The use of IO and GE models for resource-related issues is not new (e.g. Dobos and Floriska, 2007; Vaz, 2017), but the availability of NCAs makes it easier to set up models that are capable of analyzing the interrelationships between the economy and natural capital. IO analysis is seldom applied for analyzing SDGs, even though UN ESCAP (2015) promotes its use. IO analysis is easier to set up than a GE model and provides – despite its known simplifications – good first order estimates of the effects of changes in demand, technological growth or economic instruments.

A growing number of GE models are used for analyzing the environmental and economic effects of SDG-related policy choices at national or regional levels. Examples include the IEEM model (Banerjee et al., 2016) and the Inclusive Green Economy Model (IGEM) from the UNEP Partnership for Action on Green Economy (PAGE).²⁴ The IEEM model was, for example, used to assess the interlinkages between policies related to food security, sustainable agriculture and water and sanitation in Guatemala (Banerjee et al., 2017), the relationship between

²⁴ An example of a GE model at a global scale is the IFPRI model for analysing the water-energy-food nexus (see e.g. Willenbockel, 2016) that is used to assess the impact of climate change mitigation scenarios on energy prices, economic growth, food security and water availability.

sustainable park management and tourism in Rwanda, and for taxing emissions in Costa Rica.²⁵ IGEM is an instrument for achieving the transition towards inclusive green growth and that can also contribute to achieving the SDGs. It has been used *inter alia* in Peru to assess policies to achieve sustainable development, diversify the economy and create employment.²⁶

The above models rely especially on the supply and use tables of the natural capital accounts. As an alternative to this, system-dynamics models are set up. Indonesia currently uses a system-dynamics model to evaluate policy interactions, based on the stock and flow accounts. Furthermore, an example of a widely applied approach that can take advantage of the ecosystem accounts, is the InVEST model.²⁷ InVEST uses land use maps and information on soil, water, erosion, etc. that can be derived from the ecosystem extent and condition accounts, to assess in a spatially explicit way the consequences of alternative land use choices and to identify areas where investments in natural capital can enhance simultaneously human development and nature conservation. An example where InVEST is used for an analysis of SDGs is the Myanmar Natural Capital Assessment that used it for multiple scale development planning and for strategic environmental assessment (Mandle et al., 2016). Moreover, the Green Growth Knowledge Platform (Narloch et al., 2016) and the WAVES Forest Accounting Sourcebook (WAVES, 2017) mention InVEST as a tool for ecosystem services modelling and valuation that can be based on information from NCAs and used for SDG assessment. Lastly, the IEEM model also uses InVEST to include some of the biophysical feedback effects in the model.

These examples illustrate a growing number of models that directly depend on NCAs – whether they are the supply and use tables or the ecosystem extent and condition accounts – that are particularly suitable for analyzing the natural-capital-related SDGs. The disadvantage of these modelling approaches, however, is that they require strong analytical skills and that it takes time to set up and produce policy-ready results. Because neither those working at statistical agencies nor policymakers have the skills or time to successfully develop or apply the types of modelling mentioned above, this task has to be taken up by, or in conjunction with, other institutions. Many international organizations already assist with model development, but to come to actual policy use of these modelling results it is important that national research institutions or universities have the skills and resources for linking models to NCAs, in order to analyze the natural-capital-related SDGs. A growing awareness about the potential value of these modelling approaches in the SDG processes may provide triggers to further develop and spread these approaches.

Observation 6: There is an unexploited potential of methods that directly use natural capital accounts and that are helpful in various stages of the policy cycle.

After the modelling methods, there is an unexploited potential of other methods that could contribute to various stages of the policy cycle. The stage of problem identification and policy monitoring can be strengthened by retrospective analyses (e.g. **trend analyses**) and prospective analyses (e.g. **trend extrapolations and forecasts**). For this, time series are needed for the different indicators. As many countries, currently, do not possess a sufficiently long time series of accounts, these accounts cannot yet be used to their full potential. Over time,

²⁵ See <https://www.wavespartnership.org/en/2nd-forum-natural-capital-accounting-better-policy> for more information about the IEEM model.

²⁶ See www.greengrowthknowledge.org/sites/default/files/IGEM%20Webinar%20Final.pdf.

²⁷ See www.naturalcapitalproject.org.

ongoing production of accounts will address this issue. In the meantime, if trend data are not available from natural capital accounts, other data sources may be used for trend analysis, such as the UN Global Indicators Database, the World Bank World Development Indicators, or OECD databases. These global data sets are, however, not restricted national use and they are now also being applied for international comparisons.

In addition, **scenario analysis** may provide further insight into potential synergies and trade-offs between various goals and targets (Joshi et al., 2015; Lucas et al., 2016). Scenario analysis shows the need for policy integration to reach coherence between the SDGs. For this, the natural capital accounts can be used to predict natural capital developments for given scenario assumptions, but if not available, other data sources and assumptions can be applied. To evaluate the environmental and economic consequences of a range of scenario assumptions, other analytical methods discussed later in this chapter can also be considered. Finally, for reviewing policies, **econometric analyses** can be developed to look backward at the causality of relationships between interventions and economic and natural capital developments. For such analysis, the micro-level data underlying the accounts are usually necessary. That is, the data underpinning the accounts, rather than the aggregate accounts, are needed for such analyses.

NCA can be used for all types of analyses such as these. However, to date few countries have enough accounts available for a sufficiently long period of time to do this. As such, other ways to structure data are primarily used, mostly based on international data sets. However, due to the coherence of the SEEA framework, NCAs are more reliable and better show the extent of the linkages between sector activities and resource use and the economic, environmental and social consequences of changes therein than most other data sets. These insights are important for reaching SDG policy coherence.

2.5 Institutional process

This chapter focuses on the institutional hurdles that may prevent the development of an environment in which NCAs are able to improve policies directed to achieving the SDGs – policy challenge (d) identified in Chapter 2.3. To this end, we illustrate what difficulties the SDG process may face at the country level, and particularly the difficulties countries have in overcoming problems with the availability and quality of data, including data sharing mechanisms. This description is based on an internet search, interviews with resource persons in South Africa – see text box “NCAs and SDGs in South Africa” – and discussions during the 2nd Policy Forum.

Observation 7: Natural capital accounting creates suitable institutional conditions.

Until now, natural capital accounting has played a limited role in national policy and in the SDG processes in particular. There are several hurdles preventing an institutional environment in which NCAs can help to improve policies directed at achieving SDGs. Hurdles evident in many countries include:

- Poor availability and quality of data
- Insufficient staff with the necessary skills
- Insufficient cooperation and dialogue between statisticians, researchers and policymakers
- Lead agencies lacking the authority to enforce data sharing
- A lack of communication tailored to particular audiences, including policymakers and the wider population

That said, we found that setting up NCAs can be helpful for creating suitable institutional conditions. Some even see it as a potential game changer. Natural capital accounting brings rigour to foundational data, strengthens statistical skills, and appeals to policymakers due to their direct link with the national accounts. Moreover, we also perceive that the natural capital accounting and national SDG processes can benefit one another as both use a systems-based policy framework and require collaboration beyond departmental and organizational boundaries. Therefore, implementing NCAs should not be limited to the technical details, but should cover governance issues as well. This will help to create shared ownership and institutional cooperation, improve skills and competences in various institutions, and involve those who use the accounts so that a demand-led and iterative process is created. This helps to develop a suitable institutional environment in which NCAs can provide the evidence base needed for designing successful national SDG policies.

Box 2.2 NCAs and SDGs in South Africa

In recent years, South Africa has experienced a slowdown of its economic growth. This impedes the country's efforts to address the huge challenges it faces: unemployment, poverty and inequality. Moreover, Reuter et al. (2016) reports that 34% of terrestrial ecosystems, 65% of marine biozones, 80% of wetlands and 82% of rivers are under degradation threat. South Africa aligned the SDGs with its National Development Plan (NDP 2030), which was affirmed in 2015. The development of the NDP 2030 involved a broad multi-stakeholder consultation process and provides a long-term strategic framework. The plan aims to eliminate poverty and reduce inequality by 2030. A range of national policies contributes to the implementation of the NDP 2030, including policies underlying a green economy planning, such as the New Growth Path.

Implementation of the NDP 2030 appears to be hampered by a number of institutional hurdles. These include:

- Limited human and budgetary capacities for the implementation of policy, plans and programs through all spheres of government, due to low economic growth
- Poor coordination and integration of program implementation, where failure to comply with governance arrangements to foster integrated implementation, monitoring and review of the NDP 2030 on the part of sectoral departments are without consequences and where the lead agency DPME lacks the opportunity to impose sanctions to enforce compliance and participation
- Shortage of skills in key sectors of the economy and a lack of a measurement culture in the public sector, which hamper monitoring of the efficacy of policy decisions and limits sustainable development
- Weak or non-existent data to support the monitoring of implementation of NDP programs. Data gaps on key NDP programs exist, or the data available is of poor or unknown quality. For example, only 62% of Tier I and Tier II SDG indicators could be reported on, and many of them only as proxy indicators or as qualitative judgements. And when quantitative data does exist, it appears that reporting on indicators is not being done as regularly as is required (see also Footnote 14)

Availability of data and information on ecosystems is quite strong, but natural capital and ecosystem accounting are still in their early days. Natural Capital Accounts include energy, fisheries and minerals. A water account is underway. Various governmental bodies play a role in natural capital accounting, see Table 2.3. South Africa also joined the global initiative to advance the SEEA Experimental Ecosystem Accounting, led by the United Nations Statistical Division

(UNSD). For this, land and ecosystem accounts have been set up in KwaZulu-Natal, jointly with the South African National Biodiversity Institute (SANBI) and Statistics South Africa (Stats SA), working in partnership with national departments and the provincial conservation authority Ezemvelo KZN Wildlife. The initiative goes together with a broad stakeholder consultation, including the government, civil society, academic and private organisations, for discussing the results. Results from this are rendering input for the National Biodiversity Assessments, whereby NCAs are being used for mapping and classifying ecosystem types.

Table 2.3 Roles of governmental bodies in natural capital accounting

Ministry/Agency	Notes
Agriculture	
Agricultural Research Council	Established procedural guidelines for the implementation of a long-term land-cover updating and change monitoring programme for South Africa.
Environment	
Department of Agriculture, Forestry, and Fisheries (DAFF-Fisheries)	Collects fish stock data for over 200 species and provides data for fisheries accounts.
Department of Environmental Affairs and Tourism (DEA/DEAT)	Performs the role of lead agent in environmental governance. Conducted a baseline valuation report on biodiversity and ecosystem services in 2012. <i>Involved in Ecosystem Accounting efforts.</i>
South Africa National Biodiversity Institute (SANBI)	Led the National Biodiversity Assessment of 2011. <i>Involved in ecosystem accounting efforts.</i>
Planning/Science	
Council for Scientific and Industrial Research (CSIR)	Established procedural guidelines for the implementation of a long-term land-cover updating and change monitoring programme for South Africa. <i>Involved in Ecosystem Accounting efforts.</i>
Statistics/Finance	
Statistics South Africa	Produces South Africa's natural resource accounts. <i>Involved in Ecosystem Accounting efforts.</i>
Treasury	Works with the UNDP BIOFIN program.
Water	
Department of Water Affairs and Forestry (DWAF)	National monitoring programs for chemical water quality and water levels in dams.
Department of Water and Sanitation	<i>Involved in ecosystem accounting efforts.</i>
Wildlife/Biodiversity	
South African National Parks	Assisted with the National Biodiversity Assessment.
Ezemvelo KZN Wildlife	<i>Involved in ecosystem accounting efforts.</i>

Source: Reuter et al. 2016:146.

From the interviews with resource persons in South Africa, we learned that the added value of natural capital accounting includes:

- Strengthening of and bringing rigour to the foundational data for the National Biodiversity Assessments, for example by requiring consistent time series data on land cover
- Identifying data gaps
- Integrating social, economic and environmental data and information
- Strengthening the position of ecosystem assessments into national planning processes

2.6 Conclusions and steps forward

This report provides a brief overview of current and potential uses of NCAs in national SDG policy processes. Based on a literature review, a number of interviews, and the lessons learned from the 2nd Policy Forum on Natural Capital Accounting for Better Decision Making, we investigated what has taken place in the design and implementation of evidence-based SDG policies and what role NCAs are playing or could play in these. Moreover, we examined which institutional hurdles prevent an environment in which NCAs can help to improve national policies directed at achieving SDGs. This report also provided a number of observations that are relevant for advancing the application of NCAs in the SDG processes.

From the review, we learnt that NCAs have the potential to measure several SDG indicators, and especially those related to natural capital (SDGs 6, 13, 14 and 15), but also some related to sustainable production and consumption (SDGs 2 and 12), energy (SDG 7), economic growth (SDG 8) and sustainable cities (SDG 11). The biophysical systems that underpin sustainable development are crucial for the economic and socially oriented SDGs, while human activities strongly influence the biophysical systems. So far, most attention has been paid to measuring status and trends towards achieving environmental targets. Less attention has been given to the role of NCAs in developing national implementation strategies for achieving the SDGs. This narrow focus has resulted in a more top-down process to monitor the progress of SDGs by using existing NCAs, and in less cross cutting and bottom up actions that use the accounts and indicators for developing or improving national policy processes.

We observe increasing attention on analysing interlinkages between SDGs, but this attention is focusing more on monitoring and awareness-raising than on linking or embedding existing policies in the SDG policy process or on creating new policies that focus more on the synergies between the SDGs. To date, the methods promoted for assessing the SDGs pay limited attention to the potential uses of NCAs. Due to its integrated approach, capable of showing interlinkages between the economy, the environment and society, NCAs may serve as useful input in a broad range of analytical tools. This potential seems underexploited, and especially the methods that most closely relate to the setup of NCAs – footprint analysis, input-output analysis and general equilibrium analysis. This potential is little known, not broadly advertised, but examples of use are emerging and should help to promote both NCAs and analytical methods. Given their coherent, structured and systems-based setup, NCAs can help the SDG process by promoting a systems-based approach and an institutional reform towards more integrated policy-making with multiple stakeholders and accountability bodies.

There exist several institutional hurdles that need to be addressed to increase the role of NCAs in SDG implementation, monitoring and review. These hurdles include a poor coordination and siloed implementation of activities related to natural capital accounting, scattered (or non-existent) data that are often of poor quality or not shared with others, and a lack of skills to use data to their full potential. It appears that these hurdles apply to many countries. Natural capital accounting is helpful for overcoming some of these hurdles as it brings methodological rigour to foundational data, strengthens statistical skills, and appeals to policymakers due to their direct link with the national accounts. Building NCAs that can pinpoint national progress towards achieving the SDGs and analysing the policies required to achieve the SDGs will demand investment in capacity and skills across the entire spectrum — from conceiving and collecting data, to interpreting and communicating them clearly, to making them open and accessible to all.

From this, we conclude that there is an unrealised potential for using NCAs in SDG policy processes. Despite the need for further developments, indicators and analytical methods to support the SDG process already exist and are available to countries. This requires countries to develop their natural capital accounts, so that they can be used to analyse proposed, new or existing SDG policies. However, it is unlikely that this will happen overnight.

Increasing the use of NCAs for SDG policies requires a number of developments. First, it calls for national SDG policy processes that move beyond monitoring, look at synergies and trade-offs that cross the borders between ministries, cover various spatial scales and create conditions to foster a transition to a system of integrated policy-making. Here, the development processes for the SDGs and NCAs can go hand in hand. Both processes go beyond the mandate or competences of one single institution or ministry, and depend on skilled institutions to collect data, compile accounts, undertake analysis and develop policies. Moreover, both processes require strong political support and the political will to promote evidence-based policy-making and to cross institutional boundaries. In most WAVES and UNSD partner countries, the process to implement NCAs is set up in such a way.

Second, for using NCAs as well as for analysing SDG policies, it is essential that institutions capable of applying analytical methods to produce policy-ready and easily communicable messages participate in the development of the accounts. These institutions need not analyse all SDGs from the beginning, but countries can start from those that are most relevant for them. For example, Costa Rica started with accounts for forests, water and energy to support their policies related to water use and water withdrawals (SDG 6), to monitor objectives related to renewable energy production and energy intensity (SDG 7) and monitor changes in forest assets (SDG 15). Furthermore, Botswana produced water accounts that support several policies related to poverty reduction (SDG 2), water and sanitation (SDG 6) and droughts (SDG 13). Such a prioritisation guides the accounts that have to be set up first, helps with the identification of the most relevant policy questions, steers the types of analysis that are needed and facilitates the establishment of the most appropriate governance arrangements. For this, countries do not have to reinvent the wheel over and over, but can use experiences from other countries. For this to occur, special emphasis should be put on countries communicating their results. Graphically presenting indicators is often easy, but it is more challenging to present analytical results in a way that enables policymakers to understand the relevance of the accounts and raise the right questions. This in turn enables analysts to do what is needed for policy review and design and guides statistical agencies to the compilation of the right type of accounts.

2.7 References

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Appendix 2.1 The Sustainable Development Goals

The 2030 Agenda for Sustainable Development, adopted by all UN member states at the United Nations Sustainable Development Summit in September 2015, is a broad sustainability action plan for all countries, focusing on the poverty-development-environment nexus and with an overarching objective of leaving no one behind. It contains the following 17 Sustainable Development Goals (SDGs) – see <https://sustainabledevelopment.un.org>:

- Goal 1.** End poverty in all its forms everywhere
- Goal 2.** End hunger, achieve food security and improved nutrition, and promote sustainable agriculture
- Goal 3.** Ensure healthy lives and promote well-being for all at all ages
- Goal 4.** Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
- Goal 5.** Achieve gender equality and empower all women and girls
- Goal 6.** Ensure availability and sustainable management of water and sanitation for all
- Goal 7.** Ensure access to affordable, reliable, sustainable and modern energy for all
- Goal 8.** Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
- Goal 9.** Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation
- Goal 10.** Reduce inequality within and among countries
- Goal 11.** Make cities and human settlements inclusive, safe, resilient and sustainable
- Goal 12.** Ensure sustainable consumption and production patterns
- Goal 13.** Take urgent action to combat climate change and its impacts
- Goal 14.** Conserve and sustainably use the oceans, seas and marine resources for sustainable development
- Goal 15.** Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
- Goal 16.** Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
- Goal 17.** Strengthen the means of implementation and revitalise the global partnership for sustainable development

3. The role of business in Natural Capital Accounting and the Sustainable Development Goals

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Summary

Every business impacts and depends upon natural capital, and this relationship yields significant risks and opportunities to the business, and also to society around them. Understanding this relationship allows business leaders to make smarter decisions about the consequent risks and opportunities that they might face. To do so, many businesses have adopted systematic approaches to measuring, and valuing their relationship with natural capital. These approaches often differ to national accounting methodologies, but there is increasing demand to identify the synergies between them in order to better share results and insights across both communities. This paper introduces some key drivers and characteristics behind corporate approaches to natural capital, including a number of leading practical case studies, and explores the opportunities for how we might combine approaches in the future in order to advance our progress towards the Sustainable Development Goals.

3.1 Introduction to natural capital assessments in business

Every human enterprise on the planet depends on nature, or natural capital, in order to survive and thrive. Natural processes, such as water filtration, nutrient cycling, crop pollination, seasonal weather cycles, waste management and climate stability, all flow from the natural world, and their health underpins all human activities.

While businesses depend on these ecosystem services, and the stocks of natural capital from which they flow, their operations also have varying impacts upon the health of the natural world. Pollution, water consumption, conversion of natural habitats, industrialized agricultural practices and the production of toxic chemicals can all affect the health and availability of the natural processes that businesses and societies fundamentally depend on.

Many businesses are beginning to recognize this relationship, and to understand that the impacts they are having on the environment are directly affecting its ability to provide the goods and services on which they depend for continued operational success.

In the private sector, organizations are utilizing natural capital approaches in order to **inform their internal decision making** relating to these relationships. If a farmer recognizes their dependence on the services provided by pollinating insects, and a natural capital assessment

demonstrates that their practices (perhaps an overuse of pesticides, or extensive habitat destruction) are damaging the ability of insects to provide these services, then the farmer is in a position to make a decision that provides benefits to both their business model, and to the local ecosystem.

Businesses might use this natural capital information to help them to assess significant risks and opportunities at either a product, project or organizational level. Conducting these assessments allows organizations to decide which areas of their business are in need of better management or increased investment.

Unlike the SDGs, **most natural capital work in the private sector does not necessitate reporting**. However, businesses may choose to report on the outcomes of their assessments or on the decisions that these assessments inform, if they wish.

More recently, there has been an important evolution in the way that we think about natural capital. We are realizing that it adds much more value to businesses than simply managing risks through the identification of externalities, as many have previously believed.

The metaphor of capital provides three clear attributes that considerably advance existing thinking and allow us to make better informed, as well as more integrated, decisions by generating meaningful information.

From impacts → to dependencies

Most businesses can measure their impacts, but few look systematically at their dependencies. Without understanding how they rely upon nature, businesses are failing to identify risks that, in extreme cases, may fundamentally undermine their business models. Some organizations may find for instance that they have significant exposure to resource or biodiversity-related risks because of their aggregate exposure to specific geographies, sectors or markets.

From measure → to value

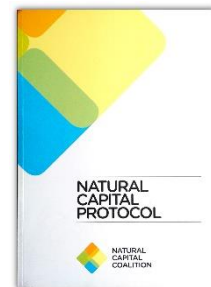
We have become adept at measuring our relationship with nature through metrics such as tons of carbon, m³ of water consumption, hectares of land area, etc. However, impact measurement alone often fails to lead to better decision making. This is because it only provides us with a number and one that is often largely devoid of context. Being told that you are using x million liters of water or emitting x million tons of CO₂, without any idea of what this means for your business, for society or for the planet, is unlikely to galvanize any serious action. *Valuing* impacts and dependencies provides an understanding of the bigger picture that works to contextualize these relationships. The way that organizations value their relationships with the natural world will depend on many different factors and will be extremely context specific; just as individuals would place a larger value on a glass of water if they were in the middle of a desert than if there were standing in a stream, business values similarly vary widely. For a farmer cultivating wheat in the UK, using x liters of water per ha may be perfectly sustainable, while to use the same measure to grow a ha of wheat in California, or South Africa, may strain the water table, threatening future supply and increasing the cost of access, while limiting availability to other stakeholders. In these different scenarios, learning that you're using x liters of water per ha, will result in very different decisions by managers.

Importantly, 'value' should not be confused with 'price'. The price of water may be the same in both the UK and in California, but the relative value of this water is not.

From separate issues → to a connected system

By considering values, stocks and dependencies, and moving beyond traditionally siloed issues (e.g. climate, water, biodiversity), natural capital allows businesses to understand fundamental inter-dependencies, tipping points, carrying capacities and thresholds. For instance, if Californian farmers deplete the local water table, this may have an effect on the health of local vegetation, which may lead to a decrease in insect populations, affecting the provision of the pollination services necessary for the success of their crop. Without an integrated approach in this instance, farmers may assume unnecessary risk or fail to identify relevant opportunities for resilience, efficiency and innovation.

To provide businesses with the tools necessary to operationalize this integrated approach to decision making, the Natural Capital Coalition – a collaborative network of 270+ organizations – developed and released the Natural Capital Protocol. The Protocol is a standardized decision-making framework that allows business to identify, measure and value their impacts and dependencies on natural capital.



The Protocol is not prescriptive, and it is not a reporting tool.

The Protocol was developed in a unique collaborative process, in which 38 diverse organizations came together and donated time and intellectual property to create a public good, which has been made freely available on a creative commons attribution license²⁸. Over 450 organizations provided input over the 2-year project.

How do private sector natural capital assessments differ from national-level natural capital accounting methods?

As a generalized differentiation, the business approach is more often need-driven and designed around one intended application than national accounting approaches. For example:

- Businesses will use natural capital information specifically to answer a question or inform a decision.
- The aim is not about collecting a set of indicators, and it is uncommon to collect information without a specific application in mind.
- Businesses will focus on a specific scope; it would often be too intensive to collect information across the whole value chain.
- Businesses will usually conduct a materiality assessment, or prioritization process, before starting their natural capital assessment. This means they can focus clearly on the most important issues.
- Businesses will often use the information internally, without disclosing it externally. Some businesses are starting to disclose, e.g. in sustainability/integrated reporting, however there is a lot more standardization to be done until results can be meaningfully comparable.

The private sector requires methodologies to be simple and material to their operations. Often, corporates are applying retrofitted methodologies from the public sector, and therefore consultants are usually required to interface between the two.

While it's true that businesses and governments often have different aims when it comes to natural capital approaches, and are attempting to capture different kinds of information, it's

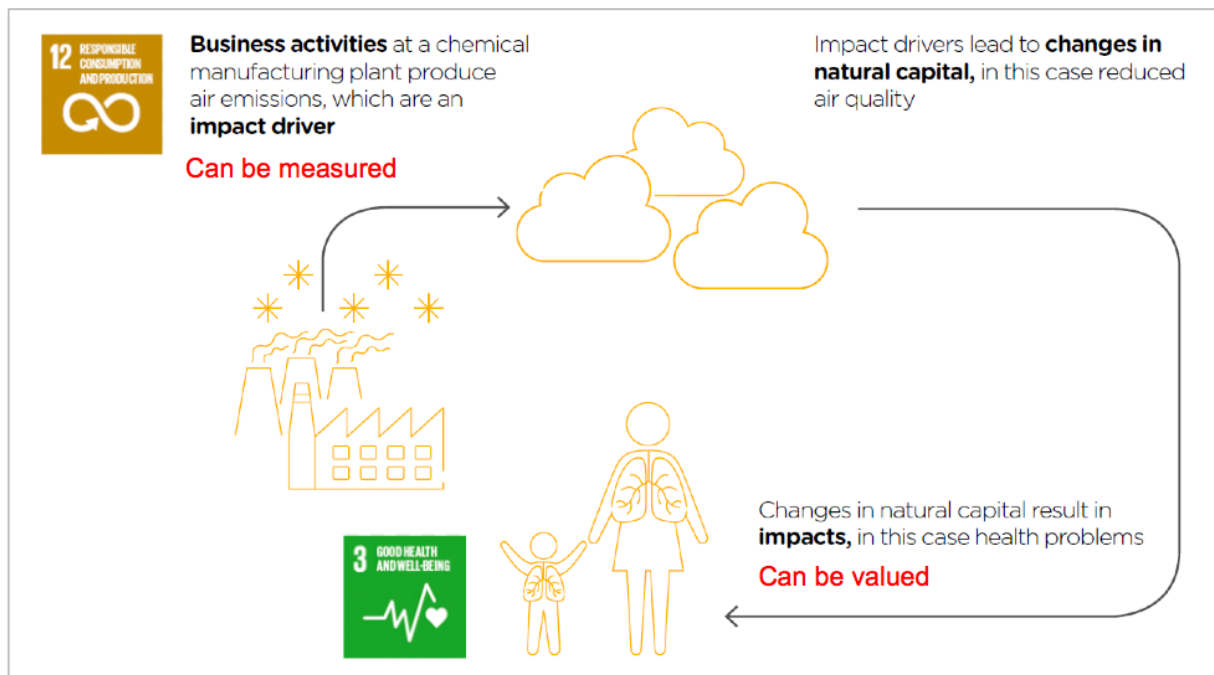
²⁸ The Protocol is freely available at: <http://naturalcapitalcoalition.org/protocol/>.

clear that the work undertaken by governments can be hugely useful to that of businesses, and vice versa.

Connection to the SDGs

By understanding how business activities can impact on society, and what this means to them, and to wider society (i.e. by valuing these relationships) we can better understand the positive or negative contribution of business towards the SDGs. *Figure 3.1* illustrates how an environmental driver (in this case air emissions resulting from production; SDG 12) can drive a change in natural capital which has consequences on human health (SDG 3).

Figure 3.1 An example of a natural capital impact pathway



Source: Natural Capital Protocol, 2016

Exploring business assessments in the regional context

As businesses begin to seriously experiment with natural capital thinking, many are beginning to recognize that they must take a systems approach, not only to their relationship with the environment, but also to their relationship with the other capitals as well.

The International Integrated Reporting Council (IIRC) has identified six capitals: financial, manufactured, intellectual, human, social and relationship and natural. In the same way that the different elements of the biosphere are all interconnected, so are the relationships between the capitals.

For instance, one clear interrelationship exists between natural and social capital. In many cases, a loss of functioning in natural capital can initiate or accelerate the degradation of social capital, and vice versa, and this recognition has led to the understanding that effective action can only be scaled if multiple stakeholders are brought in and consulted.

This is particularly true for site-based issues, for instance the development of public infrastructure such as roads and dams which can have wide-reaching impacts on local ecosystems and on the communities that depend on them. Local decision makers and policy

makers must be brought in to the process at the outset of these projects to ensure consistency, transparency and scalability.

If actions are isolated, fragmented or tokenistic, they risk being ineffective. For this reason, more business efforts around natural capital are actively engaging with local policy makers and are seeking ways to share information and insights.

3.2 Case study: Indonesia

Background and objective

Olam group is an international agri-business operating in 70 countries worldwide. Olam has long-term experience of natural capital valuation and has done previous studies on coffee in West Africa,²⁹ Columbia,³⁰ India,³¹ and now Indonesia.

This study, delivered in partnership with the International Finance Corporation (IFC) Natural Capital Program and Indufor, looks at coffee production in North Sumatra and was designed to:

- Identify and collect appropriate information to better inform decision making in Sumatra
 - Inform the future design of **effective farmer livelihood programs**, to enhance long-term yield security and resilience while reducing vulnerabilities related to natural capital.
 - Support the identification of **materially important Sustainable Development Goals** (and Targets) at a program/country level and measure Olam's contribution towards them.
- Build experience and improve Olam's technical approach
 - **Compare with previous work** done in other value chains at Olam to refine the capital and impact valuation model used.
- Refine the tools and findings needed to raise natural capital internally
 - Build **internal and external support** to mainstream capital and impact valuation across Olam's value chains
 - Support the development of **new accounting frameworks** to move capital and impact valuation out of the 'sustainability silo' and into our mainstream financial reporting systems.

Process and findings

Olam conducted a materiality assessment within the region to identify their largest impacts and dependencies on the local environment. The assessment identified the most material issues as: **soil quality impacts** (resulting from excessive fertilizer inputs), **farm dependence on water use** (through processing and irrigation), and a **dependence on pollination** (and the interactions with pesticide use and production regimes). Olam then worked to scope and conduct a full assessment to analyze these relationships in more detail. After in-depth exercises in the measurement and valuation of these pathways, both in terms of value to Olam as well as to other identified stakeholders, Olam learned:

- Negative soil quality impacts could be mitigated by adopting a 'semi-organic' approach that also brought economic gains for the farmers by achieving greater yield for lower input cost.

²⁹ <http://olamgroup.com/blog/no-sustainability-without-balance-sheet/>

³⁰ <http://49tmko49h46b4e0czy3rlqaye1b.wpengine.netdna-cdn.com/wp-content/uploads/2013/10/Cameroon-Rice-Food-Loss-Waste-Case-Study-FINAL.pdf>

³¹ <https://www.youtube.com/watch?v=QhKTmKrRlZ4>

- A dependency on water use could be managed by providing infrastructure and education to farmers, to allow them to adopt more efficient – often rain fed – water management practices. This makes farms more resilient and reduces water-purchasing costs.
- Agroforestry presents greater long-term value for the company in terms of its greater resilience to shocks, greater reliability of supply and other multiple benefits. However, the comparative value of these benefits in comparison with Net Present Value, may not be immediately visible to individual farmers.

Table 3.1 Natural capital valuation results, actions and implications in Indonesia

Actions	Implication
Valuation result 1: Adoption of proper semi-organic fertilizer application rates will enhance net profits from coffee production for both Olam and farmers.	
<ul style="list-style-type: none"> • Leverage Starbucks Farmer Support Center to provide farmer trainings across coffee sourcing areas on higher-yielding semi-organic soil amendments (can benchmark with new chemical to be piloted by Olam) • Provide a model for public sector agricultural extension services which reportedly refer to the private sector extension agents for guidance 	<p>Business: enhanced long-term yields and reliability of supply, reduced fertilizer and remediation costs, less disruption due to abiotic shocks</p> <p>Environment: enhanced soil health, reduced nutrient leakage/runoff and associated environmental impacts</p> <p>Livelihoods: increased net income for farmers, reduced human health impacts</p>
Valuation result 2: Farmer coffee producers bear significant water costs, purchasing water for semi-washed processing (and sometimes irrigation) and still do not have enough water to achieve optimal coffee yields.	
<ul style="list-style-type: none"> • Provide technical assistance to enable widespread adoption of rainwater harvesting tanks and other water infrastructure, and training on ways to optimize water use for irrigation and processing, e.g. reducing water waste, exploring natural or honey processing • Inquire into public sector ability to improve reliability of piped water access and regulate water use, particularly considering drought risks 	<p>Business: enhanced long-term yields and reliability of supply, less disruption due to abiotic shocks</p> <p>Environment: uncertain, potentially less pressure on certain water supplies</p> <p>Livelihoods: increased net income for farmers due to higher yields, reduced cost to buy imported water</p>
Valuation result 3: Agroforestry systems provide greater long-term value for Olam, particularly in weathering eruption shocks, whereas they provide positive but relatively less value for farmers given their higher risk aversion.	
<ul style="list-style-type: none"> • Design agroforestry program (locally suitable species, reliable cash flows, spacing) in order to protect coffee and other crop yields, reduce water and fertilizer costs, and mitigate any losses from drought and eruption shocks • Aside from lamtoro species included in model, can switch in other income-generating shade-tree species such as arenga (sugar palm) and avocado trees, and understory crops such as pepper 	<p>Business: enhanced long-term yields and reliability of supply, less disruption due to abiotic shocks</p> <p>Environment: enhanced soil and water quality, pollination, biodiversity, and carbon sequestration</p> <p>Livelihoods: lower NPV but more reliability in yields, diversification of income and food sources, reduced water and fertilizer costs, more reliable coffee and other understory crop yields cushioned from shocks</p>

Source: Olam, 2017

Application and scaling

The company could look at using soil, water and agroforestry models to enhance ecosystem services and manage environmental stressors, and could then communicate and formalize these practices through relevant institutions such as the Olam Livelihood Charter³² and Starbucks C.A.F.E.³³

³² <http://olamgroup.com/sustainability/olam-livelihood-charter/>

³³ <https://www.starbucks.co.uk/responsibility/sourcing/coffee>

Local stakeholders and policymakers should also be involved, for instance in the planning and design of more efficient water infrastructure in the region, and perhaps eventually through providing incentives and enablers for adopting more sustainable practices.

Olam is now in the position to use the above results in its coffee production decision making not only in Sumatra, but also in the wider region. Olam is also working to incorporate social capital valuation into its assessments and decision making, with the aim of achieving a further integrated understanding of how their business activities may work to create or to erode value across multiple capitals, and how these risks can be averted, and opportunities met.

3.3 Case study: Rwanda

Background and objective

The Wood Foundation is a philanthropic organization and social investor, working with smallholder tea farmers in Tanzania and Rwanda. The Foundation works with 17,000 tea farmers in Rwanda alone, and aims to catalyze systemic and sustainable developments in the wider tea industry.

This study focuses on the natural capital impacts and dependencies of the Foundation's Shagasha Tea Factory in southwest Rwanda, and is an early summary of some ongoing work (Indufor, 2017). In this project, the Wood Foundation partnered with the IFC and Indufor. Through a systemic application of the Coalition's Natural Capital Protocol, the Foundation expected to inform their strategic planning based on an initial materiality assessment. Early prioritization with stakeholders identified the following value chain issues as the worthiest of more analysis:

- soil sedimentation affecting downstream water supply and water processing;
- soil sedimentation in local marshlands;
- flooding in local marshlands.

The study also considered how the Shagasha operation impacted, and was impacted by, the local landscape; this included trends in climate change, income security, food security and biodiversity among others.

Process and findings

The team benefited from existing WAVES national accounting data in Rwanda and was able to run this through InVEST spatial models³⁴ to build their analysis. When looking at the material issues identified above, the findings included:

- That converting annual cropland to tea plantations had clear positive effects in decreasing soil sedimentation and positive yet minor effects in decreasing flooding. The positive impact on soil sedimentation can further be amplified by introducing farming methods that plant along the land contours. Cropland conversion and contour planting are therefore considered opportunities.
- The issue of decreased water quality for downstream water processing does not have direct business implications for the Shagasha Tea Factory. Furthermore, the local water company has already started switching from surface water sources to groundwater sources to avoid dependence on upstream land users; this is therefore not considered a material issue at the time of assessment.

³⁴ www.naturalcapitalproject.org/invest

- Smallholders suffering from the effects of soil sedimentation and flooding also do not cause significant business implications for the Shagasha Tea Factory. Neither the factory's current or future tea production depends significantly on the vulnerable areas (which suffer from lower yields due to flooding and sedimentation), and so the direct value to the business of managing them is relatively low. On the other hand, for the individual smallholder tea growers the problems are very significant; the value to society is therefore very high.

Application and scaling

The study identified a number of possible opportunities, by working with local stakeholders, for The Wood Foundation to address some of these issues:

- Equipped with new insights, The Wood Foundation could make strategic decisions to prioritize their tea expansion into areas that are prone to soil erosion. Assuming a baseline of annual crop cultivation, the switch to tea production could encourage higher soil quality and reduced downstream sedimentation. Public sector actors could support this effort by providing or sponsoring training to farmers across all relevant sectors on sustainable soil management practices.
- The study also suggested a public-sector effort to better track and disclose water quality data (e.g. as part of WAVES water accounts), and to make this available publicly, to help inform water management decisions. Readily available data could help tea producers like The Wood Foundation to stay aware of trends.
- The Wood Foundation could implement a water management plan that 1) aligns with their initial natural capital findings, but also 2) accounts for increased future demand and possible climate change risks. If water quality and quantity data was made publicly available, then management could be more reactive and effective.

This natural capital approach could be replicated for planning other tea or agribusiness projects in Rwanda. Two other international tea brands are already exploring new tea plantations in the region and could benefit from this work. Depending on the siting of the plantations in relation to downstream hydropower or drinking water treatment plants, inVEST could be used to gauge the benefits from managing natural capital in the value chain upstream.

In theory, the larger-scale nature of the planned plantations would also entail natural capital impacts and dependencies of a larger scale, and would need careful monitoring. The significance of issues is sensitive to the geography of the local landscape and the overlap with other land uses; it would be necessary for the new tea companies to reassess key natural capital impacts and dependencies in their own unique contexts and adjust their strategies accordingly.

3.4 Case study: Urban Natural Capital Accounts in the United Kingdom

Background and objective

Eftec are an environmental consultancy based in the UK who have experience of delivering natural capital assessments in both the private and public sector. During the forum, eftec presented a selection of case studies conducted at different spatial scales for public-sector decision makers. These case studies were conducted against a specific scope with the purpose of informing specific decision-making needs. They demonstrate the links between national accounting approaches and organizational methods, akin to “business” applications using a “corporate” approach.

4. UK Urban National Accounts³⁵

Scale: National

Scope: To value the benefits from natural capital in urban areas of the UK. Benefits covered included food provision, climate regulation, air quality regulation, noise regulation and physical health from outdoor recreation.

Objective: Add to the evidence building up the UK national natural capital accounts by 2020. Provide evidence of relevance to city decision makers (e.g. City Mayors).

5. Greater Manchester, UK³⁶

Scale: City

Scope: To value the benefits from natural capital in urban areas of Greater Manchester. Similar benefits as the national urban accounts are covered, plus investigation of further services at a local scale, such as the role of tree cover and green space in noise and urban heat-island regulation.

Objective: Input into the spatial planning, environmental, health and other policies of a new city-wide authority with newly devolved budget and policy responsibilities.

6. London Borough of Barnet³⁷

Scale: Local (suburban borough)

Scope: An account was constructed for the Boroughs open spaces gives a balance sheet showing that they are a health asset worth approximately £1.8bn over the next 100 years. The avoided health costs resulting from their use for recreation are over 10 times their management costs to the Borough. Benefits from enjoyment of recreation, local property premiums and climate regulation are also evaluated.

Objective: To inform a Borough strategy for of 200 open spaces, including defending budgets for their management in the face of potential cuts.

7. Beam Parklands, London³⁸

Scale: Site

Scope: An account was constructed to value the amenity of Beam Parklands following investment to enhance its natural environment. Benefits included flood water storage, biodiversity enhancement and local property price 'uplifts' (residential and non-residential) within the vicinity of the park. These benefits were significantly greater than the costs of investing in and maintaining the enhancements.

Objective: Demonstrate the return on investment from investment in natural capital.

Process and findings

All four studies found the health and wellbeing benefits of their natural, recreational assets to be hugely significant. Through the use of monetary valuation, based on avoided health costs, local decision makers were able to understand urban natural capital as an asset, instead of a source of costs. The approach proved flexible and applicable across a range of different spatial

³⁵<http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=19843>

³⁶<http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=19843>

³⁷ <https://www.eftec.co.uk/project/%20%09london-borough-barnet-corporate-natural-capital-account>

³⁸https://www.london.gov.uk/sites/default/files/beam_parklands_natural_capital_account_final_report_eftec_november_2015.pdf

scales. Each scale applied similar physical data and economic approaches, but the exact valuation approach varied with the different decision-making contexts involved.

Table 3.2 A summary of valuation results from studies across the UK

Scale	Location	Service(s) valued	Valuation method	Value (£)	
				Annual	Asset
National	UK	Physical health from outdoor recreation	QALY based welfare value Total avoided current health costs (= exchange value?)	£1.48bn £0.9bn	£44bn £27bn (over 100 yrs)
City	Manchester	Physical Health	QALY based welfare value Total avoided indirect and direct costs to society	£63m/yr £38m/yr	£1.1bn £0.8n (over 100 yrs)
Local	London Borough of Barnet	Recreation and Physical Health	Welfare value of visits Total avoided health costs	£40m/yr £19m/yr	Gross: £1.94bn Net: £1.81bn
Site	Beam Parklands, London	Local community benefits (recreation, amenity and health)	3% property price uplift (residential and non-residential)	£0.8m/yr	NPV: £26m

Source: eftec, 2017

Conclusion and scale-up

Once detailed national-level studies have developed accounting information, this evidence can potentially be re-applied cost-effectively at smaller spatial scales. This vastly increases the usefulness of accurate national research. At smaller spatial scales, public bodies can use this evidence within corporate natural capital accounting methods to inform organizational decisions. In particular, comparing values for benefits (including dependencies, such as on the natural environment as a health asset) to management costs, can be used to provide a balance sheet and justify continued management of natural capital.

3.5 How can public and private approaches of natural capital accounting combine forces to advance our shared objective of better natural capital management?

How can we promote harmonization between public and private approaches?

Participants at the 2nd Policy Forum on Natural Capital Accounting for Better Decision Making acknowledged that natural capital thinking is fast gaining momentum within the business community. Over 50 organizations piloted the Natural Capital Protocol in 2016, 100 business users signed up to additional training in 2017, and more case studies are following.

There is shared enthusiasm from both business and government users to start bringing experience together, to support each other, and to ultimately implement better solutions. Policy Forum participants identified the following “starting points” from which to begin a productive dialogue:

- **Decision making:** Corporate natural capital assessments are often conducted to answer a specific question, or to inform a specific decision. In contrast, national natural capital accounts are often conducted to identify states and trends, or to measure stocks, and are then applied in decision making retrospectively. Bringing both communities together around a specific issue, question, or decision that needs to be made, may allow us to efficiently focus both efforts on the end goal of better natural capital management.
- **Sector focus:** Many countries are developing detailed accounts for water, energy and others. There may be an opportunity to engage regulated sectors such as water, infrastructure and energy; these sectors are already working closely with policy in many areas and are also exposed to natural capital risks and opportunities. Input from these sectors could be valuable not only in analyzing the outputs of existing natural capital accounts, but also in the scoping of future work, and in discussion on how to implement better policy as an outcome.
- **Spatial focus:** Our response to the SDGs can be made more efficient and effective if we understand in greater detail where the need is greatest and who is affected; this requires more spatially explicit data and modelling. Businesses most often collect data and information at the site, project or catchment scale. There is an opportunity to leverage these spatially focused insights, to use them to complement the nationally aggregated accounts, and therefore gain a deeper understanding of issues at the spatial scale.
- **Data:** Data should not be the restricting factor it is sometimes understood to be; in many cases we already possess sufficient data to make responsible and informed decisions. Nevertheless, there could be a productive conversation around the accessibility and format of the national accounting data available to businesses, and how business can also contribute information to national accounting efforts.

What could be the next steps?

- **Need for a convening platform:** WAVES participants voiced the need to create platforms of expertise, to match-make the necessary skills, data and experience needed to implement better natural capital management. These platforms would be hosted by in-country representatives, with support from external bodies like the WAVES partnership, Natural Capital Coalition, and others.
- **Need for critical mass:** There is a responsibility on the business community to substantiate their commitment to natural capital thinking, and to demonstrate the demand for collaboration that the WAVES community can then respond to. Joint participation in events like Policy Forum on Natural Capital Accounting for Better Decision Making, and the World Forum on Natural Capital are a good first step to getting both communities in the same room.
- **Need for more case studies:** Both government and business practitioners could benefit from successful, illustrative examples of how national-level and business-level work can complement each other, and how this can result in real implemented solutions. We need first-movers!
- **Need for SME engagement:** A persistent challenge is how to make natural capital-related considerations relevant and accessible to small and medium enterprises. In many WAVES countries, SMEs represent the critical mass. It is possible that the value-chain approach presents the most practical option to “trickle down” best-practice management insights from larger businesses to the smallholders in the chain. Further discussion is needed on this issue.

3.6 Closing words

Carl Obst concluded the discussion at the 2nd Policy Forum by highlighting the universal and binding applicability of the SDGs in bringing public and private actors together around natural capital, particularly the longer-term goal towards consistency and comparability. He identified a range of opportunities for increased co-operation, including: a joint discussion among private and public land holders on stewardship of natural capital; the potential for incentives to promote improved management of natural capital and other policy settings that can generate clarity and stability for business; development of a common language to discuss natural capital; the potential to incorporate a consumer perspective on the provision of public and private goods and services from natural capital; and the capacity to better integrate and share relevant data.

There are, of course, challenges in securing such opportunities. Among these are the scale of work required to align the micro and macro perspectives on natural capital, to deal with data issues such as confidentiality and privacy, and to establish more harmonized definitions and methods. More broadly, recognition is needed of the different motivations of the sectors and actors, including likely different perspectives on the time horizons over which the sustainability of natural capital should be considered.

Notwithstanding these challenges, there are clear signs that the critical factor of engagement and discussion is underway. The presence of members of the business community at the 2nd Policy Forum is but one example of the increased discussion that is taking place. The success of the engagement will be based on understanding that this is not a “one size fits all” or single solution space. It will be fundamental to allow for different and changing context for natural capital management all over the world. Breaking down misconceptions and misunderstandings about the existing tools and frameworks will also be fundamental. In this regard, the SDGs and the substantive issue of sustainability provide an excellent platform for ongoing engagement.

Private sector applications are commonly demand-led and designed around each business’ own context. Experimentation and adaptation of natural capital approaches (such as the Natural Capital Protocol) is critical to ensuring that results are fit-for-purpose and tailored to needs. Only through more testing and more experience will we progress towards consensus on the best-case metrics, valuation techniques, baselines and so on. Until then, private natural capital assessments will remain largely incomparable.

Addressing this issue is the role of collaborative networks like the Natural Capital Coalition and the WAVES partnership. By sharing experiences, best practice and challenges, and by bringing together dissimilar and sometimes disparate stakeholder groups, we can accelerate experimentation, application and improvement across the board.

In order to accelerate progress in this area, the Natural Capital Coalition and the Institute for Development of Environmental-Economic Accounting (IDEEA Group) have launched a program entitled “Combining Forces on Natural Capital.” This program brings together many of the leaders in the development and implementation of both public and private sector approaches to natural capital.

The group released a public statement at the end of 2017, detailing their aim to “clarify how these [public and private sector] approaches overlap and combine, and to commit to producing materials that continue to support the inclusion of nature in public and private decision making.”

You can read more about this program, and the chance to be involved, at:
<http://naturalcapitalcoalition.org/projects/combining-forces-on-natural-capital/>

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4. Natural capital accounting: Growing experience and testing the 10 living principles to make it fit for policy

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Summary

The 2nd Policy Forum on Natural Capital Accounting for Better Decision Making brought together a range of different professions and organizations to share experiences, discuss issues and identify opportunities for applying natural capital accounting to the Sustainable Development Goals (SDGs). In this paper, we made a systematic analysis of the contributions to the 2nd Policy Forum – the presentations, discussions and written papers – as well as linking these to the 1st Policy Forum and other relevant documents. From this growing body of experience, we extracted important lessons for future progress and key opportunities for the application of natural capital accounting to the SDGs both as a whole as well as individually (e.g. those related to water, climate change, terrestrial and sustainable consumption and production). As part of the analysis we tested the “10 living principles” that emerged from the 1st Policy Forum. From this we conclude that: (1) the natural capital accounting community of practice is growing both in terms of the amount of emerging evidence and the number of people and organizations involved; (2) natural capital accounts can help achieve the SDGs as well as help assess trade-offs between individual SDGs; (3) the 10 living principles are useful and based on the experience to date we need to emphasize that continuous effort is required to apply them, particularly for mainstreaming and collaboration, and; (4) the Policy Forum can continue to play an important role in the development and application of natural capital accounting via the sharing of experiences, highlighting examples of the connection to policy, providing guidance and focusing attention on areas in need of future research.

4.1 Introduction

On 22 and 23 November 2017, the 2nd Policy Forum on Natural Capital Accounting for Better Decision Making (hereafter the 2nd Policy Forum) was held in The Hague, The Netherlands. The meeting was summarized in Bass (2018) and our paper builds on this summary as well as the papers by Ruijs et al. (2018) and Brown et al. (2018) by synthesizing the key lessons and opportunities that emerged from the 2nd Policy Forum, encompassing reflections on all of the Forum inputs – presentations, discussions and written papers. Our paper then goes on to link to the “10 living principles to make natural capital accounting fit for policy” that emerged from the 1st Policy Forum (Bass et al. 2017).

Over 60 participants from 20 countries came together for the 2nd Policy Forum to share experiences and learn from one another about how natural capital accounting, as described in the System of Environmental-Economic Accounting (SEEA) (United Nations et al. 2014a), can be used for decision making in government and business. Based on the 2nd Policy Forum, it is clear that more countries are undertaking construction of natural capital accounts (NCAs) (see

UNCEEA 2017), many supported by the World Bank WAVES partnership or United Nations Statistics Division (UNSD). Notwithstanding this, integrating these accounts into government policy and business planning remains a challenging task requiring specific attention.

The 2nd Policy Forum brought together users and producers of NCAs with a focus on how the accounts can feed into the national policies and business decisions aimed at achieving the Sustainable Development Goals (SDGs) of the *2030 Agenda for Sustainable Development*, which aims to end poverty, protect the planet, and ensure prosperity for all. In all, 17 goals and 169 sub-targets are defined under the *2030 Agenda* aimed at improving the lives and future prospects of everyone, everywhere. Recognition that the goals related to people, planet and profits are interlinked and indivisible has resulted in the need for an integrated agenda. At the 2nd Policy Forum, countries and agencies discussed how natural capital accounting can provide an integrated approach to the design, implementation and review of actions to achieve the SDGs. Further discussion occurred around how NCAs can be used to advance individual SDGs as well as to assess and exploit synergies and trade-offs between SDGs. The 2nd Policy Forum contained sessions on poverty, green growth, the role of business, life on land, government processes and assessing trade-offs.

In this Chapter, we summarize the main lessons that arose from the 2nd Policy Forum and analyze the content from contributions to build on the lessons from the 1st Policy Forum, specifically to what extent the material shared aligns with the 10 living principles for making natural capital accounting policy-relevant (Bass et al. 2017), and the implications of this for achieving the SDGs and related aims. The material examined includes both the presentations made at the 2nd Policy Forum as well as the written material contributed via the 2nd Policy Forum webpage,³⁹ not all of which were presented during the Forum. Two papers directly built on work presented in the 1st Policy Forum: one on accounting for biodiversity (King et al. 2018) and the other on accounting for State of the Environment reporting (Summers et al. 2018). A third on ecosystem accounting in Australia (Keith et al. 2018) made observations directly on the alignment of their work with the 10 living principles.

In the remainder of this chapter we examine the SDGs and how natural capital accounting can help monitor progress and potentially demonstrate that they have been achieved (Section 4.2 – also see Ruijs et al. 2018). In Section 4.3, we examine specific instances of uses of NCAs in decision making related to biodiversity, carbon and forests (which are related SDGs), while in Section 4.4 we evaluate the material shared relative to the 10 living principles. Section 4.5 outlines a number of general conclusions and the next steps.

4.2 Applying natural capital accounting to attain the SDGs

The core objectives of the *2030 Agenda for Sustainable Development*⁴⁰ are the 17 Sustainable Development Goals (SDGs) and 169 sub-targets including, for example, ending poverty and hunger, improving health and education, combating climate change, environmental sustainability and inclusiveness (United Nations 2015; Fig. 4.1). Currently, individual countries are in the process of translating their ambitions with respect to the SDGs into integrated policy

³⁹ See <https://www.wavespartnership.org/en/forum-natural-capital-accounting-better-policy>

⁴⁰ The 2030 Agenda, adopted at the United Nations Sustainable Development Summit in September 2015, aims to transform our world for the better. It is a broad sustainability action plan agreed upon by all UN member states, with the objective of leaving no one behind and focusing on the poverty-development-environment nexus. See <https://sustainabledevelopment.un.org/post2015/transformingourworld>

agendas. To achieve this ambition, individual countries need to create awareness, set specific national targets, design and implement policies, and monitor progress towards the goals.

Figure 4.1 The 17 Sustainable Development Goals (SDGs)



Source: www.sustainabledevelopment.un.org

Addressing the SDGs collectively requires an integrated policy framework built on the inter-linkages between the economy, the environment and society (e.g. triple-bottom line accounting). Such integrated approaches to information using accounting were evident in several contributions to the 2nd Policy Forum, including by Australia, Botswana, Costa Rica, Guatemala, Indonesia, the Netherlands, Peru and the United Kingdom. Included here were examples of natural capital accounting measuring changes in the physical stock and value of natural capital, the physical and monetary benefits received by people and, importantly, linking these to the System of National Accounting (SNA) (European Commission et al. 2009). Such accounting provides analysts and policymakers with the information needed to obtain insights into the contribution of natural capital to wealth creation, employment, wellbeing, and poverty reduction. In short, NCAs explicitly contribute to economic development and the SDGs (Bann 2016).

Monitoring status and trends of SDGs

Currently, within the SDG process, most countries focus on monitoring the status and trends of the SDG indicators (Ruijs et al. 2018), with more than 200 indicators of performance developed internationally (United Nations 2017). An analysis of the how NCAs can support these SDG indicators shows that the economic and material flow accounts provide the data necessary for a broad range of SDGs⁴¹ (also see Table 4.1 in Ruijs et al. 2018). For example, the energy supply-and-use table can generate the indicators related to energy intensity and percentage of renewable energy; the water supply-and-use tables and asset accounts are used for estimating the percentage of water resources used; and the air emission accounts serve as basis for estimating carbon emissions per unit of value added. Using natural capital accounts instead of

⁴¹ See <https://unstats.un.org/unsd/envaccounting/ceea/>.

other data sources to generate the SDG indicators results in coherence of the data within the accounting framework. In this, income, industries, inputs and outputs to production, assets classes, etc. are defined and used consistently. This ensures coherence between the indicators, enabling comparisons between different areas (e.g. water, land, energy) and between countries. The compilation of accounts by independent statistical agencies, rather than policy agencies, increases the trustworthiness of the information.

Despite the SDGs being in their infancy (i.e. established in 2015), evidence presented at the 2nd Policy Forum shows that more and more countries are using or planning to use natural capital accounting for monitoring progress towards the SDGs. For example, Costa Rica monitors progress of their sustainability objectives using their water and energy accounts (Alvarado Quesada 2017) and Botswana's water accounts provide evidence for their water governance and water planning policies related to SDG 6 (Itshekeng 2017). Zambia is putting more emphasis on SDGs related to poverty, hunger, inequality and infrastructure (SDGs 1, 2, 10 and 9) than on SDGs related to natural capital protection, but the NCAs can still play a role in monitoring progress (Lungu 2017). Additionally, there is evidence that the NCAs are being incorporated into the policy agenda, albeit indirectly, through food security, climate change and water-related policies that support objectives related to hunger and poverty.

Analyzing SDG interlinkages and SDG policies

Presentations from the 2nd Policy Forum showed that NCAs are being used for analyzing policies related to the SDGs. For example, Ruijs et al. (2018) outlined some of the many analytical methods available that can use NCAs to assess SDG policies. One such approach, network analysis, is used to analyze interlinkages between individual SDG indicators and to learn whether synergies between the SDGs can create win-win opportunities or can assess the trade-offs between them. Examples of such network analysis for SDGs are presented by Griggs et al. (2017), Zhou and Moinuddin (2017), Niestroy (2016) and, Nilsson et al. (2016a, b). Other approaches involve applying NCAs to estimate material footprints, climate footprints or water footprints (Edens et al. 2015), and in scenario analysis, cost-benefit analysis, equilibrium modelling or input-output modelling (United Nations et al. 2017).

So far, these approaches are not often applied to policy analysis. However, the 2nd Policy Forum showed that such analysis is now occurring, for example using general equilibrium models like the Integrated Economic-Environmental Modelling (IEEM) (see Banerjee et al. 2017). To date, IEEM has been used in Guatemala, Costa Rica, Colombia and Rwanda to show the economic and environmental effects of different policy scenarios (Banerjee 2017). Using the IEEM approach can show the relationship between a wide range of ecosystem services provided by the available stock of natural capital, as well as decisions about its use in production and consumption by government. In the last year, the environmental modules of the IEEM have improved, allowing greater analysis of ecosystem services. Additionally, IEEM can also be used to undertake analysis of land use and land cover changes (as in Guatemala); post-conflict deforestation trajectories (as in Colombia); and green-growth scenarios (as in Rwanda) (Banerjee 2017). The IEEM uses a social accounting matrix, the set-up of which corresponds to the arrangement of the supply-and-use tables of the national accounts and NCAs.

Due to the linkage between NCAs and economic modelling, the effects of policy changes on a broad range of SDGs can be monitored. Such linkages can also be used for analyzing the effects of policies on genuine savings.

Other modelling approaches have also been used in natural capital accounting. For example, Indonesia used a system-dynamics model to analyze the consequences of its national development plan (Medrilzam 2017). This example included the agricultural, mining and forestry industries and directly integrated information from the accounts to assess the relationships between natural capital, poverty, economic growth and the population. Lastly, the effects of policies on biodiversity, greenhouse gas emissions and land use were also included in the modelling process. In another modelling approach from New Zealand, energy and greenhouse gas emission accounts were developed and used in a computable general equilibrium model (Webb 2018). In this, the initial accounts developed the necessary information for the model, so the statistical office devoted additional resources to generate the level of detail necessary for the analysis.

Institutional conditions supporting natural capital accounting and the SDGs

There is growing attention devoted to creating the institutional conditions to enable NCAs to be used in the SDG policy-making process. For example, in Zambia, government agencies, research institutions and international organizations are working together to match the supply of natural capital accounting data to the demand for policy-ready results.⁴² Similarly, Bertrand et al. (2018) and Naidu and Vardon (2018) note the importance of aligning policy demand with research interests and account production when initiating natural capital accounting processes.

The experiences from the 2nd Policy Forum show that use of natural capital accounting in the SDG policy process is just beginning and that future progress will require coordination and cooperation between parties that may not traditionally work together. To enable this progression to occur, initiatives aimed at improving skills and competencies in the analysis and applications of the accounts to government and business decision making processes are needed – something that is of equal importance to both high and low-income countries.

The broad range of experiences to date shows that natural capital accounting processes can be helpful for building institutional coordination around the SDGs. Such institutional coordination leads to additional understanding of the processes and strengthens statistical skills (including quality checks of primary data), all of which have direct links with the national accounts providing positive outcomes for policy makers. Moreover, NCAs could underpin SDG processes as a multi-purpose information system supporting an integrated policy framework. The development of joint information and policy frameworks facilitates the need for collaboration outside of the usual departmental boundaries. For this to happen, it is crucial that activities to implement natural capital accounting are not limited to the production of accounts and the related data sources and methods, but are also extended to cover analysis and policy applications. A key constraint to achieving such an outcome requires changes in governance that enable commitment to the process. Such a process creates shared ownership, institutional cooperation, and the desire and ability to use effectively the accounts once they are produced (i.e. institutional and personal ownership).

4.3 Applying natural capital accounting to biodiversity, carbon and forests

The SDGs cover a large range of aspects of national development as well as environmental and economic management, for which the application of natural capital accounting is described in

⁴² <https://www.wavespartnership.org/en/zambia-joins-waves-identifies-priority-accounts-during-stakeholder-consultation-0>

Section 4.2 (above). Several countries and researchers have chosen to focus on particular SDGs, rather than the entire 17 SDGs. This section looks at the application of natural capital accounting to three specific SDGs: biodiversity, carbon or forests.

Biodiversity

Several contributions to the 2nd Policy Forum examined how biodiversity was included in NCAs and how this approach could be used in decision making in Australia (Keith et al. 2018; Summers et al. 2018), Peru (Portela et al. 2018), Uganda (King et al. 2018) and South Africa (Driver 2017). Encouragingly, the work in Uganda built on work presented at the 1st Policy Forum linking natural capital accounting to the Aichi Biodiversity Targets (Vardon et al. 2017b). King et al. (2018) extend the approach, mapping SDG 15 and the Aichi Targets to the NCAs under the System of Environmental-Economic Accounting (SEEA) (United Nations et al. 2014a, b). The examples from Australia, Peru, South Africa and Uganda illustrate that using accounting practices for biodiversity at the species and ecosystem level is possible and can also be useful for decisions relating to land management and endangered species protection.

Table 4.1 shows that for these four country examples, ecosystem extent accounts are the most common type of biodiversity account produced. These accounts can usually be produced with existing information on land cover obtained from remotely sensed data. Ecosystem extent accounts can be combined with other information to account for additional biodiversity values, for example, to judge the representativeness of the protected area network and to assess the supply of ecosystem services from different ecosystems. For example, two case studies presented at the 2nd Policy Forum featured work on the ecosystem service of water supply (Keith et al. 2018 and Driver 2017).

Management of threatened or charismatic (iconic) species can also be investigated via natural capital accounting. In this regard, different types of species accounts have been prepared, for example, two focusing on threatened species, one on species richness (total number of species occurring in a particular place), and another on charismatic species (Table 4.1). These types of accounts help to identify habitat for such species, from which decisions about extensions to the protected area network or for investments in the restoration of particular habitat types, can be made.

For international reporting, both SDG target 15.9 and Aichi Target 2 identify natural capital accounting as a means of ensuring biodiversity is considered in mainstream economic decision making. While the experiences to date in this regard are limited to a few countries, the examples presented here show promise for broader application in the future.

Table 4.1 Production and use of biodiversity accounts contributed to the 2nd Policy Forum

Country and region	Accounts produced	Policy issues addressed	Source
Australia – Central Highlands	Ecosystem extent Ecosystem condition Threatened species Ecosystem services	Expansion of protected area network Threatened species conservation Water management	1
Australia – Australian Capital Territory	Ecosystem extent Ecosystem condition Threatened species	State of the Environment and sustainability reporting	2
Peru – San Martin	Ecosystem extent Ecosystem condition Species richness Ecosystem services	National development planning Regional water resource management	3
South Africa – KwaZulu-Natal	Ecosystem extent	National and regional land use planning Expansion of protected area network Water management Investment in ecosystem restoration	4, 5
Uganda	Ecosystem extent Species accounts	National development planning National biodiversity conservation strategy	6

Source: 1). Keith et al. (2018); 2). Summers et al. (2018); 3). Portela et al. (2018); 4). Driver (2017); 5). Driver et al. (2015), and; 6). King et al. (2018).

Carbon and forests

Several carbon and forest accounts have been produced (e.g. Australia, Costa Rica, Guatemala Indonesia and the UK) and these have applied to a range of policy issues (Table 4.2). The forest accounts have been aimed at addressing land use planning and sustainable forestry (e.g. wood extraction is not greater than the regenerative capacity of forests). The examples from Guatemala (Banerjee et al. 2017), Costa Rica (Alvarado Quesada 2017) and Indonesia (Medrilzam and Adinia 2017) show that forest and carbon accounts are being used to protect, restore and promote sustainable use of forests, halt and reverse land degradation, and halt biodiversity loss. While these accounts provide essential information to monitor deforestation, they also link economic activity to national contributions to reduce greenhouse gas emissions. Similarly, forest, carbon and ecosystem services accounts have helped the Victorian government in Australia to compare the benefits from timber concessions with those from conserving forests (Keith et al. 2018; part 2 of this volume).

Furthermore, the forest accounts produced in the UK helped Forest Enterprise England to better quantify the ecosystem services provided by the forests they manage, and to better monitor changes in forest condition. These accounts also provided the Forest Enterprise board with better insights into the difference between the financial and social values of their forests (Winram 2017).

Table 4.2 Production and use of carbon and forest accounts contributed to the 2nd Policy Forum

Country and region	Accounts produced	Policy issues addressed	Source
Australia – Central Highlands	Forest extent Carbon stock Ecosystem services from forests (timber provisioning, water provisioning, carbon sequestration, and recreation)	Expansion of protected area network Sustainability of forest industry Water management Options for climate mitigation	1
Costa Rica	Forest extent Supply and use of timber	Forest management Deforestation policies Analysis of Payment for Environmental Services	2
Guatemala	Forest extent Supply and use of timber	Deforestation policies	3
Indonesia	In preparation	Options for climate mitigation	4
United Kingdom	Forest extent Supply and use of timber Ecosystem services from forests (timber provisioning, water provisioning, carbon sequestration, and recreation)	Forest management Monitoring changes in forest extent and condition	5

Sources: 1). Keith et al. (2018); 2). Alvarado Quesada (2017); 3). Banerjee et al. (2017); 4). Medrilzam and Adinia (2017), and; 5). Winram (2017).

4.4 Assessment of experience against the 10 living principles

The 10 living principles for making NCAs fit for policy emerged from the 1st Policy Forum (Table 4.3) (Bass et al. 2017). The aim of creating these principles was to have them tested and reviewed over time, hence the inclusion of the word “living.” Testing is important to see if these principles reflect the key issues identified by those producing or using natural capital accounts. Review is also important to see whether producers and users of the accounts use these principles in the development of natural capital accounting projects and, if not, understand why and update them as necessary.

Table 4.3 The 10 living principles for NCAs fit-for-policy purpose, grouped across four main areas (after Bass et al. 2017)

Comprehensive:	
1. <i>Inclusive</i>	Acknowledging the diverse stakeholders concerned with decisions affecting natural capital, responding to their information demands, respecting different notions of value, and using appropriate means of engagement.
2. <i>Collaborative</i>	Linking the producers of NCAs, the users of NCAs for policy analysis and the policy makers using the NCAs results, and building their mutual understanding, trust, and ability to work together.
3. <i>Holistic</i>	Adopting a comprehensive, multi/interdisciplinary approach to the economic and environmental dimensions of natural capital and to their complex links with policy and practice.
Purposeful:	
4. <i>Decision-centred</i>	Providing relevant and timely information for indicator development and policy analysis to improve and implement decisions with implications for natural capital.
5. <i>Demand-led</i>	Providing information actually demanded or needed by decision makers at specific levels.
Trustworthy:	
6. <i>Transparent and open</i>	Enabling and encouraging public access and use of NCAs, with clear communication of the results and their interpretation including limitations of the data sources, methods, and/or coverage.
7. <i>Credible</i>	Compiling, assessing, and streamlining data from all available sources, and deploying objective and consistent science and methodologies.
Mainstreamed:	
8. <i>Enduring</i>	With adequate, predictable resourcing over time; continuous application and availability; and building increasingly rich time series of data.
9. <i>Continuously improving</i>	Learning focused, networked across practitioners and users, testing new approaches, and evolving systems to better manage uncertainty, embrace innovation, and take advantage of emerging opportunities.
10. <i>Embedded</i>	NCA production and use becoming part of the machinery of government and business, building capacity, improving institutional integration for sustainable development, and incorporating NCAs use in procedures and decision-support mechanisms.

The presentations and written papers of the 2nd Policy Forum provide an opportunity to see how the 10 living principles produced from the 1st Policy Forum reflect current practice, as well as an opportunity to review and the update the principles as necessary. The following paragraphs examine the 10 principles grouped into the four main areas: comprehensiveness, purposeful, trustworthy and mainstreamed (Table 4.3).

Comprehensiveness

- **Living principle 1: Inclusive** – The experience of the 2nd Policy Forum showed that construction of NCAs is *inclusive* and as such, compel all parties involved to look beyond the factors usually considered by each in isolation. This inclusive nature makes NCAs suitable for the SDGs and the development of an inclusive policy framework. The use of NCAs in forest management in the UK (Winram 2017), Australia (Keith et al. 2018), Peru

(Portela et al. 2018) and Guatemala (Banerjee et al. 2017) shows that accounting helps to identify a range of services and beneficiaries of forests not always considered. Thus, the accounts present a more inclusive story about beneficiaries and go beyond simple binary choices (e.g. forest for timber harvesting or for nature reserve). The inclusive nature of the accounts also shows that those directly earning income from natural resources are not the only or main beneficiaries of the resource. The natural capital accounting being developed in Zambia is designed to support policies that aim to include all people and groups. Many of the contributions to the 2nd Policy Forum, as well as the papers in this report (e.g. Naidu and Vardon 2018; Bertrand et al. 2018; Webb 2018; Keith et al. 2018; and Summers et al. 2018), illustrate inclusive measures, specifically relating to consultation with multiple stakeholders.

- **Living principle 2: Collaborative** – Experience from Brazil, Botswana, Rwanda, Uganda, Indonesia, the Pacific, the Netherlands and Australia also shows that the natural capital accounting process is *collaborative*. Multiple agencies, ministries and environmental stakeholders, both nationally and internationally, are involved in producing the accounts. To achieve the SDGs, collaboration is key and actively supported by the custodian agencies of the individual SDGs. It is widely acknowledged that data for monitoring the SDGs has to come from many agencies. In this respect, the SDGs and natural capital accounting processes support each other. However, there are examples where accounts for a single resource, or SDGs for a single issue, are produced or analyzed in silos, only including the agencies that have collaborated in the past. As such, while accounts can play a role in stimulating *collaboration*, it remains a point of contention in some countries or agencies.
- **Living principle 3: Holistic** – The SDGs and natural capital accounting can be *holistic*. For example, the SDGs cover a broad range of policy fields, including all three pillars of sustainability. Natural capital accounting in principle is holistic, looking at natural capital from a broader perspective and in particular the different benefits and beneficiaries that can be gained from natural capital. The risk, however, is that both the SDGs and natural capital accounting are treated in silos. In some cases, natural resource conservation is not among the major policy priorities and, as such, demand for NCAs may be reduced (e.g. in Zambia). Conversely, the experiences in South Africa, Guatemala and Uganda show that ecosystem or forest accounts provide very relevant information and allow insights into the causes and solutions for poverty, hunger and inequality, demonstrating that policy use of NCAs can be broader than just conserving natural resources.

Purposefulness

- **Living principle 4: Decision-centered** – Decision-centered production of accounts has begun. Actual and potential uses of the accounts are very broad as described by Smith (2014), United Nations et al. (2017), Vardon et al. (2017a), and in this volume. For most countries, the concept of natural capital accounting is still relatively new and thus the production of NCAs is in its infancy. Therefore, clear examples have taken time to emerge. The 1st and 2nd Policy Fora have successfully facilitated the advancement and production of case studies and publicly brought experiences together. In some cases, the potential use of the accounts outside of government has occurred in the first instance, which is a key lesson that has emerged. For example, in Guatemala, it was the university that started constructing and using natural capital accounts. Once the Government appreciated the usefulness of national capital accounting, it began incorporating the production and use of accounts into government systems and processes. Examples where the accounts feed into

decision-making processes for developing and implementing policy responses have also been observed. For example, Brazilian water policies use the information from the water accounts in their decision making, while Costa Rica uses policy analyses based on natural capital accounting to inform energy and water policies. In Australia, the accounts for the Central Highlands could be used in decisions about timber harvesting and expanding the protected areas network. Finally, Rwanda wants to use natural capital accounting for land use planning and to feed into financial investment decisions.

- **Living principle 5: Demand-led** – Several examples of demand-led accounting exist where governments have demanded one or more accounts to support specific needs. In Botswana, it was the President who demanded natural capital accounting to support his sustainability ambitions for the country. In Australia, the Commissioner for Sustainability and the Environment of the Australian Capital Territory asked for NCAs to be undertaken for State of the Environment reporting. In the UK, Forests England asked for the creation of forest accounts, to learn more about changes in, and uses of, its assets nationally. Finally, in Uganda, the Government asked for biodiversity accounts in order to be able to report against the Aichi biodiversity conservation targets. In terms of the policy cycle and natural capital accounting (Vardon et al. 2016), these examples focus mainly on monitoring and review but also move into issue identification by informing or creating awareness in civil society.

Trustworthy

- **Living principle 6: Transparent and open** – Transparency and openness are key to natural capital accounting. For example, all-natural capital accounts produced by governments and others are published and made available to the public. This openness is also important for the SDGs and reporting against such goals. For example, the statistical process led by UNSD promotes a transparent and open SDG monitoring process. The NCAs prepared for businesses are also transparent and open with, public consultations on the sector guides of the Natural Capital Protocol, for example.⁴³ Many businesses use the NCAs to demonstrate to the public what they do to operate more sustainably. It is possible that some businesses, especially those for whom it is difficult, if not impossible, to prevent negative impacts, will not make their accounts public, and instead use them for internal decision-making processes.
- **Living principle 7: Credible** – The use of international frameworks for NCAs ensures that the accounts produced are *credible*. While governments use the SEEA as the framework for natural capital accounting, many businesses use the Natural Capital Protocol. The development of these frameworks using international processes, and their subsequent testing and use by countries and business, means that the accounts produced are *credible* and defensible. The ongoing development of each of these frameworks, in particular their extensions into ecosystem accounting, will help to maintain and extend the credibility of these accounting approaches in the future.

Credible accounts are also insured by data quality assessment processes promoted by international organizations⁴⁴ and used by government statistical agencies. There are also

⁴³ E.g. the forest products sector guide to the Natural Capital protocol, <https://collaborase.com/forest-products>

⁴⁴ E.g. International Monetary Fund data quality reference site, <http://dsbb.imf.org/pages/dqrs/dqaf.aspx>

academic processes. The case from Australia of accounting for the Central Highlands is interesting because there were several different publications for distinct groups of stakeholders: a policy brief for policy makers, a popular article for the general public, a scientific article to assure scientific soundness, and a full report containing all details of the data sources and methods. Another interesting example comes from Brazil, where a range of infographics were published to explain in clear and graphically appealing terms what the Government learned from their water accounts. Both examples illustrate how the presentation of the NCAs can help to build credibility.

A necessary but sometimes missing step in establishing credibility is explaining how NCAs are used in policy models. For example, countries like Indonesia, Costa Rica, Guatemala and Rwanda have used accounts in models for prospective assessments of policy instruments, and even though these models have been extensively explained in a technical way and the results are useful for policy analysis, for outsiders these models can look like black boxes. It is thus important that the modellers and policy developers using the models are capable of explaining in general terms how their models function and what the results mean for policy. Perceptions that the models based on NCAs are black boxes will threaten their credibility.

Mainstreamed

- **Living principle 8: Enduring** – Within government, *enduring* production of accounts has occurred in Australia, the Netherlands, the UK and other high-income countries. Ongoing resourcing for account production has occurred in Botswana, Colombia, Costa Rica and Mexico, with each of these countries producing accounts without financial or technical support from donors. Planning for account production in other countries (e.g. Guatemala, Indonesia, the Philippines, Rwanda and South Africa) is beyond the support provided by international agencies (e.g. United Nations and World Bank). In all of these countries, account production is firmly established within their statistical agencies, central banks and/or ministries, resulting in high-level support from government agencies that are users of the accounts.

In several cases, account production and analysis were a one-off event, as seen in the work of the Australian National University in Central Highlands of Victoria, Australia (Keith et al. 2018) and the UNEP-WCMC in Uganda (King et al. 2018). One reason for this may be that such programs support a one-off decision, like in the case of Australia or some of the business initiatives presented by Brown et al. (2018). Alternatively, the accounts may have been produced as a pilot to illustrate the potential uses of the accounts to government and other stakeholders (like in the case of Uganda).

- **Living principle 9: Continuously improving** – It is still too early to see whether countries that have only recently begun producing NCAs are *continuously improving* them. Where the accounts have been produced for extended periods of time (e.g. Australia, the Netherlands and the UK) as well as some of the more recent examples (e.g. Botswana, Colombia and Costa Rica), we have observed that natural capital accounting involves learning-by-doing. To illustrate this point, the first accounts take more time to produce than subsequent ones, as account production becomes faster and better. Account producers also learn more about the system, find new data sources or additional ones become available, or innovative ways to use existing data are developed (e.g. translating remote sensing or administrative data into accounts). Moreover, participation in expert

international fora, such as the London Group on Environmental Accounting,⁴⁵ and the 1st and 2nd Policy Fora, give participants new skills and experiences to improve their accounts. All of the countries that participated in the 1st and 2nd Policy Fora are enthusiastic about continued production of accounts.

- **Living principle 10: Embedded** – Embedding account production and use within government remains a challenge. While there is generally good progress with account production and systems are in place for collecting and accessing data as well as assessing and assuring its quality, *embedding* the NCAs in policy analysis (i.e. development and/or implementation), requires more effort and commitment. A key issue is that, for accounts to be used, they first need to be created and then they have to be understood and appreciated in terms of the benefits to policy and analysis. Since governments have historically functioned without NCAs, many agencies do not see the need for them. In some cases, government agencies do not want them as the information they reveal may challenge the status quo. Thus, some policy agencies may be a barrier to the production of accounts. Hence, in many cases the first accounts tend to be produced independently by a statistical agency or university. This supply-led approach is likely to continue to be necessary until NCAs are considered fundamental, like the national economic accounts.

The next barrier to production and use of accounts is improving the understanding of such accounts within the government policy and management agencies. Without such understanding, it is almost certain that these accounts will not be used or embedded within government processes or in the analyses from outside on which they rely. We have learned from the application of the IEEM model in Costa Rica that embedding requires a proper translation of the results in a way that is attractive and understandable by policymakers. This highlights the need for clear communication as well as the importance of providing a range of case studies that illustrate how NCAs can be used for particular analyses, models and evaluations in government processes – the primary objective of the Policy Forum.

4.5 Conclusions

Based on the material shared and discussed at the 2nd Policy Forum, combined with further analysis of the Forum material and other related studies (see above), it is clear that natural capital accounting is gaining traction in policy circles globally. Based on our review of the 2nd Policy Forum, we identified four key conclusions:

1. The natural capital accounting community of practice is growing in terms of (i) the amount examples where NCAs are being successfully used; and (ii) the number of people and organizations actively undertaking NCAs.
2. Producing NCAs can help countries to attain the SDGs as well as assess and evaluate trade-offs between different SDGs.
3. The 10 living principles developed from the 1st Policy Forum are supported by experiences. However, we need to emphasize the continuous effort required to apply them, particularly for mainstreaming and improved collaboration.
4. The Policy Forum is an important platform in the development and application of natural capital accounting through (i) the sharing of experience; (ii) highlighting examples of the connection to policy; (iii) providing guidance; and (iv) focusing attention on areas in need of future research.

⁴⁵ <https://unstats.un.org/unsd/envaccounting/londongroup/>

The number of countries, organizations and people involved in the Policy Forum has increased significantly. The 2nd Policy Forum was co-hosted by the United Nations Statistics Division which, as well as increasing the technical expertise of the production and use of NCAs within the Forum, also attracted additional countries, namely Brazil, Mexico, South Africa, India and China. The connection to business was also strengthened between the 1st and 2nd Policy Fora. This growth in participation is a clear sign that linking NCAs to decision making is of great interest to governments, business, academics and non-government organizations.

Importantly, the 2nd Policy Forum revealed that a range of natural capital accounting work related to the SDGs was occurring. This work began by using the natural capital accounts as an information platform for producing the indicators related to the SDG targets. Additionally, a range of countries including Australia, Costa Rica, Guatemala, the Netherlands and the UK have shown that NCAs can provide information that is important for formulating and implementing policies needed to achieve the SDGs. This work is exciting and promising but still in its infancy.

One year on and the 10 living principles have stood up to their first round of examination. While they have not yet been used explicitly upfront to design natural capital accounting programs, retrospective analysis shows they underpin the accounting process. Going forward, greater emphasis on mainstreaming of the principles is needed to help secure the resources needed for ongoing production of NCAs and also for establishing the networks and understanding needed within governments and business for their effective use in analyses and decision-making processes.

While it is clear that much work remains to make the link between NCAs to decision making common place, examples are emerging that will aid future progress. The 1st and 2nd Policy Fora highlighted many of these examples, as well as the need for this work to continue. It is of great importance that the producers and users of NCAs continue to regularly come together, to share experiences, highlight achievements, reflect on challenges, distil lessons, and identify opportunities. Going forward, guidelines for applying NCAs to the SDGs could be produced, while the application of natural capital accounting to standard government and business processes, such as budgeting and investment decisions, should be explored.

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