INCORPORATING BIODIVERSITY AND ECOSYSTEM SERVICE VALUES INTO NBSAPS

GUIDANCE TO SUPPORT NBSAP PRACTITIONERS

UNEP WCMC

Institute for European Environmental Policy

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Convention on Biological Diversity

NBSAP FORUM Support for action on NBSAPs

2011-2020 United Nations Decade on Biodiversity

This guidance has been produced as an output of a joint UNEP-WCMC and IEEP project, funded by Defra, and in collaboration with the Secretariat of the CBD to examine the '*Lessons learnt from incorporating biodiversity and ecosystem service values into NBSAPs*'.

PURPOSE OF THIS GUIDANCE

This guidance document has been prepared to support NBSAP practitioners in producing updated NBSAPs which are compliant with Aichi Biodiversity Targets 1 and 2 through the incorporation of biodiversity and ecosystem service values. Specific content, which can be found in this guidance, includes:

- An upfront document map detailing the key steps for NBSAP updating, the different approaches that can support the process, and how this relates to the rest of the document, providing a quick guide for readers to help navigate the different sections
- NBSAP revision steps and points of entry for incorporating values
- The different approaches to identifying, integrating and accounting for values, and where these fit into the NBSAP revision process
- Common lessons of good practice extracted from six case studies (full case studies provided in the Annex: www.unep-wcmc.org/guidancefornbsaps-1026.html)
- Sources for further information

This document has been produced in conjunction with a summary road map. *The Road map for incorporating biodiversity and ecosystem service values into NBSAPs* can be viewed online: www.unep-wcmc.org/roadmapfornbsaps_1027.html

FRAMEWORK FOR INCOPORATING VALUES INTO NBSAPS

The backbone to this document is a framework to assist NBSAP practitioners in understanding why and identifying how biodiversity and ecosystem service values can be incorporated into NBSAPs.

This framework can be viewed as a map to this guide, which is separated into three sections to help NBSAP practitioners answer the following questions:

- ***Why*** should we incorporate values of biodiversity and ecosystem services into our NBSAP? What are the benefits of doing so?
- ***How*** can these values be incorporated as part of in the NBSAP updating process?
- ***What*** approaches are available to support the incorporation of these values into NBSAPs?

Key steps to NBSAP Updating Process – HOW to incorporate the values of biodiversity and ecosystem services into NBSAPs (Section 2)

WHY incorporate the values of biodiversity and ecosystem services into NBSAPs? (Section 1)

Overarching priorities	Nature's contribution to the economy and human well-being (p14)
	CBD commitments (p19)
Country-level priorities	Mainstreaming (p21)
	Achieving national outcomes (p24)

Supporting APPROACHES for incorporating biodiversity and ecosystem service values into NBSAPs (Section 3)

		Stakeholder engagement (p56)	**Ecosystem assessment** (p60)	**Ecosystem service mapping** (p66)	**Ecosystem service Indicators** (p70)	**Monetary valuation** (p77)	**Accounting** (p83)
Getting organised (p29)	◆ Organise logistics ◆ Take Stock	**Organising logistics** and **taking stock** will require some initial ***stakeholder engagement***: for consultation on the existing NBSAP and identifying gaps; for gathering a suitably-skilled team; and for developing a shared structure and plan to take the revision forward. Considering biodiversity and ecosystem service values at this stage will allow the development of an engagement strategy and workplan, which will ensure the incorporation of these values.					
Engaging and Communicating with stakeholders (p32)	◆ Identify relevant stakeholders ◆ Develop tailored communication and outreach plan	Comprehensive ***stakeholder engagement***, across a range of actors, is fundamental to identifying national priorities, understanding and aligning diverse values, and incorporating these values into the overall goals of NBSAP updating. Stakeholder engagement is both an important step and an underlying approach which should be considered throughout, with on going communication and outreach to mainstream the NBSAP into sectors and society					
Gathering information (p35)	Assess: ◆ Status & trends of biodiversity & biodiversity loss ◆ Linkages between biodiversity & society ◆ The legal, institutional & policy environment ◆ Biodiversity finance ◆ Status of public awareness ◆ Identify knowledge gaps	Robust biophysical data underpins biodiversity and ecosystem service values. An ***ecosystem assessment*** can help to gather data on the status and trends of biodiversity, and its links to human well-being and society. ***Ecosystem service mapping*** and ***ecosystem service indicators*** are also useful entry points for representing and communicating spatial and temporal data of this nature, providing a 'stock take' of natural capital and helping to identify targets, priorities and actions for NBSAPs. **Monetary valuation** can be undertaken within the same process to explicitly demonstrate the economic benefits of biodiversity and ecosystem services. Similarly, **natural capital and environmental economic accounts** can (over time) offer additional indicators on the state of natural capital, related changes (including drivers of degradation) and implications for the economy.					
Developing strategies and actions (p40)	◆ Establish national vision ◆ Set national targets ◆ Identify specific strategies	**Stakeholder engagement** and deliberative processes can act to identify realistic and workable strategies for incorporating and mainstreaming ecosystem service and biodiversity values. This may be used in conjunction with an **ecosystem assessment**, and other information gathering approaches, to communicate values to decision-makers, develop plausible future scenarios and identify scientifically-informed strategic options for the NBSAP.					
Developing implementation and resource mobilisation plans (p43)	◆ Outline and prioritise specific actions ◆ Develop resource mobilisation plan ◆ Ensure strategies and actions are fully incorporated into national policies ◆ Finalise indicator set and develop monitoring plan ◆ Develop plan for Clearinghouse Mechanism	Identifying specific actions for biodiversity and key ecosystem service values will involve **stakeholder engagement** to discern key actors and ensure the actions are realistic and practical for those actors. Information on ecosystem services from **assessments**, **mapping**, **indicators**, **accounting** and **valuation** help to identify key themes and priorities, and a number of instruments including **policy documents**, **legislation** can put actions into practice. Carrying out actions and initiating change may require additional resources, or a new resource mobilisation plan. **Monetary valuation** techniques can help to put values into economic terms, put resource requirements into context and engage new funders. Similarly, improved understanding of a country's natural capital stock and depreciation can encourage efforts at mobilising funding. Finally, revised **legislation** can also support innovative biodiversity financing.					
Implementing the NBSAP (p48)	◆ Engage stakeholders in implementation ◆ Implement specific NBSAP strategies and actions ◆ Mobilise domestic and international financial resources	New **policy documents** and **legislation** can act as practical instruments for implementing change. Facts and figures from **ecosystem assessments**, **environmental-economic accounts** and **monetary valuation** studies can each demonstrate the biodiversity and ecosystem service values in the NBSAP, strengthening political will and sectoral implementation, facilitating biodiversity mainstreaming.					
Monitoring and reporting (p50)	◆ Develop National Reports ◆ Communicate results of implementation ◆ Review and adapt priorities	Following the progress of the NBSAP and its implementation is critical for continuous learning and adaptive management. On going **stakeholder engagement** can communicate biodiversity and ecosystem service values as part of the NBSAP, develop opportunities for knowledge transfer, and maintain interest as national circumstances and values change. Additionally, monitoring the impacts of NBSAPs on ecosystem services, biodiversity and human-well being, and periodically reviewing and adapting the NBSAP as necessary, can be supported by on going **assessment**, **mapping**, maintaining **natural capital and environmental economic accounts** and tracking **ecosystem service indicators**.					

CONTENTS

Document Development

This guidance originates from a joint UNEP-WCMC and IEEP project, undertaken in collaboration with the CBD Secretariat to identify the 'Lessons *Learned in Incorporating the Values of Biodiversity and Ecosystem Services into National Biodiversity Strategies and Action Plans*'.

The project pulled together a significant knowledge base which integrated a literature review with the knowledge and experiences of CBD Parties themselves. An online survey was disseminated to CBD National Focal Points, or where suitable, alternative country representatives with a significant role in NBSAP revision. As well as remote follow up with survey respondents, six case study countries were identified for in-depth consultations (Micronesia, Georgia, Burkina Faso, Norway, Guatemala and South Africa). The countries were chosen to represent different approaches, geographical regions, capacity levels, socioeconomic contexts and stages in NBSAP development. For more detailed information on each country, the case studies can be found in the Annex www.unep-wcmc.org/guidancefornbsaps_1026.html.

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Further information

This guidance document is one of two complementary key outputs of the project '*Lessons learnt from incorporating biodiversity and ecosystem service values into NBSAPs*':

Roadmap: an easily accessible tool to support Parties in incorporating biodiversity and ecosystem services into NBSAPs. This document provides succinct information on how values can be incorporated, the entry points at different stages of NBSAP updating process, and the different approaches to support incorporation of values www.unep-wcmc.org/roadmapfornbsaps_1027.html.

Guidance document: The guidance document compliments the road map and provides more detailed information of experiences and lessons learned, as well as further technical information on process and approaches www.unep-wcmc.org/guidancefornbsaps_1026.html.

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INTRODUCTION

Purpose

This guidance is designed to help Parties to the Convention on Biological Diversity (CBD) and, more specifically, National Biodiversity Strategies and Action Plan (NBSAPs) development practitioners, to incorporate the values of biodiversity and ecosystem services into NBSAPs.

The incorporation of biodiversity and ecosystem service values into NBSAPs has been called for under the Strategic Plan for Biodiversity 2011-2020, and the corresponding Aichi Biodiversity Targets 1 and 2, adopted at the 10th meeting of the Conference of the Parties to the CBD (COP 10).

Incorporating biodiversity and ecosystem service values into NBSAPs is expected to improve biodiversity mainstreaming, assist the achievement of specific national outcomes, and facilitate a concerted global effort to improve natural resource management, halt the loss of biodiversity and ensure the provision of ecosystem services and sustained human well-being now, and in the future. This would in particular be achieved through helping to identify win-win opportunities, where multiple policy objectives can be met cost-effectively. It can also help identify trade-offs that may merit being avoided.

Use

A large evidence base has supported the production of this guidance document, including individual case studies (Annex) conducted with Burkina Faso, Federated States of Micronesia, Georgia, Guatemala, Norway and South Africa. From this diversity of information, a wide range of useful supporting approaches and examples have been identified for incorporating biodiversity and ecosystem service values throughout every stage of the NBSAP development and implementation process. It is important to note that parties will ***not need to complete every task detailed here*** in order to fully incorporate the values of biodiversity and ecosystem services into NBSAPs, rather, the guidance aims to illustrate a range of options, from which Parties can chose and apply depending on their specific national context and requirements. There are multiple points of entry and a great deal of overlap: common examples of **good practice** (box 1.1) emerge across case studies, and **supporting approaches** to highlight values (box 1.2) can be applied across stages, providing 'quick win' opportunities for success.

Box 1.1
Good practice

- Apply a clear governance structure
- Ensure a common understanding amongst all stakeholders
- Focus on national priorities and key themes
- Use existing structures and processes
- Integrate bottom-up and top-down approaches
- Make the most of existing data

Box 1.2
Supporting approaches

- Stakeholder engagement
- Ecosystem assessment
- Ecosystem service mapping
- Ecosystem service indicators
- Monetary and non-monetary valuation
- Accounting
- Policy documents & legislation

Supporting Roadmap

To accompany this guidance document a summarising **roadmap** is also available. This roadmap serves as a concise, easily accessible document, mapping the stages of the NBSAP development and implementation process with a way forward for parties to incorporate biodiversity and ecosystem service values. This roadmap relates closely to section 2 of this guidance document, which can be referred to for more information.

Definitions

Before beginning to use this guidance, you may have a number of questions about some of the terms, in particular '**values**', '**ecosystem services**', and '**biodiversity**'. Firstly, this is not uncommon. The natural environment is complex and these topics have still received relatively little attention in the scientific literature. Further, this is not something to be taken lightly, or to be afraid to ask about. They are important terms and there is still yet to be a final consensus on their exact meaning.

Before the guidance begins, it is therefore important to clarify what the ***guidance*** means by these terms, to ensure you are aware of how they will be used here.

Box 1.3
But what do we mean by 'values'?

In this context, we are taking a very broad approach to the values of biodiversity and ecosystem services. Values can simply mean 'the regard that something is held to deserve' or 'the importance or preciousness of something'. Values therefore are not necessarily (and often cannot be) identified in quantitative terms.

Here, reference to values includes economic, cultural and social values as well as the intrinsic values of biodiversity, which can be represented in a variety of units - physical, qualitative, quantitative and monetary. Economic values can include market and non market values and benefits from ecosystem services (provisioning, cultural, regulatory, habitat/supporting).

This guidance therefore serves as an opportunity to highlight why biodiversity and ecosystem service values are important, and demonstrate a range of practices and lessons for identifying values, beyond monetary and quantitative methods alone.

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Box 1.4
What exactly are 'ecosystem services'?

Although there is no universal definition, the most commonly cited explanation of ecosystem services comes from the Millennium Ecosystem Assessment (MEA, 2005) and CBD article 2. That is, ecosystem services are ***the benefits that people obtain from ecosystems***, where an ecosystem is a dynamic complex of plant, animal and micro-organism communities and the nonliving environment interacting as a functional unit. Or more simply, ***the benefits that people derive from nature***. Ecosystem services consider both the ecosystems from which the services are derived, and the people who depend on and are affected by changes in their supply. There are no ecosystem services without people.

See the table below for the four typologies of ecosystem services, and examples:

Type of service	Examples of related services
Provisioning services (The products we obtain from ecosystems)	Food
	Water
	Raw materials
	Genetic resources
	Medicinal resources
	Ornamental resources
Regulating services (The benefits we obtain from the regulation of ecosystem processes)	Air quality regulation
	Climate regulation (including carbon sequestration)
	Moderation of extreme events
	Regulation of water flows
	Waste treatment
	Erosion prevention
	Maintenance of soil fertility
	Pollination
	Biological control
Habitat/Supporting services (Ecosystem functions that are necessary for the production of all other ecosystem services)	Lifecycle maintenance
	Maintenance of genetic diversity
	Soil formation
	Nutrient cycling
Cultural services (the non-material benefits we obtain from ecosystems)	Aesthetic enjoyment
	Recreation and tourism
	Inspiration for culture, art and design
	Spiritual experience
	Cognitive development

The Economics of Ecosystems and Biodiversity (TEEB) classification of ecosystem services (Kumar, 2010).

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Box 1.5

What are the links between biodiversity and ecosystem services?

Biodiversity underpins the provision of ecosystem services, and the resilience of ecosystems to future change. It has been suggested that biodiversity should be assessed as a service itself, similar to the approach of TEEB which used 'Habitat Service' as a main category. Our knowledge of the trends and drivers of change in biodiversity and economic consequences of biodiversity loss on human well-being has improved significantly over the last decade (Balmford et al. 2008). It has been shown that there is continuing trend in the decline of biodiversity (Butchart et al. 2010), and such losses will not only affect the flow of services and benefits derived from them, but also the resilience of ecosystems.

However, the quantitative links between biodiversity and ecosystem services are complex and, at present, the understanding of these is still relatively weak. Although there are examples of management options that deliver favourable outcomes for both ecosystem services and biodiversity, the theoretical and empirical evidence of the scale of synergies is still developing. In addition, the direct links between biodiversity and human and societal well-being are still being explored. It is however already clear that the provision of benefits often depends on the size, location and conditions of ecosystems, the species they contain and the interactions of ecosystems with social and economic systems.

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SECTION 1
Why incorporate the values of biodiversity and ecosystem services into NBSAPs

Fully appreciating the value of biodiversity and ecosystem services, and incorporating them into NBSAPs, is much more than a policy commitment.

NATURE'S CONTRIBUTION TO HUMAN WELL-BEING

Correlations between human well-being and natural capital are evident (Engelbrecht 2008). Nature provides humanity with a multitude of benefits. Some of these are provided directly, such as food, water, fuel and materials for construction and their benefits are obvious. Many more are hidden, such as water purification, climate regulation and managing natural hazards such as flooding and fires. Nature also creates opportunities for recreation and tourism, is integral to identity and cultural values, functions as a living library for science, and provides a store of information at the genetic, organism, species and ecosystem level.

Box 2.1
Natural capital:

refers to the stock of environmental assets contained within an ecosystem. This includes renewable and non-renewable resources and natural features essential for supporting life. They underpin the provision of flows or yields of a range of ecosystem goods or services.

These benefits can be captured under the term ecosystem services (Box 1.4). Ecosystem services articulate the connection between environmental issues and people. Human survival and well-being is utterly dependant on these ecosystem services, and thus on the health of the ecosystems that provide them. This can be realised on both a community level, through the important role of ecosystem services in livelihoods and local food security, and on a national and macroeconomic scale through contributions to poverty reduction, development and long-term economic growth. Further, investments in nature and its sustainable management can be significantly more cost-effective than investments in other forms of capital or engineered solutions for delivering services and benefits, especially if the wider co-benefits are considered (see table 2.1). For these reasons it is important that the many values of nature and the services it provides are no longer invisible, underappreciated, or overlooked.

Communities and livelihoods

Human and societal well-being depends on nature. Where natural capital is degraded and lost, there is a risk that communities are undermined and humans suffer (e.g. MA 2005). In contrast, efforts to conserve, restore and sustainably use natural capital can improve human well-being, support livelihoods and increase socio-economic and intergenerational equity (TEEB 2011A, TEEB 2012). Examples include increased employment opportunities, increase provision of food, water, fibre and medicine, improved agricultural productivity, reduced risk from natural disasters and livelihood diversification (See table 2.1).

Box 2.2
Livelihood:

a means of support and subsistence. This includes basic human needs such as food, shelter, security and freedom of choice.

Efforts to conserve, restore, and sustainably use natural capital can also increase ecological resilience. A resilient ecosystem can continue to provide ecosystem services to local communities under changing environmental conditions, such as climate change, and thus support community viability and livelihoods in the long-term. Healthy, functional, resilient ecosystems can be seen as a life insurance policy for many communities, with ecosystem-based adaptation increasingly harnessed to enhance food security at local, national, regional and global levels (Munang et al. 2013).

Box 2.3
Ecological resilience:

the adaptive capacity of an ecosystem to withstand shocks and rebuild itself, or persist on a given developmental trajectory

Nature also makes an invaluable contribution to health and mental well-being (e.g. Pretty 2004, Ulrich 1984, and Moore 1982). Many religious and cultural practices and the identities of indigenous groups intrinsically depend on nature, sometimes through highly specialised beneficial interactions, such as the Lesser Honeyguide, a bird species leading Masai tribesmen to valuable, nutritious beehives.

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Table 2.1. Examples of the benefits provided to countries through the conservation of biodiversity and maintenance of ecosystem services.

Location	Intervention(s)	Benefits	Outcome(s)	Source
South Africa	Wetland restoration	Immediate employment opportunities provided by the restoration project itself Crop and reed production Water for domestic purposes Grazing for livestock	Improved livelihoods for local poor communities	Turpie et al. 2009
India (Hiware Bazaar)	Regeneration of degraded forests Building earth embankments around hills	Conserved rain water & recharged groundwater, combating acute water shortages	Increased agricultural productivity potential by several orders of magnitude Contributing to reducing poverty by 73% in less than a decade	Singh et al. 2010
Tanzania (Shinyanga region)	Restoration of the Nihili woodland by utilising traditional knowledge	Increase in the direct provision of ecosystem services from the woodland (fuel, fruit, timber, honey, medicines, fodder)	Reduction in the time needed to collect fuel wood and non-timber forest products by several hours Sale of tree products has helped pay for children's schooling and allowed more time for education and productive work, thus creating enabling conditions for development	Barrow and Shah, 2011
Cambodia (Ream National Park)	Protection (marine)	Fish breeding grounds Subsistence goods from mangroves Storm protection and erosion control	Livelihoods and food security for local fishing communities	Emerton et al. 2002
Venezuela	Protection (terrestrial)	Reduced soil erosion Improved water supply	Improved livelihoods for local farmers	Gutman, 2002
Finland	Protection (terrestrial)	Increased visitor spending	Boosted the local economy	Metsähallitus, 2009
New Zealand (Dunedin)	Protection (terrestrial)	Improved water supply	Reduced costs of water supply to local community	BPL, 2006
Vietnam	Restoration of mangroves	Improved flood and storm defences	Livelihood security for local community	Brown et al. 2006
Germany	Restoration of peatlands	Carbon storage	Mitigation of climate change	Schäfer, 2009
USA (New York)	Management and restoration of watershed ecosystems	Increased clean water provision	Avoided significant price rise which would have resulted from an engineer's solution	Neßhöver et al. in TEEB 2011A
Mexico	Payment for ecosystem services – water charges support community engagement in forest management	Aquifer recharge, improving hydrological service benefits Reduced deforestation Species conservation	Poverty reduction Improved water security Climate change mitigation	Muñoz et al. 2010

Development and the economy

It is evident that the maintenance of healthy and resilient ecosystems can contribute to meeting multiple policy objectives simultaneously. For example, the UK National Ecosystem Assessment explored future implications of different policy scenarios on the provision of various ecosystem services from 2010 to 2060. The scenarios which involved working with nature resulted in significant gains in ecosystem services and led to the most important long-term economic gains to society (UK NEA 2011).

In South Africa, it was calculated that the value of livelihood benefits derived from the degraded Manalana wetland (located near Bushbuckridge, Mpumalanga) was just 34% of what could be obtained from a healthy ecosystem. In addition, the Manalana wetland acts as a safety net for poor households during periods of economic difficulties such as high unemployment (Pollard et al. 2008).

Healthy and resilient ecosystems can contribute to delivering broader development goals, especially on poverty eradication. In turn, the degradation and loss of natural capital can undermine development and long-term economic growth and prosperity - global commitments to improve well-being and eradicate poverty are more difficult to achieve without recognising and taking into account the value of natural capital and its associated benefits.

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Investments in the restoration of ecosystems and the designation of protected areas and associated conservation measures have demonstrated benefits from the local to the global level (e.g. Munang et al. 2013, TEEB 2011A, TEEB 2012. See Table 2.1). At the city, regional and national levels, safeguarding and investing in natural resources can address environmental objectives, foster growth and development and create employment opportunities. Further, nature in and around cities is often considered a core element of effective urban planning, investment and management (TEEB 2011A, TEEB 2012). Looking at the benefits of nature from a national perspective can also be important for long-term strategic planning and choosing development pathways. A wide range of studies have also attempted to put a monetary value on various ecosystem services, to illustrate their considerable contribution to the economy (see Table 2.2).

To fully realise nature's contributions to development and prosperity, the focus needs to be not only on effectively responding to the symptoms (e.g. degradation, loss of ecosystem functions and services) but also to the underlying causes and drivers of the problems (e.g. production methods and consumption levels). Addressing these simultaneously will be essential to achieving lasting results. Biodiversity policy should not be seen as independent of sectoral and cross-sectoral policies, and sectoral and cross-sectoral policies should be seen as "the vehicles through which crucial biodiversity goals need to be attained in order to maintain, and enhance, human well-being" (SCBD, 2011).

Table 2.2: Estimate values of biodiversity and ecosystem services. Some of these studies are some years old now, but the order of magnitude of these estimates serves to put conservation and restoration budgets into perspective.

Ecosystem service	Specific examples	Value from study	Source
Food	Global fish catch	Actual landed value $70 billion/year (full supply chain value is much higher). Inefficient use of the global fish stock is estimated to lead to $50 billion/year less than optimally managed globally fisheries	World Bank 2010 World Bank 2008
Fresh water	Auburn, Maine watershed	$570,000 initial cost to purchase land avoided $30 million in capital cost and an additional $750,000 annual costs $300 million/year	Ernst 2004
Biotechnology	Wild genetic resources	26% of all new approved drugs over the past 30 years are, or have been derived from, natural products.	Newman and Cragg 2012
	Cardiovascular drugs from Gingko tree	Turnover of $360 million/year	TEEB 2008
Sport	Nature-based recreation (e.g. hunting, fishing and observing wildlife) in the US	$122 billion (nearly 1% GDP) in 2006	US Fish and Wildlife Service, 2007
Tourism	Coral reef- and mangrove-associated tourism in Belize	$150-196 million in 2007 (12-15% GDP)	Cooper et al. 2008
	The Cairngorms National Park, Scotland	1.4 million visitors per year each spending on average $100 per day	Cairngorms National Park Authority, 2005
	Tourism related to protected areas and nature in Bolivia	Estimated to generate approximately 20,000 jobs, indirectly supporting close to 100,000 people	Pabon-Zamora et al, 2009
Genetic resources	Pharmaceuticals	25-50% of the pharmaceuticals industry's turnover (which is approximately US$825 billion per year) is attributable to genetic resources	Ten Kate and Laird, 1999 Bishop et al. in TEEB 2011B
	Overall value of commercial seed market	US$30 billion	SCBD 2008
Carbon sequestration & climate regulation	Carbon storage service of the UK's trees	At least $2.6 billion	Brainard et al. 2003
	Carbon storage and sequestration of urban trees in the US	Storage value: $14.3 billion Sequestration value: $460 million/year	Nowak and Crane 2002
	Carbon sink function of natural peatlands in Ireland	Benefits in terms of carbon restoration were worth on average €1,506 per ha for the avoided carbon loss (75 tCO2eq. per ha; adopting a carbon price of €20t CO2eq.) and €118 per hectare/year for the average net carbon sequestration (5.9 tCO2eq. per ha/ year)	Wilson et al. 2012
	Seagrass carbon storage around the world	Around 3 tonnes of carbon are stored in living seagrass per hectare covered 4.2 to 8.4 billion tonnes of organic carbon stored globally in the top metre of seagrass soils.	Fourgurean et al. 2012

THE CONVENTION ON BIOLOGICAL DIVERSITY

In an attempt to create a global concerted effort towards halting the loss of biodiversity, the United Nations Convention on Biological Diversity (CBD) entered into force on 29 December 1993 with 3 main objectives:

1. The conservation of biological diversity.
2. The sustainable use of the components of biological diversity.
3. The fair and equitable sharing of the benefits arising out of the utilisation of genetic resources.

On ratifying the CBD, parties assume a set of commitments, the main aim of which is to ensure they meet the three objectives of the Convention. Through Article 6,[1] each party is obliged to develop a National Biodiversity Strategy and Action Plan (NBSAP) which is intended to act as a road map of how the country, taking into account specific national circumstances, intends to fulfil these objectives and integrate the conservation and sustainable use of biodiversity into relevant sectoral or cross-sectoral plans, programmes and policies.

The new Strategic Plan

The 10th meeting of the Conference of the Parties to the Convention on Biodiversity (CBD COP 10) in 2010 saw the adoption of the new Strategic Plan for Biodiversity 2011-2020 (Decision X/2). This is comprised of a shared vision, a mission, strategic goals and 20 targets, collectively known as the Aichi Biodiversity Targets. The goals and Aichi Biodiversity targets comprise both: (i) aspirations for achievement at the global level and (ii) a flexible framework for the establishment on national targets. In the same Decision parties were urged to revise and update their NBSAPs, to translate this overarching international framework into revised and updated NBSAPs.

Strategic Goal A of the Strategic Plan calls for Parties to '***address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society***'. Of the Aichi Biodiversity Targets identified for achieving this goal, two specifically call for Parties to create awareness of the values of biodiversity and integrate biodiversity values into strategies and planning processes as well as their integration in national accounting:

- **Target 1:** *By 2020, at the latest, people are* ***aware of the values of biodiversity*** *and the steps they can take to conserve and use it sustainably.*
  An improved understanding of the values of biodiversity, including its importance for development and human well-being, can provide evidence to promote awareness and invoke the behavioural changes necessary to conserve and use it sustainably.

- **Target 2:** *By 2020, at the latest,* ***biodiversity values have been integrated*** *into* ***national and local development and poverty reduction strategies and planning processes*** *and are being incorporated into* ***national accounting****, as appropriate, and* ***reporting systems****.*
  This target specifically calls for biodiversity values to be incorporated into a range of national and local strategies and planning processes, including NBSAPs, to ensure the opportunities derived from biodiversity conservation and sustainable use are recognised and reflected in decision-making.

[1] http://www.cbd.int/convention/articles/?a=cbd-06

Key to mainstreaming biodiversity across government and sectors is Target 3:

- **Target 3:** *By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimise or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.*
  Promoting the right incentives helps to mainstream biodiversity into other sectors and national policies (e.g. agriculture, fisheries, industry, etc.) and ensures biodiversity values are reflected in decisions.

In order to implement the new Strategic Plan for Biodiversity and achieve the Aichi Biodiversity Targets, Decision X/2 also invited parties to ***update and revise their NBSAPs*** in line with the Strategic Plan for Biodiversity 2011-2020. In addition to urging Parties to revise their NBSAPs in line with the Strategic Plan, Decision X/2, also requested that Parties utilise their NBSAPs to ***mainstream biodiversity*** at the national level.

Biodiversity and ecosystem services values should be considered during the revision process, in line with targets 1 and 2, and can also be used as a vehicle to support biodiversity mainstreaming (see section 2).

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Aichi Biodiversity Target 17 is also itself a driver for the revision of NBSAPs:

- **Target 17:** *By 2015, each party has developed, adopted as a **policy instrument**, and has commenced implementing an effective, participatory and updated **national biodiversity strategy and action plan**.*
  Since its first meeting, the COP to the CBD has made more than 60 Decisions that provide guidance to Parties on NBSAPs in various forms.[2] The most recent consolidated guidance to assist Parties in the development and revision of their NBSAP calls for NBSAPs to '*highlight the contribution of biodiversity, including, as appropriate, ecosystem services..., as well as the economic, social, cultural, and other values of biodiversity as emphasised in the Convention on Biological Diversity*'.
  Learning from the 'first generation' of updated NBSAPs, produced in line with the Strategic Plan for the 2002-2010 period; there is still a real need for integration with other policy processes[3] and a greater focus on development objectives, including economic objectives and implications.

Strategy for Resource Mobilisation

A review of implementation of the strategy for resource mobilisation at CBD COP 11 saw the adoption of four preliminary targets for resource mobilisation (Decision XI/4). The fourth target called for '*at least 75 per cent of Parties provided with adequate financial resources to have prepared financial plans for biodiversity by 2015, and that 30 per cent of those Parties have assessed or evaluated intrinsic, ecological, genetic, socioeconomic, scientific, educational, cultural, recreational and aesthetic values of biological diversity and its components*'. The incorporation of values within a revised NBSAP provides a means to achieving this target.

[2]Annex to UNEP/CBD/WG-RI/2/3: http://www.cbd.int/doc/meetings/wgri/wgri-02/official/wgri-02-03-en.pdf

[3]See Prip, C, Gross T, Johnson, S, Vierros M (2010). Biodiversity Planning: an assessment of national biodiversity strategies and action plans. UNU-IAS: Yokohama, Japan

Box 2.4
What is 'biodiversity mainstreaming'?

Biodiversity, development and poverty reduction are intrinsically linked and demand an integrated approach. The CBD has long emphasised the need for integrating, or 'mainstreaming', biodiversity into national and local development and poverty reduction strategies, most recently in its new Strategic Plan for Biodiversity 2(2011-2020).

Mainstreaming biodiversity is about more than applying "safeguards" to ensure that development processes do no harm to biodiversity, but also recognising the potential of biodiversity for achieving desirable outcomes and identifying synergies. The CBD defines mainstreaming as "*the integration of the conservation and sustainable use of biodiversity in both cross-sectoral plans such as sustainable development, poverty reduction, climate change adaptation/mitigation, trade and international cooperation, and in sector-specific plans such as agriculture, fisheries, forestry, mining, energy, tourism, transport and others*". Importantly, it highlights that mainstreaming is not about creating parallel and artificial processes and systems, but about integrating biodiversity into existing and/or new sectoral and cross-sectoral structures, processes and systems. It is thus as much as political issue – requiring a process of institutional change – as it is a technical one.

The policy areas and sectors in which integration of the values are crucial include both those that have adverse impacts on biodiversity and those where there are positive opportunities for co-benefits and synergies. For example, the extent to which climate change mitigation and adaptation objectives as well as flood and drought risk management and coastal protection are pursued through ecosystem based solutions will have implications for the conservation of habitats and ecosystems. Similarly, ecosystem restoration contributes to climate change adaptation, e.g. through flood and soil management, and protection of water resources through water retention measures.

Although there has been limited experience in biodiversity mainstreaming to date, many lessons can be learned from environmental mainstreaming efforts.

- It requires collaboration – a two-way exchange between biodiversity and development interests rather than a push by just one
- It is a process of political and institutional change, as well as procedural or technical change. Relevant 'hooks' within the NBSAP, aiming at explicit integration into sectoral and cross-sectoral policy documents, plans and actions, legislation, budgets and monitoring systems can trigger the mainstreaming process
- Cross-sectoral coordination is essential. Often environmental mainstreaming is led by the environment sector, at times the politically 'weakest' sector. Yet environment, including biodiversity and ecosystem services, extends across key sectors (e.g. agriculture, mining, forestry). Therefore it requires cross sector coordination to strengthen links and actions between sectors and associated public and private sector institutions that affect and/or benefit from biodiversity. An endorsement of the NBSAP by a range of government departments, and its adoption at the highest political levels confers legitimacy. A sound evidence base, coupled with targeted communication and outreach can facilitate buy-in

Box 2.4
What is 'Biodiversity mainstreaming'? continued

To identify the links that need to be established between the NBSAP and other sectoral strategies, a country may want to conduct systematic mapping of the associations with different sectoral and cross-cutting strategies.

Adapted from Biodiversity Mainstreaming: A Rapid Diagnostic Tool. IIED and UNEP-WCMC, 2012

For more information See also:

- www.environmental-mainstreaming.org
- Dalal-Clayton, B., Bass, S. 2009. The Challenges of Environmental Mainstreaming. IIED, London
- Integrating Ecosystem Services into Development Planning – A stepwise approach for practitioners based on the TEEB approach (GIZ, 2012)
- Mainstreaming biodiversity into national sectoral a cross-sectoral strategies, policies, plans and programs (SCBD, 2011)

VALUES AS A VEHICLE FOR MAINSTREAMING

Mainstreaming is key to the implementation of the Convention and as such should be a central part of NBSAPs. According to the 2002 Hague Ministerial Declaration, the most important lesson of the previous ten years was that the objectives of the Convention would be impossible to meet until consideration of biodiversity is fully integrated into other sectors (SCBD, 2011). The wider fate of ecosystems across the world critically depends on a range of national policies and programmes that do not necessarily aim to advance environmental objectives. This is particularly true for the adverse impacts of policies that result in land-use change or the development of grey infrastructure (i.e. built infrastructure, such as roads, railways and hard flood or coastal defences).

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"Through mainstreaming, biodiversity concerns will be internalised into the way development efforts operate, shifting responsibility and ownership for conservation and sustainable use from solely the hands of the environment ministry/authority to those of economic sectors. This sharing of ownership and responsibility presents the opportunity of freeing up resource traditionally used by environment authorities to counter and neutralise damaging policies and actions, and of substantially increasing the final, human and technical capacity to implement the Convention" (SCBD, 2011).

The identification, demonstration and use of values in their various forms are considered essential for mainstreaming biodiversity across different sectors. The incorporation of biodiversity values into national accounting and reporting systems is necessary to limit the unintended negative consequences of policy decisions on biodiversity. The integration of biodiversity and ecosystem service values into planning processes and national accounting and reporting systems will require parties to appropriately value biodiversity.

As such, mainstreaming efforts should be a central on going theme of every country's NBSAP (SCBD, 2011), and an important part of the mainstreaming effort can be driven by the demonstration of the benefits, to various economic sectors, of investing in conservation and restorations, and the potential contribution for meeting a wider range of economic and policy objectives.

A wide range of sectors have an interest in enhancement of biodiversity and ecosystems now, and in the future. Taking into account the values of nature in the other sectors' policies, legislation, plans and programmes can help to identify and deliver win-win opportunities and policy synergies. Further benefits include policy coherence, cost-effectiveness, avoidance of unwanted trade-offs and the identification of potentially harmful incentives and subsidies.

While the NBSAP can usefully commit to taking ecosystem services into account in its planning, the actual integration of biodiversity and ecosystem values into other sectors will happen as part of the separate planning cycles. What is key to a successful integration of ecosystem services in developing other sectoral strategies is the existence of a relevant evidence base on the most important ecosystem services in the country, the impacts of different economic sectors on the ecosystems delivering these services, as well as information on the dependence of different economic sectors and socio-economic groups, to be used in the mainstreaming process. Therefore, in order to take full advantage of the multiple benefits biodiversity and ecosystems provide, there must be a clear understanding of the values of nature and where they can usefully be taken into account in public and private decisions (TEEB, 2011, ten Brink, 2012). Presenting sectors with evidence of these values and their beneficial role in their specific activities, alongside development of feasible plans to incorporate them into existing structures and practices will provide enabling conditions for mainstreaming.

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VALUES AS A VEHICLE FOR ACHIEVING NATIONAL OUTCOMES

Biodiversity mainstreaming can result in a spectrum of outcomes, ranging from influencing policy, plans, budgets or decisions to impacts in changing behaviour and delivering environmental improvements (See table 2.3). Some countries may want to address all of these issues, others may feel they have the appropriate policies and plans in place but this is not being translated into effective action on the ground, or vice versa. This will depend on specific national contexts and priorities, as well as actors and spheres of influence.

Considering ecosystem service and biodiversity values in NBSAPs, and using them as a tool for biodiversity mainstreaming, can therefore support broader national outcomes.

Table 2.3: National outcomes of biodiversity and ecosystem services mainstreaming (adapted from Biodiversity Mainstreaming – A rapid diagnostic tool, IIED & UNEP-WCMC, 2012)

Outcomes	Examples
Governance outcomes	Improved consideration of stakeholders' and right holders' concerns (particularly those who are directly dependent on biodiversity and ecosystem services)
Policy & political outcomes	High-level sector, fiscal, development and social policies, constitution and statements of national vision, include biodiversity and ecosystem service considerations and vice versa
Plan outcomes	Inclusion of biodiversity and ecosystem service considerations in development and poverty reduction strategies and in biodiversity strategies
Budget & accounting outcomes	Evidence of public-private sector resource mobilisation, inclusion of development-biodiversity linkages in national public and sector budgets, inclusion of ecosystem services in national accounting systems
Institutional & capacity outcomes	Strengthened capacity within biodiversity-related institutions to understand development and economic processes and interact in a constructive manner; valuation of the economic importance of biodiversity and ecosystem services in the economic outcomes undertaken and used in decision-making
Investment and economic outcomes	Improved domestic resource mobilisation for biodiversity and ecosystem service investments or recognition of potential trade-offs in sector investments such as mining
Behavioural outcomes	Key patterns and processes of production, consumption and waste treatment in sectors and localities are informed by biodiversity and ecosystem service considerations
Pro-poor biodiversity management outcomes	Pro-poor management of ecosystem services, such as medicinal, cosmetic or edible plants; healthcare, wild foods, soil fertility; traditional breeds and crop varieties; water purification; cultural or religious benefits from biodiversity realised
Ultimate (biodiversity & developmental) impact of these outcomes	Improved productivity and sustainability of use of biodiversity and ecosystem services assets; protection and management of targeted species populations

WHERE NOW?

Since the publication of the MA in 2005, followed by the establishment of TEEB, researchers and policy makers have demonstrated increasing interest in the concept of ecosystem services, resulting in a wide range of new research that is intended to help characterise, quantify, measure, track and in some cases value – in monetary or non-monetary terms – ecosystem services across a range of scales (Chen et al. 2006; Metzger et al. 2006; Naidoo et al. 2008; Nelson et al. 2009; Bateman et al. 2010).

Given the multiple benefits, both national and local, and environmental and otherwise, there is now a real opportunity for decision-making to take nature and a wider range of its public goods and private benefits into account (ten Brink, 2012). NBSAP updating provides an opportunity to leverage these advancements in research and decision-making, and play a major role in identifying values, communicating them to stakeholders and decisions-makers, and illustrating a cross-sectoral way forward to achieving a myriad of beneficial outcomes, for both the environmental sector and far beyond.

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SECTION 2
How to incorporate biodiversity and ecosystem service values into NBSAPs

NBSAP PLANNING AND DEVELOPMENT

The CBD recommends seven key steps in preparing or updating an NBSAP. Each of these steps can act as points of entry for incorporating the values of biodiversity and ecosystem services. Further, biodiversity and ecosystem service values should be included throughout the entire NBSAP updating process, so that they are fully and functionally incorporated into all relevant strategies, actions and planned outcomes.

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Figure 3.1: The seven key steps in NBSAP Development, and opportunities for the incorporation of biodiversity and ecosystem service values

1. GETTING ORGANISED

***Organising logistics** and taking stock will require some initial **stakeholder engagement**: for consulting on the existing NBSAP and identifying gaps; for gathering a suitably-skilled team; and for developing a shared structure and plan to take the revision forward. Considering biodiversity and ecosystem service values at this stage will allow the development of an engagement strategy and work plan, which ensure their incorporation.*

In **Burkina Faso** a coordinating group has been put in place, alongside clear process management structures and a schedule for meetings and workshops. Furthermore, a national biodiversity committee has been established through an inter-sectoral decision, to drive the NBSAP revision. The committee will include representatives from key ministerial departments to ensure an adequately skilled team in line with the main themes of the CBD Strategic Plan. Similar supporting 'advisory boards' have also been established in **Micronesia** and **Georgia**. In **South Africa**, during the stocktaking phase, a number of experts were consulted to provide strategic assessments of key thematic areas (including spatial issues, economic integration and poverty reduction). A series of consultative workshops were conducted to discuss and refine the results, attended by national, regional and local government staff, NGOs and civil society representatives.

2. ENGAGING & COMMUNICATING WITH STAKEHOLDERS

*Comprehensive **stakeholder engagement** across a range of actors is fundamental to identifying national priorities, understanding and aligning diverse values, and incorporating these values into the overall goals of NBSAP updating. Stakeholder engagement is both a step and an approach which should be considered throughout, with ongoing communication and outreach to mainstream the NBSAP into sectors and society.*

In **Guatemala**, past collaboration between government and academia has yielded great results, so their latest NBSAP update took a participatory approach, involving 67 institutions and over 167 actors, to integrate knowledge from all sectors. In **Micronesia**, national stakeholder workshops were conducted to clarify key issues and develop the NBSAP in a participatory manner. This helped to identify national and state-level priorities, and mainstream the NBSAP into multiple sectors. For both countries, even broader stakeholder participation is planned in the next round of NBSAP updating, with commitments to gather more data and explicitly address biodiversity and ecosystem service values.

3. GATHERING INFORMATION

*Robust biophysical data underpins biodiversity and ecosystem service values. An **ecosystem assessment** can help to gather data on the status and trends of biodiversity, and its links to human well-being and society. **Ecosystem service mapping** and **indicators** are also useful entry points for representing and communicating spatial and temporal data of this nature, providing a 'stock take' of natural capital and helping to identify targets, priorities and actions for NBSAPs. Similarly, **natural capital and environmental economic accounts** can (over time) offer additional indicators on the state of natural capital, related changes (including drivers of degradation) and implications for the economy.*

South Africa was the first country to incorporate a comprehensive spatial assessment as part of its NBSAP. Priority areas for conservation action identified by the spatial assessment were used to support the process of developing targets and actions. In addition, spatial assessments in South Africa are used to produce biodiversity sector plans, the primary tool for mainstreaming biodiversity at the local and district levels. The **UK** NEA was a comprehensive appraisal of the UK's natural environment in terms of the benefits it provides to society and to continuing economic prosperity. Based on this data, the government published a White Paper making bold commitments to putting the value of nature at the centre of decision-making. Subsequent NBSAP updating emphasised the importance of healthy, well-functioning ecosystems and coherent ecological networks. In **Micronesia**, a parallel eco-regional planning process provided spatially explicit data on high priority areas, acting as tangible objectives to be incorporated into the NBSAP.

4. DEVELOPING STRATEGIES AND ACTIONS

Stakeholder engagement *and deliberative processes can help identify realistic and workable strategies for incorporating and mainstreaming ecosystem service and biodiversity values, which relate to exisiting frameworks and national priorities. This may be used in conjunction with an* ***ecosystem assessment****, and other information gathering approaches, to communicate values to decision-makers, develop plausible future scenarios and identify scientifically-informed strategic options for the NBSAP.*

Cross-sectoral collaboration in **Guatemala** has lead to a commitment to conduct more research into not only the values of biodiversity and ecosystem services, but also the costs of degradation in support of strategic restoration activities. Preparatory work has included a workshop on ecological restoration and a proposed National Network of Ecological Restoration to identify and prioritise degraded ecosystems. In **Burkina Faso**, linking environmental issues to broader national priorities - combating land degradation and alleviating poverty – has helped to develop integrated sustainable land management strategies. High level commitments have been made for ecosystem evaluations, mapping, and new institutional frameworks, complemented by 'good practice' studies and on-the-ground education and training.

5. DEVELOPING IMPLEMENTATION & RESOURCE MOBILISATION PLANS

Developing specific actions centred on biodiversity and ecosystem service values will involve ***stakeholder engagement*** *to identify key actors and ensure the actions are realistic and practical. Information on ecosystem services from* ***assessments, mapping, indicators*** *and* ***valuation*** *helps to identify key themes and priorities, and a number of instruments including policy documents and legislation can put actions into practice. Implementation will also require resources.* ***Monetary valuation*** *can put values into economic terms, put resource requirements into context and engage new funders. Similarly improved understanding of a country's* ***natural capital*** *stock and depreciation can encourage efforts at mobilising funding. Finally, revised legislation can also support innovative biodiversity financing.*

In **Micronesia**, an all-inclusive engagement process helped to develop state-level BSAPs as implementation plans sitting under the guiding framework of the overall NBSAP. The Micronesia Conservation Trust acts as a funding source for implementation activities with the ambitious 'Micronesia challenge' helping to promote awareness and generate additional funds. In **Georgia**, monetary valuation studies were used to demonstrate the value of protected areas, with sector scenario analysis clarifying their critical role in financial and economic stability. Similarly, in **Guatemala**, investments in ecosystem protection and restoration were justified through highlighting the value of the risk reduction and water-flow regulation services provided by healthy ecosystems; while in **South Africa** the costs of controlling invasive alien species may seem high until they are compared with the value of the ecosystem services being lost as a result of the impacts of invasive alien species, which is six times higher.

6. IMPLEMENTING THE NBSAP

New policy documents and legislation can act as practical instruments for implementing change. Facts and figures from ***ecosystem assessments, environmental-economic accounts*** *and* ***monetary valuation*** *studies can provide the necessary evidence base to respond to biodiversity and ecosystem service values in NBSAPs through sectoral plans, thus creating a basis for strengthening political will, facilitating biodiversity mainstreaming and preparing the ground for sectoral implementation.*

In **Micronesia**, a study on the economic valuation of coral reef fisheries is being used at the sub-national level as guidance for carrying capacities to assist with fisheries management and policy interventions. Further valuation studies are planned, in order to provide more information. In **South Africa**, the economic valuation contained in the Annual Tourism Report places tourism as a key driver of the country's economy. This sets a strong case to include specific activities to integrate biodiversity considerations into the Tourism sector's growth strategies and management plans. In **Burkina Faso**, the Poverty and Environment Initiative (PEI), and more specifically a study on the "economic evaluation of the environment and natural resources in Burkina Faso", which highlighted the risks and costs associated with the degradation of natural assets, has resulted in a better understanding of the importance of ecosystem services to the country's economy. It also led to an improved consideration of those values in sectoral policies, inter alia through the preparation of a guide for the integration of the environment and poverty-environment links in the development of sectoral strategies in Burkina Faso.

7. MONITORING AND REPORTING

Following the progress of the NBSAP and its implementation is critical for continuous learning and adaptive management. On going ***stakeholder engagement*** *can communicate biodiversity and ecosystem service values as part of the NBSAP, develop opportunities for knowledge transfer, and maintain interest as national circumstances and values change. Additionally, monitoring the impacts of NBSAPs on ecosystem services, biodiversity and human-well being, and periodically reviewing and adapting the NBSAP as necessary, can be supported by on going* ***assessment, mapping, maintaining natural capital*** *and* ***environmental economic accounts****, and tracking ecosystem service indicators.*

Due to the complexity of the natural environment, it is often difficult for decision-makers to gain an overview of the state of biodiversity for monitoring and reporting. The Norwegian Nature Index aims to provide an easily digestible summary of progress by aggregating over 300 datasets to document overall trends in the state of major ecosystems and biodiversity. The Index itself acts as a value of **Norway's** natural capital and results can be used to define clearer targets, and prioritise actions to improve natural resource management. In **Georgia** on the other hand, monitoring and adaptive management were conducted through government and expert consultation, highlighting changes in the institutional environment. It was realised that since moving towards a deregulated economy, the recommendations in Georgia's first NBSAP were no longer feasible. The latest NBSAP is now working to build ecosystem service and biodiversity values into **Georgia's** new economic model, focussing on adaptability to rapidly changing situations, which will require robust indicators and efficient monitoring and reporting systems. **Norway** is a member of the Wealth Accounting and Valuation of Ecosystem Services (WAVES), and an active promoter of more sustainable national accounting at the Nordic level. In a recent scoping study on Nordic environmental indicators and statistics, accounting systems tracking the physical characteristics and functioning of different ecosystems were identified as a possible first step towards ecosystem service accounts. Similarly, commitments have been made in **Burkina Faso** towards the development of land-use accounts to support effective implementation of sustainable land management plans.

NBSAP Development Steps as Points of Entry

1. GETTING ORGANISED

In the initial stages of NBSAP updating, careful planning is necessary to set a direction for the updating process, as well as learning from existing capacity and resources. Clear commitments to consider biodiversity and ecosystem service values at this stage, as well as an understanding and overview of how such goals can be obtained will be critical for their incorporation.

Box 3.1
KEY TASKS to GET ORGANISED

- Organise logistics
  - Put together a work plan and schedule
  - Assess available resources
  - Build a team and multi-sectoral advisory committee
  - Develop a coordination and communication structure
  - Develop a data management plan
- Taking stock
  - Review existing NBSAP
  - Identify guidelines for biodiversity assessment
  - Identify knowledge gaps

When **organising logistics...**

- Include clear objectives, which specifically focus on biodiversity and ecosystem services values, in the work plan and schedule
- Ensure there are sufficient resources allocated to achieving these objectives (See Micronesia, Box 3.3)
- Build a team with the appropriate skills, experience and authority to ensure biodiversity and ecosystem service values are appropriately embedded into existing structures and key sectors (See Micronesia and Burkina Faso Box 3.4)
- Biodiversity and ecosystem service values are a cross-sectoral consideration. Develop a coordination and communication plan which facilitates this, to ensure a comprehensive and coherent NBSAP which incorporates values into a range of relevant themes (See Georgia, Box 3.5)
- Ensure the data management plan includes space for qualitative and quantitative data on the social, biophysical and economic components of biodiversity and ecosystem service values, as appropriate for your national context. Standardisation of criteria and methods for generating data across multiple participating institutions can facilitate integration of different types of information and a robust analysis (See Guatemala, Box 3.6)

When **taking stock...**

- When reviewing the existing NBSAP, consider where existing (if any) information on biodiversity and ecosystem service values could be incorporated (See scoping review in South Africa, Box 3.7)
- Consider including a valuation component in the biodiversity assessment, and where there are significant knowledge gaps, incorporate suitable commitments to carry out valuation studies into the NBSAP (See South Africa 3.7)

Box 3.2
SUPPORTING APPROACHES for this stage

- Stakeholder engagement (see p56)

Box 3.3
Establishing a consistent source of funding in Micronesia

During the previous round of NBSAP updating, **Micronesia** found that there while there were funds available during the planning phase, there was a lack of funding for application and implementation. A major achievement however was the establishment of the Micronesia Conservation Trust (MCT), which acts as a steady source of funds for local governments, non government/community-based organisations and communities to implement NBSAP activities on the ground and engage in capacity building exercises. The MCT, in partnership with a number of other organisations, enabled the delivery of a two-week training course in Economic Tools for Conservation in Micronesia. This equipped local conservation practitioners with the necessary principles and tools to carry out valuation studies, and led to the initiation of two valuation projects. Field work began in late 2012, and it is anticipated that results will have a short-term impact on key conservation issues and policies, acting as an evidence base for NBSAP updating as appropriate, as well as laying the foundation for longer-term conservation economics capacity-building in Micronesia.

Box 3.4
NBSAP updating teams – Skills, experience and authority in Micronesia and Burkina Faso

Micronesia's NBSAP updating was led by a co-chair which included both a government and NGO representative, to attain buy-in from both sectors. They found that the assignment of a full time member of staff, at National Government level, in a leading role, significantly helped implementation and mainstreaming.

In **Burkina Faso** a coordinating group has been put into place, alongside clear process management structures and a schedule for meetings and workshops. Further, a national biodiversity committee has been established, by an inter-sectoral decision, to drive the NBSAP revision. The committee will include representatives from key ministerial departments to ensure an adequately skilled team in line with the main themes of the CBD Strategic Plan. Further, a specific Directorate for Environmental Economics and Statistics was established with the Ministry of Environment and Living. This institutional innovation aims to help integrate existing projects into the revised NBSAP, with a particular focus on developing environmental accounts and future work in biodiversity and ecosystem service valuation.

Box 3.5
Thematic situation analysis in Georgia

In **Georgia**, when starting the revision of the NBSAP the Ministry of Environmental Protection formed a Coordinating Committee and invited experts to decide on the overall framework, procedures and content. A situation analysis in eleven thematic components was carried out by various NGOs and scientific organisations, forming the basis for the development of the future NBSAP. This was followed by thematic workshops to discuss and communicate the results of the consultation process. Currently, the final structure of the NBSAP is being developed and the revision of the strategy and action plan has started. Regular workshops are held to share latest developments and discuss the upcoming steps.

Box 3.6
Standardisation of methods to generate information in Guatemala

The development of **Guatemala's** System of Integrated Environmental and Economic Accounting (SEEA) began in 2006 as a joint initiative between academic and government sectors to work towards integrating biodiversity and ecosystem service stocks and benefits into the national accounting framework. During the planning phase, criteria and methods to generate information across participating institutions were standardised. This was key to facilitating integration and ensuring the reliability of the analysis.

Box 3.7
Setting commitments to fill in knowledge in South Africa

Valuation work on biodiversity and ecosystem services is still in its early stages in **South Africa**. During the previous round of NBSAP in 2005, no information was available on biodiversity and ecosystem services values. However, recognising the importance of incorporating them into national policies and planning, a 5-year target was set to conduct a periodic country-wide economic valuation of biodiversity, with an emphasis on goods and services, drawing linkages between biodiversity, the economy and poverty alleviation.

Although the target was not achieved, it set the ground for South Africa's commitment to incorporate biodiversity valuation into policy development, especially as a mechanism to guide national government budget allocations and spending patterns. As a consequence, in 2011 a scoping review was carried out to identify existing ecosystem services valuation studies and gaps. Some of the findings of these studies were included in the National Biodiversity Assessment 2011, and they can be incorporated into the revised NBSAP. In addition, it has highlighted the need to develop a consistent framework for valuing services at national level; a project to develop a South African TEEB has just been initiated.

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2. ENGAGING AND COMMUNICATING WITH STAKEHOLDERS

Stakeholder engagement is absolutely critical to allow a comprehensive appraisal of key issues and to identify national priorities. Recognising, demonstrating and capturing the real values of biodiversity and ecosystem services with a nation, and understanding how they can be incorporated into existing structures and practices requires practical guidance from key sectors working on the ground. An open, inclusive process also creates ownership of the NBSAP. This improves visibility and credibility and facilitates integrated implementation and mainstreaming of biodiversity and ecosystem service values across sectors.

Box 3.8
Key tasks to engage and communicate with stakeholders

- Identify key stakeholders
  - Complete a stakeholder analysis and mapping
  - Engage stakeholders
- Develop a communication and outreach plan for each step in the process

When **identifying and engaging stakeholders...**

- Be inclusive and think carefully about the key users of biodiversity and ecosystem services in your country, to ensure their views and values are fully taken into account. As well as improving the evidence-base for NBSAP development, an understanding of how the values of biodiversity and ecosystem services are going to be incorporated into existing structures and practices will improve uptake, implementation and operationalisation
- Stakeholder engagement is essential throughout, to provide grounded, practical guidance. Further, additional opportunities to engage new audiences may occur at different steps in the updating process. Ensure that each step considers how to create a dialogue on biodiversity and ecosystem service values, creating space for knowledge exchange and joint learning (See Guatemala, Norway & South Africa Box 3.10)
- Completing a stakeholder analysis and mapping can improve understanding of how biodiversity and ecosystem service values align with each stakeholder group, and clarify how best to communicate and engage with them regarding the use of values to facilitate mainstreaming

When **developing a communication and outreach plan...**

- Think strategically about your communication and outreach package, align the values of biodiversity and ecosystem services with national and sectoral priorities, and use different languages and communication tools for different audiences. Maintain communication and outreach throughout to create understanding, ownership and a solid foundation for uptake of the NBSAP on completion. Clearly articulate the benefits that biodiversity and ecosystem service values can provide, beyond conservation targets (see Burkina Faso, Box 3.11, and Section 1 – WHY incorporate the values of biodiversity and ecosystem services into NBSAPs for more information)

Box 3.9
SUPPORTING APPROACHES for this stage

- Stakeholder engagement (see p56)

Box 3.10
An inclusive consultation process, creating multiple engagement opportunities in Guatemala, Norway & South Africa

Guatemala updated their National Biodiversity Policy (NBP) in 2011 with the intention to develop a legal framework with the capacity to exert influence across institutions and sectors in supporting a new strategy (i.e. the NBSAP). The same consultation process was used for the NBSAP updating to identify strategic actions necessary to implement the policy. Participation of stakeholders and the wider public was a key element in policy development, and recognised as highly important for mainstreaming biodiversity issues across society. The following sectors and institutions were involved in the first phase of NBP development:

- 14 institutions involved in the management and/or use of biodiversity and ecosystem services
- 24 international NGOs
- 12 national environmental NGOs
- 9 Universities and Research Centers
- Indigenous and rural community NGOs

National funders to finance research and development related to biodiversity

This was followed by a negotiation phase, to increase knowledge of the policy, its requirements and increase ownership, with a more representative sample of institutions and organisations: 67 institutions and over 167 actors, including for example indigenous authorities and women's groups. This resulted in the final proposal for the new NBP and revised NBSAP and culminated in the adoption of the policy through a Governmental Agreement, gaining a greater exerting influence than the previous NBSAP, which had only been approved by the Secretariat of the Presidency of the Republic, an institution of inferior category in the government structure, compared with a Ministry.

In **Norway**, the development of the new NBSAP is led by the Ministry of Environment. It will be an interministerial strategy and action plan for biodiversity in Norway involving all relevant ministries. In addition a consultation process with the Sami Parliament (Sámediggi) will be performed. The Sámediggi is an institution of cultural autonomy for Norway's indigenous people, and their involvement is critical given the important role that biodiversity and ecosystem services play in sami livelihoods. At the start-up of the process a consultation with all relevant stakeholders took place, based on an invitation to submit input to the process. Prior to this (2011) a group of NGOs gave their advise on specific actions based on the Aichi targets to be addressed in the NBSAP.

A parallel process is the ongoing work from a National Expert Commission on Values of Ecosystem Services. This process was decided by the Government in October 2011. The interdisciplinary commission consists of twelve experts with wide professional and scientific backgrounds, including from economics and ecological sciences. The main objective is to provide advice to national policy makers, but also seeks to influence local and regional policy makers, business, research communities and the public at large. The commission has therefore been requested to engage key stakeholders in its work, including affected economic sectors and relevant organisations, and will build on input from key research institutions. The Secretariat for the commission is provided by the Ministry of the Environment.

The commission will present its findings and recommendations in a National Official Report (NOU), which will be presented to the Government by 31 August 2013. The report will be subject to a public hearing, and will be used as a basis for development of possible new policies and efforts related to values of ecosystem services. Selected recommendations may be included in Norway's revised National Biodiversity Strategy and Action Plan.

Box 3.10
An inclusive consultation process, creating multiple engagement opportunities in Guatemala, Norway & South Africa (cont.)

In **South Africa**, during the development of the previous round of NBSAP, the draft Strategy was debated in a series of consultative workshops, to ensure needs from different stakeholders were identified and incorporated into the planned targets and activities. A first national workshop was convened in March 2004 to discuss the stocktaking and assessment, followed by a second national workshop in July 2004. Additional discussions and consultations took place in all nine SA provinces during 2004, with various national departments and NGOs representatives. In addition, two workshops that focused on municipalities were held in partnership with the South African Local Government Association (SALGA) in October and November 2004. These were attended by representatives of all three types of municipality (metropolitan, district and local) from all nine provinces. An NGO biodiversity network, NetBio, hosted several workshops for NGOs and CBOs, while civil society representatives attended all the national and provincial workshops.

Box 3.11
A range of communication outputs, and sector-specific analysis in Burkina Faso

In **Burkina Faso**, NBSAP updating has involved a strategic focus on sustainable land use and sustainable soil management, as a national priority for achieving simultaneous outcomes of poverty alleviation and environmental conservation. In order to communicate the NBSAP to different audiences a number of outputs have been developed, focussing on sustainable soil use:

- A study on good practices on the sustainable management of soils has been published in 500 copies and translated into four languages
- A training plan on sustainable soil management has been developed, with training modules to be launched in the near future
- A study on a communication strategy for the sustainable management of soils, with an accompanying adoption plan is currently being developed

Further, under the Poverty Environment Initiative (PEI), sectoral economic evaluations have been conducted in the cotton industry and the mining industry. These sectors will be explicitly referenced in the revised NBSAP to clearly articulate sustainable practices to these specific audiences.

3. GATHERING INFORMATION

It will be necessary to have a strong evidence-base to act as the foundation of the NBSAP and provide justification for specific priorities and actions. The biophysical properties of ecosystems underpin the services and values they provide, and it will be important to gather robust scientific data in order to develop well-informed strategies.

Box 3.12
KEY TASKS to GATHER INFORMATION

- Assess status and trends of biodiversity and biodiversity loss
  - Spatial data on ecological status
  - Threat status
  - Protection and conservation management status
  - Drivers of loss
- Assess linkages between biodiversity and society
  - Linkages with poverty
  - Development and human well-being
  - Identify key ecosystem services
  - Assessing the value of biodiversity to key sectors
- Assess the legal, institutional and policy environment
  - Relevant biodiversity laws, policies, management practices
  - Existing organisations, institutions and capacities
  - Ongoing biodiversity initiatives
  - Opportunities for mainstreaming to address biodiversity loss
- Biodiversity finance
  - Existing biodiversity expenditures
  - Spending in other sectors / policy areas that could be spent differently to improve biodiversity outcomes
  - Perverse, positive and negative incentives and subsidies
- Status of public awareness (e.g., of biodiversity and the value of biodiversity)
- Knowledge gaps

When **assessing status and trends of biodiversity and biodiversity loss...**

- Highlight the economic and social costs of biodiversity loss vs. the gains of protection, conservation and sustainable management (See Guatemala, Box 3.14)
- Gather spatially explicit data to inform regional planning and prioritisation – valuation techniques can also be applied to maps and models (e.g. InVEST, see p69) (See South Africa and Micronesia, Box 3.15)
- Create plausible future scenarios via stakeholder consultation to inform management and policy options (See Georgia & South Africa, Box 3.16)

When **assessing the linkages between biodiversity and society...**

- Explore the benefits of biodiversity and ecosystem services, in terms of their values, for local livelihoods as well the economy overall, especially with insights from natural capital and environmental-economic accounts (the latter providing in particular information on the market value of provisioning ecosystem services via accounts on e.g. timber, fish and other nature based goods) (See Micronesia and Burkina Faso, Box 3.17 and Guatemala, Box 3.14)
- Use biodiversity and ecosystem service values to highlight the contribution of nature to key national priorities such as poverty alleviation and development (See Guatemala, Box 3.14)
- Strategically identify the key ecosystem services within the environmental and socio-economic context of your country, and gather information on their social and economic values (e.g. Burkina Faso, Box 3.19)

- Identify key sectors and users that derive value from biodiversity and ecosystem services (where they are available consider using SEEA Central Framework and related accounts) and highlight the importance of these values to their livelihoods and practices, and the need for sustainable management to ensure the continued flow of services and values into the future (See Micronesia, Box 3.17)

Use existing information as far as possible to create an evidence base for stakeholders and decision-makers. Begin with what is available and refine data, systems and mechanisms over time (e.g. Guatemala's) and attract attention and build capacity through learning by doing.

When **identifying knowledge gaps...**

- Don't be afraid to highlight what is not known. If scientific information is lacking, including commitments to gather more information on biodiversity and ecosystem services, or completing a pilot or scoping study, is an important step forward for incorporating or mainstreaming values (See Georgia and Norway, Box 3.20, and South Africa Box 3.7)

Box 3.13
SUPPORTING APPROACHES for this stage

- Stakeholder engagement (see p56)
- Ecosystem assessment (see p60)
- Ecosystem service mapping (see p66)
- Ecosystem service indicators (see p70)
- Monetary valuation (see p77)
- Natural capital and environmental-economic accounting (see p83)

Box 3.14
Focusing on national priorities when gathering information, and highlighting the costs of degradation in Guatemala

As a starting point **Guatemala** chose to focus on the ecosystem services that are most visible/tangible for decision-makers and the general public. Studies that attracted the most attention largely focused on climate vulnerability and the role of ecosystems in reducing the risk of environmental disasters or mitigating impacts, particularly water-flow regulation. Furthermore, demonstrating not only the value of the services, but also ***highlighting the costs of degradation*** in terms of reducing ecosystem service output, led to a national workshop in Ecological Restoration in 2011, and a proposed National Network of Ecological Restoration. It has been estimated that investments in ecological restoration could provide a wide range of economic benefits including reduced damage caused by natural phenomena, as well as increased hydropower potential, and fuel wood provision, which makes up 47% of national energy consumption. Next steps include the development of a strategic alliance to promote the restoration of degraded ecosystems that provide important goods and services.

Box 3.15
Collecting spatially explicit information helps prioritisation in South Africa and Micronesia

South Africa was the first country to incorporate a comprehensive spatial assessment as part of its NBSAP. In 2004 the first comprehensive national spatial assessment of the status of biodiversity at the ecosystem level was carried out. Using systematic biodiversity planning techniques it analysed the threat status and protection levels of terrestrial and aquatic ecosystems countrywide, and identified broad-scale geographical priority areas for conservation action. These results informed the development of the previous round of NBSAPs in 2005, influencing the action and target setting process. For example, in the NBSAP 2005 a 5-year target was set to expand the protected area network to make progress towards meeting national targets following areas identified in the NSBA 2004. More detailed ecosystem-specific protected area targets were then developed in the National Protected Area Expansion Strategy 2008.

In addition, spatial biodiversity planning in South Africa is used to produce biodiversity sector plans, the primary tool for mainstreaming biodiversity at the local and district level. They provide a map of areas that are important for conserving biodiversity pattern and ecological processes (called critical biodiversity areas (CBA) and ecological support areas (ESA)), together with contextual information on biodiversity and land-use guidelines.

In **Micronesia**, independent mapping exercises carried out by partner NGOs provided spatially explicit data, which was built into the NBSAP updating process. The eco-regional planning process highlighted and ranked areas of High Biological Significance in each state, which provided some tangible objective for prioritisation and targets.

Box 3.16
Conducting scenario analysis to inform management and policy options in Georgia & South Africa

During two valuation studies conducted on protected areas in **Georgia**, a sector scenario analysis was carried out which compared Business As Usual with a Sustainable Ecosystem Management scenario. The studies clearly illustrated the values of the selected protection areas, and their critical role in sustaining productivity and economic growth in the surround areas, thus providing a sound justification for their continued conservation.

For the development of **South Africa's** National Climate Change Response White Paper, three different scenarios were analysed each with projections to 2050. Even under the best case emission scenario, results showed that South Africa is especially vulnerable to climate change impacts. The White Paper highlights the integral role of healthy ecosystems in responding effectively to these risks, and the need to conserve, rehabilitate and restore natural ecosystems that improve resilience, providing an explicit argument for spatial prioritisation of areas important for climate change resilience and ecosystem-based adaptation.

Box 3.17
Highlighting the linkages between biodiversity and society in Micronesia & Burkina Faso

Economic valuations of Pohnpei's coral reef fisheries in **Micronesia** considered the importance of the fisheries to local livelihoods, by considering the income generated for local fishermen and local businesses (i.e. market sales). This revealed that the economic potential from future fishing and dive tourism is being rapidly eroded by overfishing (by large scale commercial fisheries), and jeopardising food security. The study predicted that the socio-economic impacts of overfishing on local communities could lead to the necessity for external aid to support local communities, proving more costly in the long-run. This linkage between biodiversity, society and human well-being provided clear justification for conservation and sustainable management, and the study will be used to provide guidance on carrying capacities at sub-national levels, to assist with management and policy interventions. Similarly, focussing on the benefits of poverty alleviation through sustainable land-management and the reduction of land degradation has proven to be strategically useful for mainstreaming biodiversity and ecosystem service values in **Burkina Faso**.

Box 3.18
Using the value of ecosystem services to mainstream biodiversity into national policies in South Africa

In **South Africa** research to improve understanding and demonstrate the value of ecosystem services has become a priority. National spatial assessment and mapping of ecosystem services has facilitated better integration of ecosystem services into biodiversity assessment and planning at all scales, ultimately enabling mainstreaming of ecosystem services in planning and decision-making in other sectors:

- **National Strategy for Sustainable Development:** it has five strategic goals, the second of which is: "Increase awareness and understanding of the value of ecosystem services to human wellbeing." The Action Plan has five strategic priorities, including Priority 2: "Sustaining our ecosystems and using natural resources efficiently". The term "ecosystem services" even appears in the diagram depicting sustainable development on the cover of the NSSD
- **National Development Plan:** it includes significant attention to biodiversity assets and ecosystem services, providing a platform for including their values as strategic national resources in planning and policy
- **Disaster management:** a review of the Disaster Management Act has been recently initiated, introducing a focus in the legislation on the role of intact ecosystems in disaster risk reduction, and making links with ecosystem-based adaptation to climate change
- **Water policies:** the mainstreaming of water-related ecosystem services during the revision process of the National Water Resources Strategy has highlighted the importance of protecting water ecosystems. As a consequence, a freshwater ecosystems chapter has been developed for the revised National Water Resource Strategy. This is the first time that protecting freshwater ecosystems has been recognised as a core strategy in the National Water Resource Strategy. Furthermore, work is being done on the revision of the water pricing strategy, in order to ensure that the water price calculations include the cost of rehabilitation of all important ecological infrastructures for hydrological functioning

In addition, the Global Environmental Facility has invested in a Project on Ecosystem Services (ProEcoServ) to develop innovative and practical approaches to mainstream the value of ecosystem services into national development programmes. South Africa is one of five pilot countries involved, with the Council of Scientific and Industrial Research leading the South African component in partnership with DEA and SANBI. The project was initiated during 2011 and will be completed in 2014.

Box 3.19
The benefits of learning by doing – Getting environmental accounts off the ground in Guatemala and Burkina Faso

The development of **Guatemala's** System of Integrated Environmental and Economic Accounting (SEEA) has helped to more clearly reveal the relationships between the environment and the economy, and inform decision-making, despite a lack of data. Guatemala identified that some of the biggest challenges in the development of the SEEA have been associated with the generation, management and dissemination of reliable information. Despite this, the process has allowed important collaborative relationships between government institutions and academia to emerge. The development of the SEEA has also been acknowledged as a permanent process, with accounts continuously refined over time. Despite initial limitations, partially completed accounts can provide important inputs to decision-making and it is recognised that is it essential to assist institutions in improving information generation and management, ensuring they also respond Guatemala's specific national requirements.

Box 3.19
The benefits of learning by doing – Getting environmental accounts off the ground in Guatemala and Burkina Faso (continued)

In ***Burkina Faso***, a pilot project on environmental accounts to work towards integrating natural capital into national accounting systems was carried out. The approach was largely inspired by the United Nation's Statistics Division SEEA, and focussed on four thematic accounts: water accounts, forest accounts, land use and soil accounts. These were chosen based on their policy relevance (soil, forests and water are the main natural assets in Burkina Faso) and the availability and regularity of data. Overall environmental expenditures accounts were also piloted. The overall aim of the project was to contribute to an improved appreciation of the value of the environment, and the implementation of the national strategy to reduce poverty, as well as the development of inter-institutional cooperation.

The process involved the adaptation of natural asset account guidance to the specific context of Burkina Faso; identification and collection of data, with the participation of technical partners; data processing and analysis; and data evaluation in terms of quantity, quality, regularity, reliability and coherence.

Burkina Faso learned a number of key lessons from this, including the importance of data availability, national information systems, and institutional arrangements. Results, in terms of cooperation and capacity building in environmental accounting were obtained, and activities have attracted much attention, in particular from different technical and institutional partners. Further, and importantly for integrating values across sectors, the project led to a better consideration of the role of the environment in the National Poverty Reduction Strategy.

Box 3.20
Commitments to gather more data in Georgia and Norway

In **Georgia**, the previous NBSAP included clear commitments to 'collect data' and 'conduct economic assessments' (see Box 3.27). A TEEB scoping study is now being conducted in parallel to the NBSAP updating process, which, amongst other things, is serving to identify existing data and give specific recommendations for how to integrate biodiversity and ecosystem service valuation into relevant national and local policies, programmes and planning processes. The NBSAP will reflect the results of the current TEEB scoping process, and among the actions there will be commitments to carry out additional economic valuation studies - the overall aim is to increase attention towards the need for more and more accurate valuation exercises in order to recognise and demonstrate the values of Georgia's natural capital.

Norway has similar commitments, and is aiming for knowledge based management of biodiversity. This is reflected in the Nature Management Act. In addition to coordination of legislative instruments the first Norwegian NBSAP also made strong priorities for coordinating and improving the knowledge of biological diversity. The establishment of the Norwegian Biodiversity Information Centre was one distinct outcome. A Nature Index based on biological data for the main ecosystems has been developed and is used for biodiversity reporting in the National budget.

In addition, the National Expert Commission on Values of Ecosystem Services (established in October 2011) has been tasked *inter alia* to:

- Review TEEB reports and consider if and how ecosystem services terms and approaches may be relevant for human well-being in Norway
- Describe the status and trends for ecosystems and ecosystem services in Norway
- Review methods for valuation and recognition of values of ecosystem services, and to consider advantages and disadvantages of monetary valuation
- Investigate values of Norwegian ecosystem services based on existing studies
- Review and consider methods for demonstrating values of ecosystem services in public decision-making
- Consider possible means for capturing values of ecosystem services in economic and regulatory instruments
- Review and consider ways of estimating or calculating values of ecosystem services as part of Norway's national wealth

4. DEVELOPING STRATEGIES AND ACTIONS

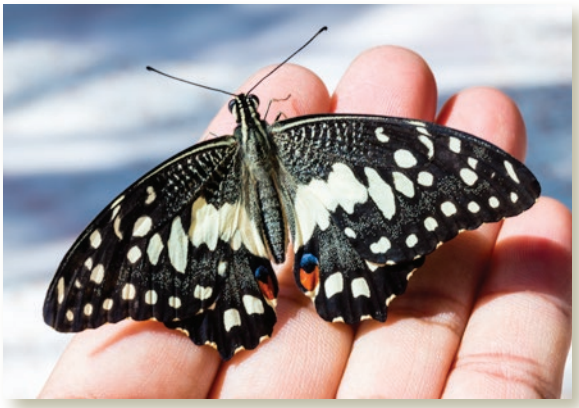
An over arching strategy for achieving the NBSAP will provide a vision and direction for achieving the overall goals, and associated benefits, of improved biodiversity management. Incorporating specific targets and strategies relating to biodiversity and ecosystem services values with your national context can ensure goals are met and provide a way forward for values mainstreaming.

Box 3.21
KEY TASKS to DEVELOP STRATEGIES AND ACTIONS

- Establish national vision
  - Including national principles and priorities
- Setting national targets
  - Including potential indicators to measure progress
- Identify specific strategies
  - Detail the way forward to achieve the Strategic Plan, national goals and targets

When **setting national targets...**

- Include nested targets, goals and priorities that specifically relate to biodiversity and ecosystem service values, and the potential benefits of their incorporation into national frameworks and practices (See Guatemala, Box 3.23)
- Develop targets in conjunction with comprehensive stakeholder engagement and scientific knowledge to ensure they are based on accurate and up-to-date information. Scenario analysis focused on how biodiversity and ecosystem service values might change in the future can facilitate the development of workable and scientifically sound strategies (See Georgia, Box 3.16)
- When developing targets based on biodiversity and ecosystem service values, be ambitious and foresighted, but be realistic. Ensure targets are based on your specific national context and priorities (see point above). For example, in a nation where there has been little work on biodiversity and ecosystem, a realistic target may be to complete an ecosystem assessment, in order to generate information and develop a better understanding of the issues at hand and the value of nature. On the other hand, in a nation where the science is already well developed, a more ambitious target to incorporate biodiversity and ecosystem services into national accounting, or to maintain natural capital at a level that leads to sustainable flow of value (e.g. fish stocks, soil quality for food provision) may be more appropriate. Appropriate natural capital accounts that help monitor the quality and quantity of ecosystems could underpin efforts to achieve such targets
- Overall, ensure the targets are SMART (see Micronesia, Box 3.24)
  Specific
  Measurable
  Attainable
  Relevant
  Time-bound



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When **identifying specific strategies** to help achieving targets relating to biodiversity and ecosystem services values...

- Consider the broad courses of action, and allocation of resources, necessary for achieving values-related targets
- Think about long-term goals and priorities relating to biodiversity and ecosystem service values, and who the key actors might be in achieving these goals

Box 3.22
SUPPORTING APPROACHES for this stage

- Stakeholder engagement (see p56)
- Ecosystem assessment (see p60)
- Ecosystem service mapping (see p66)
- Ecosystem service indicators (see p70)
- Monetary valuation (see p77)
- Natural capital and environmental-economic accounting (see p83)

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Box 3.23
Clear strategic objectives mapping the way forward for valuation in Guatemala

Guatemala's National Biodiversity Policy is structured around five axes, each one representing a priority area:

- Axis 1: Knowledge and responding to the values of biodiversity;
- Axis 2: Conservation and restoration of biodiversity;
- Axis 3: Sustainable use of biodiversity and ecosystem services;
- Axis 4: Biodiversity in the mitigation and adaptation to climate change; and
- Axis 5: Implementation

In support of this framework, the NBSAP *2012-2022 The decade of life and Development* sets out clear objectives, and associated actions, and the issue of economic and social valuation is specifically addressed in:

Strategy 1. Territorial Institution and articulation of key actors.

Strategic Objective 2: To strengthen financial mobilisation to implement the National Policy of Biodiversity its strategy and Action Plan

- Strategic Activity 2.1. To develop the resource mobilisation strategy to implement the decade of life and development: this activity encompasses a holistic analysis of funding biodiversity and ecosystem services, all the cross-sectoral relationships of biodiversity and ecosystem services, national finance and international cooperation (including International aid for development)
- Strategic Activity 2.2. To develop financial mechanisms at a local, regional and national level, supported by direct and indirect users of biodiversity and ecosystem services: this activity includes the identification of all sectors using biodiversity and ecosystem services which can support short term financial mechanisms. It also includes the design and development of financial mechanisms at all scales that must guarantee the maintenance/improvement of ecosystem services
- Strategic activity 2.4. To develop the National Program of Incentives/Compensation to conservation, sustainable use and restoration of biodiversity and ecosystem services. It implies the creation either 'a' national political and juridical framework OR else framework must be plural national political and juridical framework, pilot experience of valuation and incentives/compensation and the development of structure, functional and financial of the mechanism

Strategy 2. Consciousness and Valuation. Objective 4. To develop the National System of Knowledge and Valuation of Biodiversity and Ecosystem services

- Strategic Activity 4.3. To develop an integral value of biodiversity and its links with livelihoods and key ecosystem services to human well-being and human development: this activity develop valuation mechanism in the regional-cultural approach to fulfil the National System of Knowledge in order to prioritise local, regional and national programs of incentives/compensation
- Strategic Activity 4.4. To develop the right tools and mechanism to incorporate the value of biodiversity and ecosystem services into the national inter-institutional plans

Box 3.24
SMART targets enable on going assessment and monitoring of progress in Micronesia

In **Micronesia**, the NBSAP and State BSAPs evolved into a long-term (2004-2023) FSM Strategic Development Plan (SDP) where specific, measurable, action-oriented, relevant and time-bound (SMART) objectives and activities were incorporated into an Environment Sector Strategic Goal Matrix. A five-year (2009-2014) strategic action plan was then developed, which was endorsed and launched at the biennial FSM Environment Conference in 2009. Micronesia found that SMART, quantifiable target setting allowed re-visitation and on going assessment of plans.

5. DEVELOPING IMPLEMENTATION AND RESOURCE MOBILISATION PLANS

Implementation and resource mobilisation plans are critical for action on the ground. Considering biodiversity and ecosystem service values at this stage will ensure that specific actions are developed such that values can become fully incorporated and mainstreamed into national practices and contribute towards achieving national outcomes.

Box 3.25 KEY TASKS to DEVELOP IMPLEMENTATION AND RESOURCE MOBILISATION PLANS

- Develop specific plans of action for each strategy
  - Key actors
  - Timelines
  - Likely costs and benefits
- Develop implementation plans
  - Including prioritised, integrated plan for overall capacity
- Develop a resource mobilisation plan
- Incorporate strategies into national frameworks
  - Policies
  - Laws
  - Budgets
- Develop monitoring plan for targets and associated actions
  - Including monitoring indicators
- Develop plan for ClearingHouse Mechanism

When **developing specific plans of action** for each strategy...

- Continue to engage relevant stakeholders, specifically considering the key actors who will be involved in carrying out action relating to biodiversity and ecosystem service values on the ground. Maintain a comprehensive, integrated over view across sectors and across components of the NBSAP. In particular think about agriculture, fisheries, forestry and development sectors and links to climate change, food security and poverty alleviation (See Norway, Box 3.10, Micronesia, Box 3.27 and Burkina Faso Box 3.28)
- Develop realistic timelines for carrying out actions relating to values (See Georgia, Box 3.29). It may be that actions are developed for conducting a valuation study in the short term, which will be mainstreamed into national planning in the medium to long term. Ensure appropriate mechanisms will be in place for completing each action along the time line. This will also need to be re-addressed during the monitoring and reporting stage
- When estimating the costs of implementing the NBSAP, also include the potential gains which can be made by taking into account the values of biodiversity and ecosystem services and delivering the NBSAP outcomes. Often, these values are exceptionally high. This can support resource mobilisation by putting resource requirement into context, attracting attention and engaging possible funders (See restoration in Guatemala, Box 3.14, and South Africa Box 3.30)

When **developing implementation plans...**

- Ensure actions are aligned with existing structures and practices through engagement with relevant stakeholders and actors (See Burkina Faso, Box 3.28). In particular, address actions for incorporating biodiversity and ecosystem service values into legislation, policy documents and accounting frameworks
- Capacity building is fundamental for implementation, to equip actors with the necessary knowledge and skills to carry out values-based actions. Ensure relevant, targeted capacity building plans are made, based on biodiversity and ecosystem service values, and prioritise key audiences. This can range from scientific researchers, equipping them with the necessary tools to gather information on biodiversity and ecosystem service values, to captains of industry, advising them on how incorporating biodiversity and ecosystem service values into their business plans can make economic and financial sense (See capacity building in Micronesia, Box 3.31)

When **developing resource mobilisation plans...**

- Think strategically about engaging funders, i.e. identify key sectors benefitting from biodiversity and ecosystem service values: who are the primary users, how will they benefit from investing in biodiversity and ecosystem services, what on going financial mechanisms are available to secure sustained funding? This may require the development and implementation of innovative financial mechanisms
- Consider financial flows associated with the drivers of biodiversity loss, such as harmful incentives, and how they can be influenced to reduce their impact. By minimising negative incentives, resource requirements to avoid or redress biodiversity losses can be minimised
- Environmental economic accounts, for example pollution accounts, asset accounts, material flow accounts, or EHS accounts may help provide the necessary evidence to facilitate decisions to help make the polluters or the users pay (introducing levies or taxes to ensure adequate pricing of resource extraction, use and/or degradation and raise funds for restoration or investments to help reduce environmental externalities including those resulting in the degradation of ecosystems and biodiversity loss)

When **incorporating strategies into national frameworks...**

- Ensure comprehensive and coherent integration of biodiversity and ecosystem service values across policies, laws and budgets, and across sectors. A well-integrated, concerted effort will be necessary for implementing change (See Guatemala, Box 3.32)
- Ensure this is based on an understanding of how the NBSAP, and biodiversity and ecosystem service values, are likely to be used. Build on existing practices and structures to facilitate uptake (See Burkina Faso, Box 3.33)

When **developing a monitoring plan...**

- Be sure to include monitoring systems related to biodiversity and ecosystem service values, and if possible integrate these across the different thematic areas, with a number of mechanisms for monitoring progress
- Ensure timely availability of data and statistics underpinning biodiversity-related indicators and targets (especially those related to mainstreaming), which might require the development of natural capital or environmental-economic accounts, including those related to maintaining the stock of natural capital, its quality and the level of ecosystem services flows they generate

Box 3.26
SUPPORTING APPROACHES for this stage

- Stakeholder engagement (see p56)
- Ecosystem assessment (see p60)
- Ecosystem service mapping (see p66)
- Ecosystem service indicators (see p70)
- Monetary valuation (see p77)
- Natural capital and environmental-economic accounting (see p83)

Box 3.27
Specific state-level activities are tailored to local needs in Micronesia

In **Micronesia**, the development of State BSAPs provided a sub-national implementation road map for specific actions on the ground, aligned with the specific terrestrial and marine jurisdiction of each of the states. Activities are aligned across local, state and national priorities, and only those endorsed and lead by relevant communities and stakeholders are supported. Further, specific agencies were strategically identified to take on responsibility for implementation and/or facilitate outcomes at the state level. This combination of approaches was found to improve mainstreaming and uptake on the ground.

Box 3.28
Relevant sectors will develop different parts of the Strategy and Action Plans in Burkina Faso

For **Burkina Faso's** current revision process, relevant actors will participate in scoping meetings, consultations and endorsement workshops. In the first phase, when concrete targets and actions to strengthen implementation will be identified, specific individuals from relevant Ministries, local authorities and Civil Society Organisations will be assigned to formulate proposals. Following endorsement, relevant sectors will develop different parts of the Strategy and Action Plans, as well implementation and financial plans to be integrated into the National NBSAP, under the supervision of the inter-sectoral committee. This division of responsibility across the affected sectors will ensure actions are aligned with existing structures and practices, as opposed to existing as stand-alone, external activities.

Box 3.29
Activities with timelines and indicators enabled monitoring of progress in Georgia

For the previous and first NBSAP of Georgia an economic development component was formed in 2002. During the process the team of experts understood that evidence of the values of biodiversity could play an important influential role in decision-making processes. The action plan recommended the following relevant actions, with specific timelines, as well as indicators of success for monitoring and reporting:

Strategic Goal H: To ensure appropriate financial and economic programmes are in place in order to support effective conservation of biodiversity and ensure the delivery of the BSAP

#	Activity	Year	CBC Article	Indicator
H1	Collect data necessary for the valuation of biodiversity *(including opinion surveys with key stakeholders, identification of primary risk factors and use of internationally accepted methods)*	2005-2006	1, 6	Reliable, relevant and accessible information available
H4	Identify and estimate the benefit to major sectors of products and services derived from biodiversity and analyse its use	2006	8, 9, 14, 16, 20, 21	Benefit derived from biodiversity conservation calculated
H5	Conduct economic assessment of the consequences of the loss of biodiversity	2006	7	Damage caused by loss of biodiversity calculated
H6	Estimate financial needs for biodiversity conservation based on valuation assessments	2007	8, 9, 20, 21	TEV calculation completed

Source: NBSAP Georgia, 2005, page 76

Complementary actions were also recommended under the heading of legislation and institutional development:

- I4: Develop a law on Ecological Insurance
- I8: Create legal mechanism for economic incentives for sustainable use of biodiversity (Indicator: Normative act the national biodiversity fund developed).

Unfortunately, this was developed when Georgia was in a time of economic regulation, and many of the recommendations become unfeasible due to a dramatic unforeseen change in economic context. Despite this, the existence of specific actions allowed Georgia to identify what had and had not been achieved, and what adaptations were necessary in the next round of updating to ensure suitability to the current economic context, implementation, and greater flexibility in the future.

Box 3.30
Putting resource requirement into context in South Africa

Tourism in **South Africa** is strongly linked to South Africa's environmental features—protected areas, natural landscapes, wild animals and pristine beaches. The Annual Tourism Report 2005 states that the Total Foreign Direct Spend in South Africa was R56 billion, or R28 billion more than gold exports. This places tourism in a prime position as one of the key economic drivers in South Africa. Specific activities were included in the previous round of NBSAP to integrate biodiversity considerations into tourism growth strategies and management plans.

In addition, invasive alien species are a key priority area for South Africa, and a multi-agency coordinated national programme to control the full suite of impacts posed by invasive species was foreseen in the previous NBSAP. The projected cost of controlling well-established invasive alien plants species over the next 25 years is R36 billion (an average of R1.4 billion a year). These costs may seem high until one considers the value of the ecosystem services currently being lost as a result of invasive alien species: R6.5 billion each year, a value that would be more than six times higher had no management of these plants been carried out.

Box 3.31
Capacity building to support implementation in Micronesia

A two week training course entitled **Economic Tools for Conservation** was conducted in **Micronesia**. The course gave key conservation professionals from all four states of the FSM, plus Palau, the Republic of the Marshall Islands, and American Samoa, the necessary knowledge and skills to economically evaluate key issues affecting the environment on their islands. Guidance was provided on data and techniques that can be used to estimate values of biodiversity and ecosystem services. In addition, the course built on local capacity for carrying out additional studies, as encouraged by the NBSAP.

Box 3.32
Guatemala takes a cross-sectoral approach, integrating their NBSAP into multiple relevant sectors

In **Guatemala**, mainstreaming biodiversity and ecosystem service values into other sectors is facilitated by specific NBSAP activities being incorporated into other strategies and plans:

- The ***National Climate Change Policy*** proposes the development of national capacities and technology transfer for territorial planning for mitigation and adaptation to climate change in Guatemala, taking into account the environmental management of land with emphasis on adaptation climate change. It also considers the integrated management of watersheds, the productive landscape and bio-cultural and biological corridors;
- The ***National Rural Development Policy*** includes the strengthening of socio-environmental management and the wise use of natural resources and goods, especially land, water and forests, according to the principles of bioethics, in order to increase the resilience to climate change;
- The ***National Strategy for the Conservation and Management of Natural Resources in Communal Lands*** proposes integrated conservation management to supplement the System of Protected Areas (SIGAP). It highlights the role of communal land for biodiversity conservation and points to the need to take into account the role of traditional knowledge of conservation and governance systems in indigenous territories, resonating with what is proposed in the revised (2012) NBSAP through the concept of a National Conservation System;
- The ***National Policy of Food Security*** is articulated with the NBSAP through its environmental transversal axis, which states that the Strategy's objectives call for activities which include the preservation and restoration of environmental conditions, enhancing the ancestral knowledge of indigenous peoples and citizens about their environment, ensuring their sustainability through development patterns that maintain the productive capacity of natural ecosystems for future generations

In addition, as part of the System of Integrated Environmental and Economic Accounting (SEEA) eight sectoral accounts are being developed for forests, water resources, fisheries and aquaculture resources, expenses and environmental transactions, energy and emissions, waste, land and ecosystems and subsoil resources. Despite this activity being developed between the academia sector and the National Bank, the results are not yet incorporated into the National Accounts. However, results are considered in the National Reports on Human Development.

Box 3.33
Strengthening existing structures in Burkina Faso

In **Burkina Faso**, there are various plans to investigate and promote the levels of awareness of the values of biodiversity and ecosystem services across key stakeholders (see Box 3.10). In particular, to support their integration into various sectors, tools will be developed for the integration of biodiversity into local development plans. This began in 2010, and will be strengthened as part of the NBSAP updating process. Further, existing processes and institutional arrangements to support sectoral and inter-sectoral integration will be strengthened. This will be enabled through stakeholder workshops and the sharing of the NBSAP updating responsibility across sectors.

6. IMPLEMENTING THE NBSAP

Only if the NBSAP is fully implemented will the real benefits and opportunities from biodiversity and ecosystem service values be realised. Developing the NBSAP in close consultation with stakeholders and key actors throughout should provide the enabling conditions for implementation, and it is at this stage that biodiversity and ecosystem service values need to be fully integrated into national frameworks and mainstreamed across policy and the public sphere.

Box 3.34
KEY TASKS to IMPLEMENT THE NBSAP

- Engage stakeholders in implementation
- Implement specific strategies and actions
- Mobilise domestic and international financial resources

When **implementing key strategies...**

- Leverage the capacities of the stakeholders and advisors involved in the NBSAP development process, particularly those most relevant to implementing change based on biodiversity and ecosystem service values. They can act as champions to take relevant actions forwards in their own sector (See Norway, Box 3.36 and South Africa Box 3.37)

When **strengthening political will...**

- Continue to articulate the benefits of biodiversity and ecosystem services, and the values they provide. Use facts and figures based on scientific assessment (See Gathering Information), but ensure scientific data is translated into policy-relevant information, which is easily digestible. Relate actions to national priorities such as development and poverty alleviation (See Micronesia, Burkina Faso and Guatemala, Boxes 3.14 and 3.17), with examples of success
- Consider a variety of media and fora in order to reach a range of audiences. Hold public consultations (See Norway, Box 3.36). Align communications with sectoral priorities, and identify strategic, relevant examples for different sectors

Box 3.35
SUPPORTING APPROACHES for this stage

- Stakeholder engagement (see p56)
- Ecosystem assessment (see p60)
- Ecosystem service mapping (see p66)
- Ecosystem service indicators (see p70)
- Monetary valuation (see p77)
- Natural capital and environmental-economic accounting (see p83)

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Box 3.36
The Norway TEEB committee are responsible for stakeholder engagement, to facilitate the implementation of results

For the TEEB for **Norway** study, a committee has been assembled consisting of twelve members with varied expertise and contacts. They will be guided by a 'reference group' consisting of different ministry representatives, with the Ministry for Environment providing the overall Secretariat.

Amongst other tasks included in the overall review of the values related to ecosystem services in the country, the committee are responsible for stakeholder engagement. They are expected to leverage their existing contacts, and establish new ones, to build partnerships with interested parties and relevant sectors and organisations. In particular, open consultations will be held to engage members of the public.

Box 3.37
Working through champions in South Africa

Planners and decision-makers have numerous and often conflicting imperatives to which they must respond, and safeguarding biodiversity is seldom an explicit requirement of their jobs. In **South Africa**, mainstreaming biodiversity in this context has been most effective when spatial biodiversity plans that identify geographic biodiversity priority areas and are accompanied by land-use guidelines have been developed, and at least one or two people based in the implementing agency have been closely involved in the development of the biodiversity planning tools (i.e. maps and guidelines) and are centrally involved in their implementation. These people play the role of champions, who understand the purpose of the tool, and are committed to finding ways through which it can be integrated in the organisational systems and procedures of the implementing agency.

Champions working in this way can effectively build awareness and develop willingness to put the biodiversity planning tools into practice. For example, in the Namakwa District in the Northern Cape province, a Biodiversity Advisory Forum has been formed to bring together planners and decision-makers from organisations in different sectors to develop a learning network and build their capacity for using the district-level spatial biodiversity plan to inform land-use planning and decision-making more effectively. Those who participate in the Forum can then serve as champions for the biodiversity plan within their relevant organisations.

7. MONITORING AND REPORTING

Following the progress of the NBSAP and tracking its implementation is essential for full uptake of plans and actions and continuous learning and adaptive management to deal with changing circumstances. Monitoring and reporting systems need to take into account biodiversity and ecosystem service values to ensure they are fully mainstreamed, and plans and actions are effective.

National Reports are important tools for biodiversity planning at the national level, providing the analysis and monitoring necessary to inform decisions on implementation. When **developing National Reports...**[4]

- Ensure biodiversity and ecosystem service values are incorporated across all key sections of the report. Take an integrated approach, rather than an isolated section for values alone, and think about how they link in to other thematic areas

Box 3.38
KEY TASKS to MONITOR AND REPORT

- Develop National Reports
- Communicate NBSAP
  - Communicate strategies and plans broadly
  - Communicate results of implementation
- Review and adapt priorities within the NBSAP periodically based on new information

When **communicating the NBSAP...**

- Make specific reference to biodiversity and ecosystem service values, their benefits, and the results their incorporation has helped to achieve. Make specific references to evidence and examples of success where possible (See 'Gathering Information')
- When communicating results, be positive but don't refrain from highlighting challenges and lessons learned to leverage support for more work in the future
- Ensure communication outputs are easily understandable for a variety of audiences (See Burkina Faso and Norway Box 3.40)

When **reviewing and adapting priorities...**

- Think about how your national context may have changed, and how this influences biodiversity and ecosystem service values. This may include changes in economic orientation, changes in the political environment, or even changes in the natural environment such as environmental disasters and climate change. Values are not fixed, they will change circumstantially. Further, the best mechanisms and frameworks for integrating biodiversity and ecosystem service values into society will change in line with other socioeconomic and policy changes (for example, Georgia, Box 3.31)
- Comprehensive monitoring and reporting systems will facilitate the review and adaptation process (See Norway, Box 3.40)

[4]National reports are essential tools in allowing the Conference of the Parties to keep the implementation of the Convention under review. In Decision X/10, the Conference of the Parties requested Parties to submit their fifth national report by 31 March 2014. It will provide an important source of information for a mid-term review of progress towards the implementation of the Strategic Plan for Biodiversity 2011-2020 and progress towards the Aichi Biodiversity Targets which will be undertaken by the Conference of the Parties at its twelfth meeting in the second half of 2014.

Box 3.39
SUPPORTING APPROACHES for this stage

- Stakeholder engagement (see p56)
- Ecosystem assessment (see p60)
- Ecosystem service mapping (see p66)
- Ecosystem service indicators (see p70)
- Monetary valuation (see p77)
- Natural capital and environmental-economic accounting (see p83)

Box 3.40
Accessible communication outputs in Burkina Faso and Norway

In order to communicate the importance of biodiversity and ecosystem services and their values throughout society in **Burkina Faso**, a number of awareness-focussed activities are anticipated:

- A study on the level of key stakeholder's awareness of the values of biodiversity and ecosystem services
- Awareness raising actions, such as;

- Translations of key words into easily understandable French, as well as the other main languages in the country
- Contacts with mobile phone agencies, television and the press disseminate awareness raising messages
- A study on the development of a guide on environmental education at primary school level

Translation of key words and mainstreaming into education and the popular media can ensure messages are heard across all levels of society, facilitating a concerted societal response to the new NBSAP and mainstreaming of the values of biodiversity and ecosystem services.

In **Norway**, the Norwegian national Nature Index has been developed around the understanding that it is often difficult for politicians and the general public to gain an overview of the state of biodiversity. This is partly due to the complexity of the natural environment and lack of synthesis of the knowledge that exists from numerous studies published in various journals, but also lack of knowledge in some areas and because the media tends to take a negative focus on biodiversity topics. The Nature Index is based on the best available knowledge in Norway for a wide variety of indicators, and combines all of the information into an easily digestible overview of developments. It acts as a framework for simplifying and communicating a huge amount of data, aggregating 310 indicators for the status and trends of biodiversity, and representing nine major terrestrial and marine ecosystems. Indicators are then used to produce indices that reflect the overall status of biodiversity across different ecosystems, to measure and monitor progress in halting the loss of biodiversity (thus also acting as an indicator for monitoring the progress of the NBSAP). The Nature Index also gives an indication of which environmental pressures are driving change and how difficult it can be to take the necessary steps to respond to these. Results are therefore easily understandable, communicable to decision-makers and can be applied to define clearer targets and prioritise efforts (i.e. for reviewing and updating an NBSAP). At present the index does not cover ecosystem services.

COMMON EXAMPLES OF GOOD PRACTICE

Across the case-studies a number of re-occurring examples of good practice for incorporating values of biodiversity and ecosystem services into NBSAPs were identified. This included:

- A clear governance structure
- A common understanding amongst all stakeholders
- A focus on national priorities and key themes
- Use of existing structures and processes
- Integration of bottom-up and top-down approaches
- Making the most of existing data

Table 3.1 below details how each country achieved these.

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	Common lessons of good practice					
	Apply a clear governance structure	**Ensure a common understanding amongst all stakeholders**	**Focus on national priorities and key themes**	**Use existing structures and processes**	**Integrate bottom up and top down approaches**	**Make the most of existing data**
Micronesia	✓ Cross-sectoral leadership ✓ Participatory approach ✓ Separate groups with different roles and responsibilities (e.g. a co-chair, 'NBSAP task force', state-level agencies) ✓ Assign clear leadership roles within groups ✓ Regular meetings & multi-stakeholder workshops ✓ Assignment of a full-time staff member at National Government level ✓ Ensure adequate funding and realistic budgeting for the entire process	✓ Multi-stakeholder national workshops and sub-national consultations ✓ Seek partnerships with sectors beyond the environment	✓ Development of State level BSAPs (SBSAPs) to align with national-level guiding priorities ✓ Focus on protected areas, with an ambitious commitment to the Micronesia Challenge – this elevated the profile of NBSAP efforts and leveraged funding and technical support ✓ Link to sustainable development plans, poverty reduction and key industries	✓ Use of a parallel eco-regional planning process to 'piggyback' on workshops and consultations, and incorporate data and recommendations into NBSAP ✓ Assignment of existing relevant state agencies to oversee delivery of NBSAP at state level ✓ Working with local partners to assess the feasibility of establishing and mainstreaming ecosystem services into existing local efforts ✓ An iterative process to ensure engagement and buy-in	✓ Assignment of a full-time staff member at National Government level to attain high level buy in ✓ Assignment of agencies to oversee implementation at state level and assist on the ground delivery	✓ Building on local knowledge to identify Areas of Biological Significance in the outlying islands/atolls or remote areas and reinforced with subsequent scientific assessments (e.g. marine rapid assessment)
South Africa	✓ Participatory approach ✓ Separate groups with different roles and responsibilities (e.g. state-level Steering Committee, Task Teams, NGOs consortium) ✓ Regular meetings & multi-stakeholder workshops ✓ Assignment of a full-time staff member at National Government level	✓ Comprehensive stocktaking process to integrate knowledge from all sectors (e.g. economic, development and poverty alleviation, legislation and institutional sectors) ✓ Multi-stakeholder workshops at national and provincial level.	✓ Inclusion of comprehensive spatial assessment and alignment with National level geographical priority areas ✓ Link to sustainable development plans, poverty reduction and key industries	✓ Link the NBSAP to existing national strategies and policies (NSBA, NBF, NBA) ✓ Development of tools for mainstreaming biodiversity in to existing municipal and local land-use planning policies	✓ Assignment of a full-time staff member at National Government level to attain high level buy in	✓ Use of existing data on geographical priorities for conservation to inform target setting ✓ Consideration of existing reporting requirements from other legal instruments to act as core monitoring framework for the NBSAP
Georgia	✓ Separate groups with different roles and responsibilities (e.g. a coordinating committee and an expert group) ✓ Focus on a transparent, open process with wide stakeholder engagement		✓ Carried out a situation analysis in 11 thematic components, involving consultation with relevant stakeholders and thematic workshops ✓ Carried out consultations with sectoral ministries and agencies ✓ Creation of a specific economic development component of the NBSAP ✓ Ensure integration of the NBSAP into relevant sectoral chapters, rather than a stand-alone document	✓ Creating synergies with the National TEEB scoping study to identify data and incorporate recommendations		✓ Identification of existing data with the help of the national TEEB scoping study ✓ Use of existing monetary valuation exercises to demonstrate the links to national development priorities and increase attention towards the need for further work. Data also used to help set SMART targets when drafting the action plan

Burkina Faso	✓ Cross-sectoral leadership ✓ Participatory approach ✓ Separate groups with different roles and responsibilities (e.g. a coordinating group & a technical group) ✓ Clear process management structures ✓ Regular meetings & multi-stakeholder workshops ✓ The main information-providers must be considered in the institutional set-up	✓ Awareness raising actions and on-the-ground training ✓ Translation of key words relating to ecosystem goods and services into easily understandable concepts in all relevant languages ✓ Sharing assessment results with land-users ✓ Frame the NBSAP within a wider context, underlining the benefits that can be expected from implementation	✓ Focus on existing national priorities – combating land degradation and alleviating poverty through sustainable and equitable land management	✓ Development of tools for the integration of biodiversity in to existing local development plans ✓ Development of a Guide for the integration of the environment and poverty-environment links in the development of sectoral strategies	✓ Study on identifying good practices of sustainable soil management, followed up by training on the ground ✓ Study on a communication strategy for sustainable soil management ✓ Developing a guide on environmental education	✓ Used an existing valuation study to increasing decision-makers' awareness of the values of ecosystem services and biodiversity, and stimulate further discussion/ consultation ✓ Used existing research to highlight the socio-economic importance of non-timber forest products and their contribution to food security, health and well-being – lead to the creation of an agency specifically tasked with promotion and development of NTFP. ✓ Used a pilot project on the development of environmental accounts to attract attention and highlight data and capacity building needs
Guatemala	✓ Participatory approach ✓ Establishment of a structured process for implementation and review of the strategy ✓ Specific efforts to ensure inputs from indigenous people	✓ Comprehensive consultation processes to consider and align the interests of all actors, and integrate knowledge from all sectors ✓ Sharing information with all stakeholders and sectors before, during and after events and establishing multiple learning opportunities. ✓ Collaboration between government institutions and academia is particularly beneficial for pooling existing information and generating operational environmental indicators ✓ Translate scientific information into a language that is easily understood by decision-makers and the wider public	✓ Highlight the strategic value of biodiversity and its contributions to human well-being, in particular sustainable economic development and poverty alleviation ✓ As a starting point, prioritise ecosystem services that are most visible/tangible for decision-makers and the public ✓ Focus on national priorities – climate vulnerability and water provision, and mitigating the risks and impacts of environmental disasters ✓ Emphasise the costs of degradation to identify and prioritise restoration needs	✓ Creation of a multi-sectoral policy to support mainstreaming and spread responsibility amongst existing structures across the whole state cabinet ✓ Link the NBSAP to existing national strategies and policies (climate change, rural development, food security, conservation and management of natural resources in communal lands)	✓ Specific efforts to collect inputs from indigenous people through the organisation of the First National Congress on Traditional Knowledge and Biological Diversity ✓ To anchor the NBSAP in to the National Councils of Development at all scales (communities, local governments, departments and national level)	✓ Consideration of existing socio-environmental indicators from previous work to act as basic information tools in environmental assessment and development of a biodiversity baseline ✓ Use of existing mapping exercise to identify gaps and priorities ✓ Use of data from existing studies to develop databases to systematise existing information, and create data management structures for future monitoring and reporting ✓ Use existing economic valuation exercises to attract attention of decision-makers and the wider public, and identify gaps and needs
Norway	✓ Led by the Ministry of Environment, in consultation with numerous other relevant ministries			✓ Anticipated use of outputs from the TEEB national study to inform policy action, and integrate results into the NBSAP.		✓ Use of the existing Norwegian Nature Index to reflect the overall status of biodiversity and highlight information needs ✓ Use of results from the Glomma River Basin Sub-Global Assessment and the Norwegian Millennium Ecosystem Assessment pilot study to provide data ✓ Use of TEEB Nordic to identify important ecosystem services and create further policy action on the socio-economic importance of biodiversity and ecosystem services in individual Nordic countries.

Table 3.1: Common examples of good practice for incorporating the values of biodiversity and ecosystem services into NBSAPs.

SECTION 3
Supporting approaches to demonstrate the values of biodiversity and ecosystem services

The importance and value of biodiversity and ecosystem services can be presented both in non-monetary (qualitative, quantitative and spatial) and monetary terms. To achieve a comprehensive picture of the values associated with the benefits people obtain from ecosystems a range of tools may be used:

- Non-economic methods and tools to assess the multiple values people derive from ecosystems include for example biophysical assessments such as ecosystem assessments as well as more social assessment methods including structured participatory decision-making processes
- As regards the use of monetary values, a variety of economic valuation methods have been developed, refined, and applied to biodiversity and ecosystem services in a range of different contexts. Monetary analysis focuses on translating the data produced by biophysical and quantitative (sometimes also qualitative) assessments into monetary terms, with a view of helping to inform decision-making as part of a wider evidence base

This section provides an overview of the approaches that can be used for incorporating biodiversity and ecosystem service values into NBSAPs, and where and how they might be applied in the NBSAP updating process.

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STAKEHOLDER ENGAGEMENT

Background

If an NBSAP is to be effective and meet its goals, all relevant government agencies, community organisations, non-governmental organisations, indigenous and traditional peoples' groups, scientific associations and the academic community, business and industry, educators and the media need to be involved in its design and implementation. The importance of stakeholder engagement in the development of a well-grounded, sustainable NBSAP is highlighted through its inclusion as an individual step in the NBSAP revision process.

Why use this approach?

Broad scale and active stakeholder participation is essential for ensuring biodiversity and ecosystem system services are incorporated into NBSAPs. It is unlikely that a small group of official or expert 'biodiversity planners' will have the understanding, expertise or knowledge to successfully identify the diverse range of values or existing valuation work that could be integrated into an NBSAPs. Different stakeholders will place varying levels of importance on the different values provided by biodiversity and ecosystem services. The inclusion of a range of stakeholders will therefore help to ensure a wide breath of values are considered during the revision process.

It is also important to involve as many societal stakeholders as possible because their buy-in and participation is key to the effective implementation of the NBSAP. Stakeholders will be more responsive to an NBSAP if it includes objectives and targets that respond to biodiversity and ecosystem service values, which have significance to their interests and well-being.

The use of an ecosystem service approach for identifying stakeholders can greatly assist with the identification and incorporation of values in an NBSAP. Using ecosystem services as a starting point for stakeholder identification can ensure that the linkages between biodiversity, development and human well-being are adequately reflected.

Stakeholder engagement is seen as an essential approach for mainstreaming the NBSAP (and therefore biodiversity) into other sectoral strategies and plans. The identification, demonstration and use of values in their various forms are seen as key support tool in facilitating mainstreaming biodiversity into other sectoral plans and processes. Therefore the inclusion of stakeholders with a view to supporting mainstreaming, is also likely to lead to the incorporation of biodiversity and ecosystem service values in the NBSAP.

Box 4.1
Who are the stakeholders?

The term 'stakeholder' in the context of NBSAP revision refers to social groups or institutions that have an interest in the policy of planning questions under discussion.

Stakeholders can be identified as having an interest in the revised NBSAP for a number of reasons:

1. They may possess experience, expertise and/or knowledge that is relevant to biodiversity and an assist in ensuring the NBSAP obtains better outcomes.
2. They have a legitimate interest in the issue and therefore a right to be consulted on and participate in the NBSAP revision process.
3. They have a direct legal or administrative responsibility for aspects of biodiversity.
4. Activities they carry out may have an impact on biodiversity.
5. Measures and policies adopted under the NBSAP may have an impact on their own work.

Mechanisms for involving stakeholders

There is no one universal, one-size-fits-all-approach when it comes to the mechanisms to support stakeholder involvement. A good starting point may be to examine if the country already has consultation procedures for public policy discussions in place or if there are any existing forums for broad based discussion of environmental or development policy. These procedures could be utilised and built upon, either by using the same structure, or by establishing a new structure modelled on the procedures that have proved successful in the national context. There are a large number of mechanisms to support stakeholder engagement (see Box 4.3 for some innovative approaches previously adopted by India) including the establishment of biodiversity working and advisory groups, broader stakeholder workshops and e-conferences and citizen juries (see Box 4.2).

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Box 4.2:
Citizen juries – a possible mechanism for stakeholder engagement

The aim of a citizens' jury is to link local voices and visions with national and international policy making. In the context of NBSAP revision a citizens' jury can be a good model of participatory decision-making that allows the voices of the most marginalised (indigenous and local communities, small-scale land owners, etc), and yet most affected by management policies, to be heard and included.

It is important to ask whose perspectives, knowledge and aspirations will be embedded in the NBSAP, and those who are excluded. Recognising that policies usually reflect and reinforce the interest of the powerful, citizen juries are attempts to foster greater inclusion and democratic pluralism in policy making.

Although a relatively new concept in regards to stakeholder engagement for NBSAPs, citizen juries have been successfully used to influence other policy making processes. For example, a citizens' jury was run in Mali as a space to share knowledge, dialogue and inform decisions on genetically modified organisms (GMOs) in relation to the future farming.

Source: IIED. *Deliberative democracy: Citizens' Juries: http://www.iied.org/deliberative-democracy-citizens-juries*

Box 4.3:
Lessons learnt from India's NBSAP preparation experience

India's preparation process for its previous NBSAP was the biggest biodiversity planning exercise ever undertaken. The Indian Ministry of Environment and Forests (MOEF) entrusted a non-governmental organisation with the task of coordinating the preparation of the NBSAP through a large-scale decentralised process across all states of India. The NBSAP approach was based on the premise that biodiversity has ecological, cultural and spiritual value, as well as economic, value and impinges on every citizen. A variety of innovative tools and strategies were used to enable more than seventy state, sub-state, eco-regional and thematic plans to be prepared in addition to the overall national plan including:

- National, regional and state-level workshops
- Public hearings
- Sectoral meetings
- Radio program series
- Community-based biodiversity registers
- Mobile biodiversity festivals
- Village-level consultations
- School projects
- Competitions and nature camps
- Boat racing

The process was instrumental in raising stakeholder awareness of biodiversity, in increasing stakeholders' capacity to contribute to biodiversity planning, in building networks, and in empowering people to take action. It challenged the assumption that huge amounts of money are needed for such a process, and demonstrated what it is possible to achieve with limited resources.

It is important to note that the draft plan developed through this process was not accepted by the Ministry of Environment and Forests but was rather labelled a 'technical report' in the process of preparing a new national document. An important lesson from this is the need to balance the representation of different sectors of society, including not only marginalised voices, but also other societal actors whose inclusion is necessary in order to produce a realistic and workable Module 5: Societal Engagement Plan. This lesson should not detract from the innovation and creativity of the Indian experience. The consultation process was considered as important as the final product, in regards to increasing awareness of biodiversity and empower people through participation.

Source:

IIED, 2005. *An activist approach to biodiversity planning: a handbook of participatory tools used to prepare India's National Biodiversity Strategy and Action Plan*. IIED, London.

TPCG and Kalpavriksh. 2005. *Securing India's Future: Final Technical Report of the National Biodiversity Strategy and Action Plan*. Prepared by the NBSAP Technical and Policy Core Group. Kalpavriksh, Delhi/Pune.

Where can I get further information?

There are a number of resources available to provide guidance on stakeholder engagement for the revision of NBSAPs. In particular, there are a number of CBD capacity building modules specifically designed to provide detailed guidance:

The module **Ensuring stakeholder engagement in the development, implementation and updating of NBSAPs** module[5] (Module B-5) is framed around a series of questions relating to stakeholder engagement, which include:

- Why is stakeholder participation so important for NBSAPs?
- When should the different categories of stakeholders be brought into the NBSAP process?
- What are the possible mechanisms for involving stakeholders?

The module on **Mainstreaming biodiversity into national sectoral and cross-sectoral strategies, policies, plans and programmes**[6] (Module 3) specifically covers stakeholder engagement in the context of actions to support mainstreaming of the biodiversity across sectoral strategies and planning process.

A recent module on **Ensuring Inclusive Societal Engagement in the Development, Implementation and Updating of NBSAPs**[7] (Module 5, B series) provides guidance on ensuring public participation in the NBSAP revision process.

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[5]http://www.cbd.int/doc/training/nbsap/b5-train-stakeholder-nbsap-en.pdf
[6]http://www.cbd.int/doc/training/nbsap/b3-train-mainstream-revised-en.pdf
[7]http://www.cbd.int/doc/training/nbsap/b5-train-stakeholder-nbsap-revised-en.pdf

IDENTIFICATION AND ASSESSMENT OF ECOSYSTEM SERVICES

A variety of approaches are available to Parties for monitoring and assessing ecosystem services. These can assist with the incorporation of biodiversity and ecosystem service values into NBSAPs by providing an evidence base on which to built strategies, targets and actions, and providing time series data for monitoring and reporting. These approaches include ecosystem assessments, the development of ecosystem service indicators and ecosystem service mapping. These approaches are often interlinked: ecosystem indicators are often used as part of the assessment process and ecosystem mapping often supports the production of spatial ecosystem service indicators. They can also provide a wide variety of values data, including both qualitative and quantitative information.

Ecosystem assessment

Background

An ecosystem assessment is a social process (See figure 4.1) which establishes a scientific link between environmental issues and people. It focuses on ecosystem services and their links to human well-being (Figure 4.2a), considering both the ecosystems from which services are derived and the people who depend on them (Figure 4.2b), thus bridging the gap between environmental and development sectors. An ecosystem assessment aims to identify the cause of ecosystem change, and their consequences for human well-being, and present decision-makers with management and policy options to support more sustainable and equitable use (Figure 4.2c). The Millennium Ecosystem Assessment (MA, 2005) provided the first comprehensive demonstration of the importance of ecosystems for human well-being, bringing together a consensus of social and natural scientists to analyse a wide body of data. The MA demonstrated that appropriate action through policy and practice can mitigate the detrimental impacts of human activity on ecosystems and the valuable services they provide. The MA also included several sub-global components to take account of the multi-scale nature of environmental change, and since its release many countries have continued undertaking ecosystem assessments at different scales, supported and co-ordinated by the Sub-Global Assessment (SGA) Network.

Box 4.4
Ecosystem Assessments

An ecosystem assessment is social process through which the findings of science concerning the causes of ecosystem change, their consequences for human well-being, and management and policy options are brought to bear on the needs of decision-makers (MA, 2005)

Since the MA, The Economics of Ecosystems and Biodiversity (TEEB) initiative has also been undertaken, contributing considerably to the assessment knowledge base and awareness, in particular on the valuation of ecosystem services. Following TEEB many countries have also initiated country level studies, which have many similarities to an ecosystem assessment and help to inform more specific policy decisions.

Following increasing support for the biodiversity and ecosystem service approach an Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) has been established to act as an on going global mechanism to bridge the gap between the scientific community and policy makers, strengthening the use of science in policy making. It is anticipated that the SGA Network and its constituent ecosystem assessments will be tightly linked to IPBES and related decision-making processes.

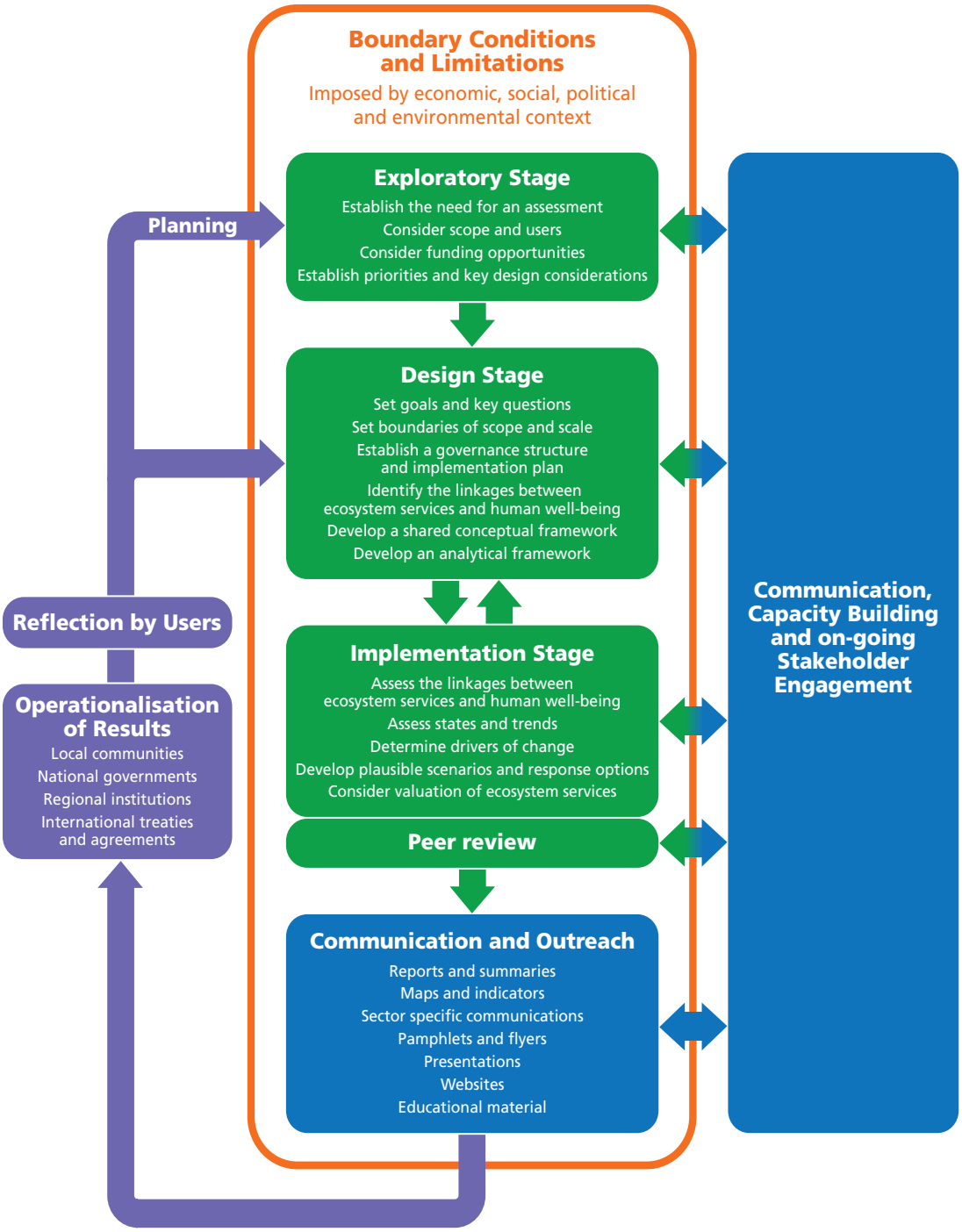


Figure 4.1 The ecosystem assessment process, consisting of five key stages: Exploratory, Design, Implementation, Communication and Operationalisation. Adapted from Ash et al. 2010

Fig. 4.2a: The links between ecosystem services and human well-being. MA, 2005

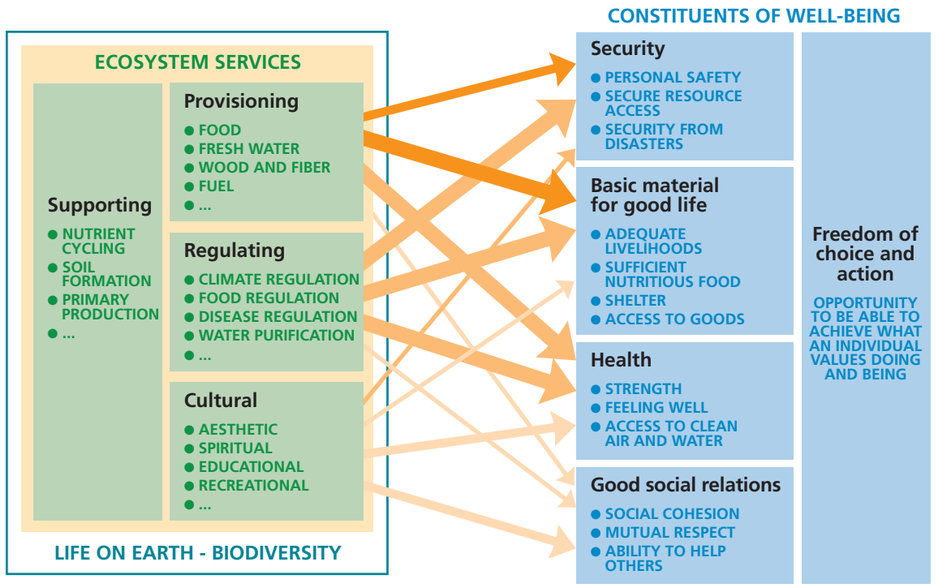


Fig. 4.2b: Framework for linking ecosystems to human well-being (modified from Haines-Young & Potschin 2010)

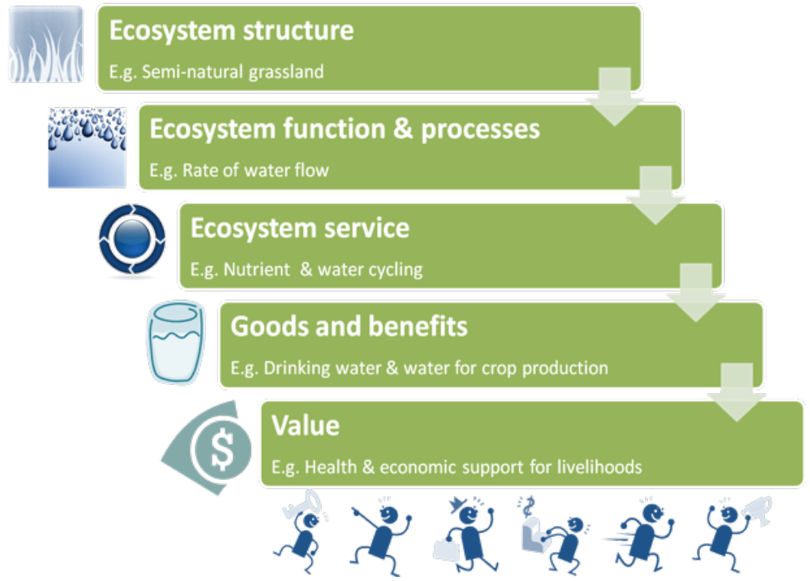
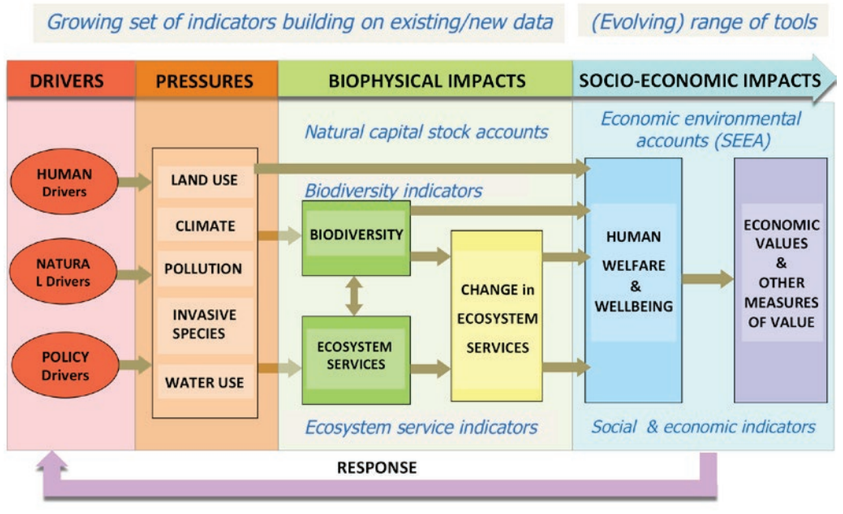
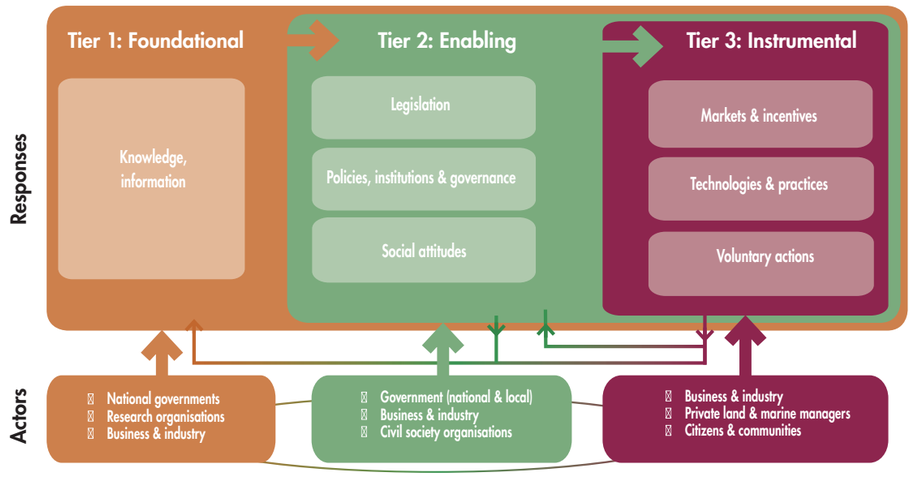


Fig. 4.2c: The Path-way from Drivers to Impacts, Information Needs and Tools, (ten Brink et al. (2012)



Source: ten brink et 2012, adapted from Braat and ten Brink et al (2008)

Fig. 4.2d: The cascade of responses illustrates three types of activity that can be used to influence policy, the management of ecosystems and the role key actors can play (UK NEA 2011)



Why use this approach

An ecosystem assessment is designed to produce results far beyond a set of reports and recommendations; the real value of this approach lies in the entire engagement process it brings about. Ecosystem assessments can inform decision-making processes, such as NBSAP updating, of the value of ecosystem services and biodiversity by highlighting the links between healthy ecosystems and the attainment of economic and social goals. A key component of the ecosystem assessment approach is **stakeholder engagement** (See MA Methods manual chapter 2 - Ash et al. 2010) designed to achieve core values of relevance, credibility and legitimacy. This means that assessments can form not only a credible and robust scientific evidence-base for action, but also develop information which is directly relevant to policy, as well as practical and useable tools to inform better decision-making and mainstream biodiversity and ecosystem services across sectors.

Ecosystem assessments are also highly flexible and adaptable. The ecosystem assessment approach can be tailored to specific social, political and economic contexts, and conducted across multiple sites and scales to meet needs of decision-makers at the scale at which decisions are undertaken. This cross-cutting, adaptable approach is particularly suitable for the NBSAP updating process, since parties are invited to create their own national targets based on their own contexts and priorities.

The survey showed that ecosystem assessments are already used for policy support in a number of countries, indicating that there is existing capacity and support for this approach (see Annex). It is therefore likely that some countries already have access to some suitable information to incorporate into their NBSAP updating.

Box 4.5
The UK National Ecosystem Assessment – influencing decision-making and NBSAP revision

The UK National Ecosystem Assessment (UK NEA) was the first analysis of the UK's natural environment in terms of the benefits it provides to society and continuing economic prosperity. The UK NEA was reported in June 2011 and used to inform The Natural Environment White Paper The Natural Choice: securing the value of nature. Through the results of the UK NEA, The White Paper made bold commitments to putting the value of nature at the centre of decision-making. The subsequent updating of the NBSAP built on the Natural Environment White Paper to outline a strategic direction for biodiversity policy, stressing the provision of support for healthy well-functioning ecosystems and the establishment of coherent ecological networks. A set of outcomes for 2020 were defined, including the establishment of a network of marine protected areas containing in excess of 25% of English waters by the end of 2016. Overall, the strategy aims to ensure that biodiversity values are considered in the decision-making processes of both the public and private sectors. Further, the government also intends to develop new and innovative financing mechanisms for achieving the 2020 outcomes.

The UK NEA is available online: http://uknea.unep-wcmc.org/

Box 4.6
Using ecosystem assessments to mainstream poverty-environment linkages

The UNDP-UNEP Poverty Environment Initiative (PEI) supports country-led efforts to mainstream poverty-environment linkages into national development planning in 18 countries. Assessments are centred on responding to a clearly articulated policy relevant question that reflects an important need expressed by local decision-makers and interest groups.

An economic analysis of natural resource management was undertaken in Rwanda in 2005 as a pilot study for PEI. This study integrated an ecosystem assessment approach to highlight ecosystem services-human well-being linkages, and a valuation study to make an economic argument for ecosystem service conservation.

Assessment results were presented during preparations of Rwanda's Economic Development and Policy Reduction Strategy (EDPRS) and experts provided technical briefing throughout EDPRS formulation. As a result, environmental issues were successfully incorporated into the national poverty reduction strategy.

This entire process also raised general awareness of the importance of ecosystem services and biodiversity, engaging different sectors, and gaining political generating a demand for more integrated planning and information for improved environmental management.

Further information on PEI and the Rwandan example is available online: http://www.unpei.org/

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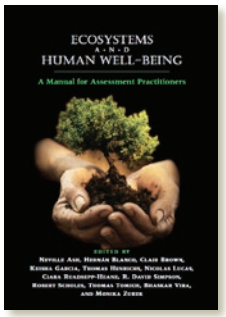
Where can I get further information?

There are a number of online resources available to provide guidance for ecosystem assessments and valuation, as well as a number of networks of practitioners and experts who can provide advice, support and capacity building opportunities.



Ecosystems and Human Well-Being: a Manual for Assessment Practitioners[8] can provide methodological support to countries for adopting the ecosystem assessment approach. It details the MA conceptual framework and methods, offering tools, approaches and case studies of good practice for conducting an ecosystem assessment.

To support and facilitate the growing demand for ecosystem assessments on all scales, the **Sub-Global Assessment (SGA) Network**[9] has been established to create a common platform for ecosystem assessment practitioners to promote and facilitate improved capacity in undertaking and using assessments, bringing together experts and new practitioners to exchange information and build a collective pool and knowledge and lessons. Additionally, a recent output of the SGA Network is a lessons learned document: Lessons learned from carrying out ecosystem assessments: Experiences from members from members of the Sub-Global Assessment Network. This is a brief collation of the collective wisdom of the SGA network, intending to be a set of simple practical first steps for getting new assessments off the ground.

The Economics of Ecosystems and Biodiversity (TEEB) network[10] can provide more information on TEEB studies and their application and benefits for policy makers.

The Ecosystem Services Partnership (ESP)[11] is a network of scientists, academics and researchers, which works more on the technical side of enhancing the science and practical application of ecosystem services assessment. The Partnership coordinates collaborative efforts on ecosystem services world-wide, aiming to link practitioners, researchers, and stakeholders who are working toward better understanding, modelling, valuation and management of ecosystem services and natural capital.

[8]http://www.unep-wcmc.org/medialibrary/2010/10/31/90af3045/EcosystemsHumanWellbeing.pdf
[9]http://www.ecosystemassessments.net/
[10]http://www.teebweb.org/
[11]http://www.fsd.nl/esp

ECOSYSTEM SERVICE MAPPING

Background

Ecosystem service mapping is most effectively used within a wider decision-making process that starts with stakeholder consultation, such as an ecosystem assessment. Within an ecosystem assessment mapping is generally used to assess states and trends in ecosystem service provision and human well-being, providing spatial quantification of ecosystem services and their values. Ecosystem service mapping is also used in the context of developing spatial ecosystem service indicators.

Different methods for mapping ecosystem services exist, depending on data availability and spatial and temporal scales of assessments. These methodologies vary considerably in the scale, scope and method of ecosystem service analysis (See Table 4.1).

Table 4.1. Major approached to producing maps of ecosystem services (after Eigenbrod et al. 2010)

Methodology	Advantages	Disadvantages	Examples
Requires primary data from within the study region			
Representative sampling of entire study region (e.g. atlas data; region-wide survey)	Provides the best estimate of actual levels of ecosystem services Well suited to heterogeneous ecosystem services	Expensive or difficult to obtain, so often unavailable Degree of error will depend on sampling intensity	Recreation Biodiversity Reed and Fish production
Modelled surface based on sampling from within study region	May require far fewer samples than representative sampling Smoothing will overcome sampling heterogeneity	Smoothing will mask true heterogeneity in the service Error will depend on sample size and fit to modelled variables	Carbon storage Biodiversity Biodiversity 'hotspots' Carbon sequestration Agricultural production Pollination Water retention Recreation
Does not require data from within the study region			
Land cover based proxy (e.g. benefits transfer)	Enables mapping of ecosystem services in regions where primary data are lacking	Fit of proxy to actual data may be very poor	Biodiversity (existence value and bioprospecting) Recreation Carbon storage Flood control Soil conservation
Proxy based on logical combination of likely causal variables	Can offer a major improvement on performance of land cover based proxies alone, without the need for much additional data	Potential for large error is still high if assumed causal variables are not in fact good predictors	Recreation Flood control Water provision Soil accumulation

Mapping is closely linked with modelling. Not all ecosystem service metrics can be directly measured; many such as carbon storage and watershed quality are a product of the properties of an ecosystem. This means they need to be modelled, usually by applying a production function equation to an underlying dataset to link the condition of the ecosystem to the provision of the service. Modelled metrics are often represented in the form of maps of ecosystem service supply or demand.

Modelling and mapping is becoming increasingly popular in academic literature. It can be used to draw together multiple types of information from multiple sources and provide information at times and places where it would be impractical or impossible to measure.

Why use this approach

Maps are valuable sources of integrated information and powerful communication tools, bringing together widely dispersed information into a unified, spatially explicit output. Ecosystem service mapping methods can be adapted to data availability, as well as specific audiences and uses. Mapped outputs can be easily interpreted and tailored to feed directly into land-use planning or other spatial decision-making processes, which can support NBSAP updating through identifying spatial priorities and action.

Mapping of ecosystem services and their values is a valuable tool for highlighting *synergies and trade-offs* associated with alternative choices in spatial planning. This can highlight country priorities for NBSAP updating in a number of ways:

1. Ecosystem service mapping helps to make use of existing information to improve understanding of the *biophysical* aspects of ecosystem services, such as stocks and flows, which are vital for their maintenance. This detailed understanding supports prioritisation of specific ecosystem features, such as habitat types or features, which is highly useful for NBSAP updating.
2. Mapping can help to identify entire priority regions for conservation, where multiple benefits of ecosystem services and biodiversity co-exist. Investing in natural capital in areas where such clear synergies exist can benefit both nature and people, ensuring the efficient allocation of limited environmental and financial resources. This too can feed into NBSAP updating, enabling decisions to be made based on 'triple wins' for social, environmental, and economic progress.
3. The integration of mapping and modelling can also allow 'futures thinking', so that current decisions can be informed by estimates of the implications of particular policies and strategies in the future. Maps can estimate how current location, amount, delivery and value of relevant services are likely to change in the future. From these estimates, management choices and favourable policy options can be identified, which the NBSAP updating process can also build upon.

As ecosystem service mapping techniques continue to develop, flexibility and adaptability is a key feature. Mapped outputs can be expressed using various metrics, for example services can be estimated in biophysical terms or economic terms, making them adaptable to specific audiences and uses. Spatial resolution of analyses can be flexible, making them applicable to local, regional or global scales. This is particularly useful for the 'nested' approach of the NBSAPs. Mapping also takes into account flows of ecosystem services. This can reveal spatial distinctions between areas of supply and demand of ecosystem services, highlighting co-dependence of different geographical areas, including across borders. This can help to identify areas where interventions to secure cooperation and mutual benefits are essential.

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In addition to key analytical features, mapping of ecosystem services has clear benefits for communicating ecosystem assessment findings to non-technical audiences. Mapping can bring together multiple ecosystem features in a way which can be succinctly represented and interpreted, many ecosystem assessments have found that maps, accompanied by an explanatory narrative, are the most effective way to communicate findings (CBD tech series 58). To further facilitate engagement, some mapping tools allow for an on going iterative process. Scenarios can be updated, based on stakeholder consultation and using the information revealed by the models and maps, until suitable solutions are identified. This approach means that information can be produced which is directly relevant to national priorities and useful for key decision-makers.

Where can I get further information?

Networks of practitioners and on-line tools are both available to provide further information and support for mapping and modelling ecosystem services.

Networks

GEO:[12] The Group on Earth Observations is a voluntary partnership of governments and international organisations, launched in response to calls from the 2002 World Summit on Sustainable Development and the G8, to encourage collaboration for exploiting the growing potential of Earth observations to support decision-making in an increasingly complex and environmentally stressed world. GEO is currently working on constructing **GEOSS**:[13] The Global Earth Observation System of Systems based on nine 'societal benefit areas' – disasters, health, energy, climate, water, weather, ecosystems, agriculture and biodiversity, which aims to improve understanding of biodiversity and environmental factors affecting human well-being, management of natural resources and; information regarding forecasting and early warning of weather and natural and human-induced disasters. As GEOSS continues to develop, new models are and information portals are regularly published and widely available. GEO is also committed to on going capacity building efforts and user engagement.

iEMSs:[14] The International Environmental Modelling and Software Society works to bring together people and organisations dealing with environmental modelling, software and related topics. iEMSs aims to develop and use environmental modelling and software tools to advance science and improve decision-making with respect to environmental issues and resource management. There is a focus on inter-disciplinary collaboration and the development of generic frameworks and methodologies which integrate models and software tools across issues, scales, disciplines and stakeholders. iEMSs promotes contact and information exchange among physical, social and natural scientists, software developers, economists, educational institutes, NGOs and governmental bodies across the globe to facilitate coordination and cooperation between science and decision-making.

[12]http://www.earthobservations.org/index.shtml
[13]http://www.earthobservations.org/geoss.shtml
[14]http://www.iemss.org/society/index.php/about-iemss

The Ecosystem-Based Management (EBM) tools network[15] provides an online hub for tools and projects on interdisciplinary ecosystem based management, primarily with an emphasis on coastal-marine spatial planning. The network provides contacts to practitioners and organisations as well as hosting a large database of tools, which includes methods and software to help improve coastal-marine spatial planning and management decision-making.

Tools

The Natural Capital project[16] is working on developing tools for quantifying the values of natural capital in clear, practical ways. **InVEST:**[17] Integrated Valuation of Environmental Services and Tradeoffs, is a family of tools created under this project to map and value ecosystem goods and services. Models are based on production functions that define how an ecosystem's structure and function affect the flows and values of environmental services. Models are spatially-explicit and results and analysis are adaptable to key priorities. A user guide has also been developed, giving a step-by-step guide to installing and running the tools, and how to interpret output results.

ARIES:[18] Artificial Intelligence for Ecosystem Services, is a suite of applications using web based technology to map benefits, beneficiaries and flows of ecosystem services. It includes applications focused on ecosystem services, valuation and biodiversity, and allows for custom interfaces to be built to simplify use for specific end users.

MIMES: The multi-integrated earth systems model is a multi-scale suite of models that assess the value of ecosystem services in a sophisticated and transferable system by using five different integrated spheres to capture all elements of ecosystems - anthroposphere, atmosphere, biosphere, hydrosphere, and lithosphere. MIMES evaluates land-use changes and subsequent effects on ecosystem services at global, regional and local levels, using spatial data as input, with a strong focus on valuation and trade-off analysis.

Co$ting Nature[19] is a web based tool for analysing the ecosystem services provided by natural environments, identifying the beneficiaries of these services and assessing the impacts of human interventions. This is designed as a policy support system, incorporating detailed spatial datasets at 1 km^2 and 1 ha resolution for the entire World, spatial models for biophysical and socioeconomic processes and scenarios for climate and land use.

[15]http://www.ebmtools.org/
[16]http://www.naturalcapitalproject.org/
[17]http://www.naturalcapitalproject.org/InVEST.html
[18]http://www.ariesonline.org/
[19]http://ebmtoolsdatabase.org/tool/costing-nature-coting-nature

ECOSYSTEM SERVICE INDICATORS

Background

The importance of ecosystem services in supporting economic activity and human well-being calls for action to quantify value and monitor trends in these services, so as to ensure that they are adequately considered in decision-making processes. Robust ecosystem service indicators, based on reliable metrics and measures are critical to knowing whether or not these essential services are being maintained and used in a sustainable manner. Ecosystem service indicators are therefore of increasing interest and importance to a variety of users at a range of scales.

Box 4.7:
Definitions of indicators, metrics and measures

Measure: a value that is quantified against a standard at a point in time

Metric: a set of measurements or data collected and used to underpin each indicator

Indicator: a measure or metric based on verifiable data that conveys information about more than itself. It is information packaged to communicate something important to decision-makers

Index: a numerical scale used to compare variables with one another or with some reference number

Source: Biodiversity Indicators Partnership (2010)

Why use this approach?

Ecosystem service indicators can serve as important tools for national planning, reporting and decision-making (e.g. NBSAPs, National Development Plans, Poverty Reduction Strategy papers (PRSPs)) and local decision-making (e.g. watershed management, Payment for Ecosystem Services (PES) schemes, and district development plans). At the international level, users of ecosystem service indicators include Parties to multilateral environmental agreements (MEAs) such as the other Rio conventions (UNFCCC and UNCCD) and biodiversity-related conventions such as the Ramsar Convention on Wetlands, as well as other international processes such as the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) and the Millennium Development Goals process (MDGs).

Ecosystem service indicators can play an important function in supporting the incorporation of biodiversity and ecosystem service values into NBSAPs in two main ways:

1. Existing ecosystem service indicators can highlight the value of biodiversity and also trends in provision of services which can be utilised in the NBSAP planning process to help identify priority national targets and actions.
2. Countries may also wish to establish ecosystem service indicators to enable them to monitor progress towards national targets set in the area of ecosystem services and valuation as part of the NBSAP revision progress.

Types of indicators

Ecosystem service indicators can often been characterised according to whether they represent ecosystem service supply or demand:

- **Service supply** – the delivery and flow of a service to a human population. Either the *actual* supply defined by weights, volumes or other quantifiable unit of the service, or the *potential* supply where a proxy such as ecosystem state or area is used to infer the level to which service supply may potentially occur
- **Service demand** - the demand for a service is considered as the requirement a population has for service delivery, and is influenced by changes in economic and social circumstance. Typically demand is indicated by financial means and follows an economic definition; however in the context of cultural and regulating service a broader concept of service demand is used. Demand can be classified as direct indicators such as the price paid for a service, versus indirect demand indicators which tend to be proxies for the true demand for the service

Ecosystem service indicators are often developed for use in sub-global assessments (SGAs). A review of the indicators used in sub global assessments conducted in 2011 (UNEP-WCMC 2011) showed that all four MA ecosystem services classes – provisioning, regulating, cultural and supporting – are being assessed in SGAs. Ecosystem services that have high demonstrable value for supporting human livelihoods tend to dominate. Examples include food, fuel wood, freshwater, biological raw materials, climate regulation, water regulation and tourism and recreation (Table 4.2). The majority of indicators were found to be for provisioning and regulating services followed by supporting and cultural services. Among provisioning services, the provision of food, biological raw materials and freshwater are most frequently addressed by indicators. The most measureable and policy relevant indicators per ecosystem type are presented in Table 4.2.

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Table 4.2: Examples of most measureable and policy-relevant indicators per ecosystem type*

Ecosystem type	Sub-category	Indicator
PROVISIONING		
Food	Crops	Rice production
		Area planted with rice
	Food and nutrition	Total dietary intake of carbohydrates and proteins
	Capture fisheries	Fish production level
		Fish species diversity
		Value of fish landing related to coral reefs (regional and national)
		Total annual fish landings (regional and national)
		Mean trophic level (regional and national)
		Catch per unit effort (regional and national)
		Deterioration and status of exploitation of fisheries management units
	Aquaculture	Fish cage area
	Wild foods	Hunting statistics
REGULATING		
	Water regulation	Water quality
		Water-bodies
	Climate regulation	Carbon stocks
		Carbon storage
		Greenhouse emissions
		Climate
		Greenhouse gases emissions
	Erosion regulation	Soil loss for an annual average rainfall level
		Annual number of tropical cyclones (regional and international)
	Natural hazard regulation	% PIB of costs of natural disasters
		Value of shoreline protection related to coral reefs (regional and national)
	Water purification and waste treatment	Waste
	Air quality regulation	Acid decomposition
		Impact of wildfires on air quality
CULTURAL		
Recreation and tourism	Protected areas and national parks	Visitors to protected areas
	Ecotourism	Visitor numbers to Northern Range
		Value of tourism related to coral reefs (regional and national)
		Revenue from tourism
	Potential income from tourism	Tourism potential of the Caribbean region (regional)
	Recreation and tourism	Culture
SUPPORTING		
Water cycling	Water flux	Evapotranspiration (ET)
INDICATORS UNDERPINNING MORE THAN ONE ECOSYSTEM SERVICE		Loss of natural vegetation
		Forest inventory
		Number of species
		Percentage of forest cover
		Change in live coral cover (regional and national)
		Biodiversity
		Biodiversity intactness index
		Above-ground biomass

* Obtained from the results of a questionnaire undertaken with over 30 SGA coordinators
Taken from: UNEP-WCMC, 2010

Box 4.8
Nature-based tourism and recreation indicators

The most common measure of cultural services relate to nature-based tourism and recreation, These are frequently collected by protected area authorities or tourism offices, either through visitor books and financial accounts or entry/exit surveys and include measures of visitation, revenue and sometimes employment. The Northern Range Assessment in Trinidad provides a good example (Figure 4.3).

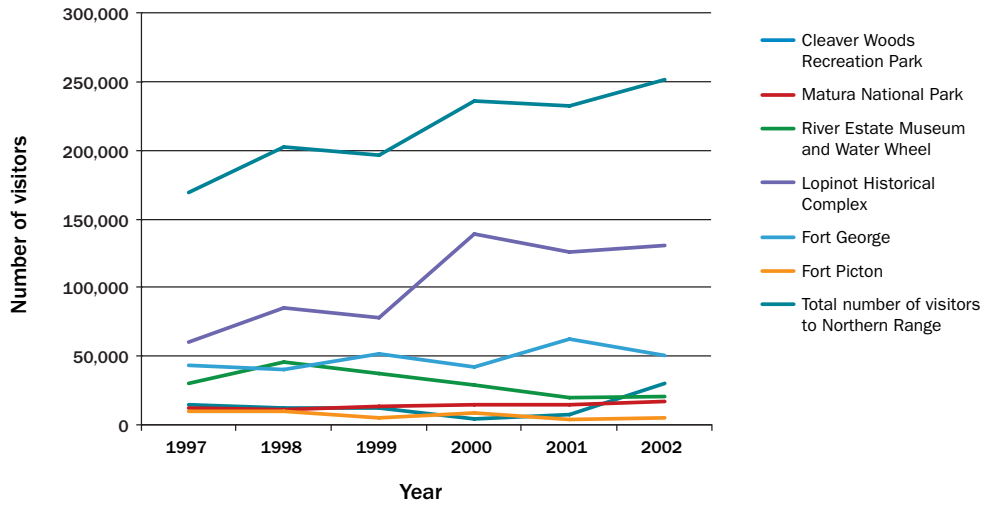


Figure 4.3. Summary of visitor numbers to Northern Range Sites (Trinidad) for 1997-2002. Source: Northern Range Assessment

Taken from: UNEP-WCMC, 2010

Indicators underpinning more than one ecosystem service (i.e. biodiversity and ecosystem indicators) were also commonly used in SGAs (Table 4.2). These tended to be measures of the amount or condition of the system and included the status and trends of change in vegetation cover, number of species, area and distribution of ecosystems, ecosystem diversity and biodiversity intactness. The majority of these are biodiversity indicators which either indirectly or directly underpin services such as food, biomass fuel, biological raw materials, water regulation, natural hazard regulation, climate regulation, erosion regulation, water purification, soil formation, nutrient cycling and ecotourism.

Box 4.9
Indicators for ecosystem services on a national scale: a step-by-step approach and its implementation for Switzerland

Although the importance of ecosystem services in widely recognised, the lack of indicators implies that the welfare contribution of biodiversity and ecosystems is often neglected in political decisions.

Different but complementary approaches to ecosystem service account systems are in development. One approach focuses on ecosystem capacity (stock) and the sustainability of resource use, Another focuses on accounting mainly for final ecosystem services (flow) and their contribution to human well-being, thus demonstrating the value of ecosystems and environmental policy target groups that are interested in economic progress.

In Switzerland, the Federal Office for the Environment (FOEN) has concentrated on applying the second approach in a step-by-step fashion to: 1) identify and create an inventory of ecosystem services relevant to Switzerland; and 2) develop indicators of final ecosystem services (hereafter termed services).

The inventory consists of 26 services and 1-3 indicators for each service (Table 4.3). The services are assigned to the four policy goals of FOEN: health, security, national diversity, and production factors. The inventory and indicators are based on the Common International Classification of Ecosystem Services (CICES) by the European Environment Agency (EEA), which establishes the link between the System of the Millennium Ecosystem Assessment (MA) and standards for national economic accounting.

Table 4.3. Examples of final ecosystem services and indicators from the Swiss inventory

Final Ecosystem Services	Indicators
Recreational services from city green areas and open spaces as well as from nearby and remote recreational areas	Size and accessibility of green areas in residential areas Recreational use of forests, measured in visits per day
Protection from avalanches, rockfalls and debris flows through vegetation on steep slopes	Protected values through protected forests in Swiss francs (prevented damage potentials)
Natural supply of **drinking and process water**	Water supply that consists of untreated spring and ground water in million m^3 and percentage share
Existence value of diversity* at levels of species, genes, ecosystems and landscapes	Indicators of the biodiversity monitoring of Switzerland

* Non-use value of biodiversity in addition to the use value of ecosystem services.

The Swiss project focussed on non-monetary (mostly bio-physical) indicators as they are generally considered more reliable and data availability is generally better. Keeping in mind that ecosystem service indicators need to be policy relevant and meaningful, the Swiss project also aimed to ensure that each indicator is ambiguously positively related to economic welfare. The indicators will be integrated into the online system of indicators for environmental reporting of FOEN which can be accessed via the following link: http://www.bipindicators.net/LinkClick.aspx?fileticket=QxjjDuqt2Qk%3d&tabid=155. They will also be part of future environmental reports on a national level.

Source: Schlatter et al. 2010; Hauser et al. 2010

Box 4.9

Indicators for ecosystem services on a national scale: a step-by-step approach and its implementation for Switzerland (continued)

The Swiss project focussed on non-monetary (mostly bio-physical) indicators as they are generally considered more reliable and data availability is generally better. Keeping in mind that ecosystem service indicators need to be policy relevant and meaningful, the Swiss project also aimed to ensure that each indicator is ambiguously positively related to economic welfare. The indicators will be integrated into the online system of indicators for environmental reporting of FOEN which can be accessed via the following link: **http://www.bipindicators.net/LinkClick.aspx?fileticket=QxjjDuqt2Qk%3d&tabid=155**. They will also be part of future environmental reports on a national level.

Source: Schlatter et al. 2010; Hauser et al. 2010

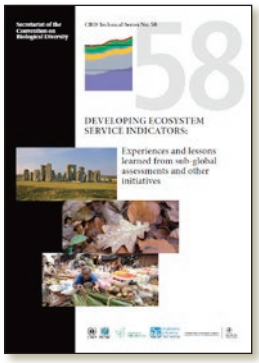
Taken from: UNEP-WCMC 2010

Where can I get further information?

There are a number of resources available which both review the status of ecosystem service indicators and provide guidance on the development of biodiversity-related indicators more generally.

Ecosystem Service Indicator Reviews

CBD Technical Series No. 58:[20] Developing ecosystem service indicators: Experiences and lessons learned from sub-global assessments and other initiatives. This contains simple, concise guidance on metrics, measurements and mapping for ecosystem services, accompanied by a more comprehensive overview of different mapping approaches and a number of practical examples from sub-global assessments.



Guidance for indicator development

The **Guidance for National Biodiversity Indicator Development and Use**[21] document is designed to help with the development of biodiversity indicators at the national level for uses such as reporting, policy making, environmental management, and education. The document introduces the Biodiversity Indicator Development Framework (Box 4.10) which includes the key steps in the production of sustainable indicators. The guidance is intended for potential biodiversity indicator developers, whether they are in government agencies, academia or NGOs. Examples of indicators produced for Eastern and Southern African countries using the biodiversity indicator development framework are provided in the document: **Biodiversity Indicators Capacity Strengthening: experiences from Africa – Progress, lessons learnt and needs for future indicator development**.[22]

[20]http://www.cbd.int/doc/publications/cbd-ts-58-en.pdf
[21]http://www.bipindicators.net/LinkClick.aspx?fileticket=brn%2fLxDzLio%3d&tabid=157
[22]http://www.bipindicators.net/LinkClick.aspx?fileticket=MOQWtKP113Q%3d&tabid=157

Box 4.10
Frame for national indicator development and use

The framework shown in Figure 4.4 is designed to help in the development and use of national indicators. While specifically developed and applied in the context of biodiversity, the Indicator Development Framework can also be applied to the development of ecosystem service indicators. By adopting a participatory approach and focusing on building the capacity of important national stakeholders, the framework fosters ownership and effective use of the indicators at the national level. The recently published 'Guidance for national biodiversity indicator development and use' (Biodiversity Indicators Partnership 2011) comprehensively describes the key steps in the production of successful national indicators. Whilst it is not a requirement to include all of the steps in the development of environmental and socio-economic indicators, the more of the steps that are covered in the process of developing and using indicators the more likely it is that the indicators will be successful.

Source: Biodiversity Indicators Partnership (2011)

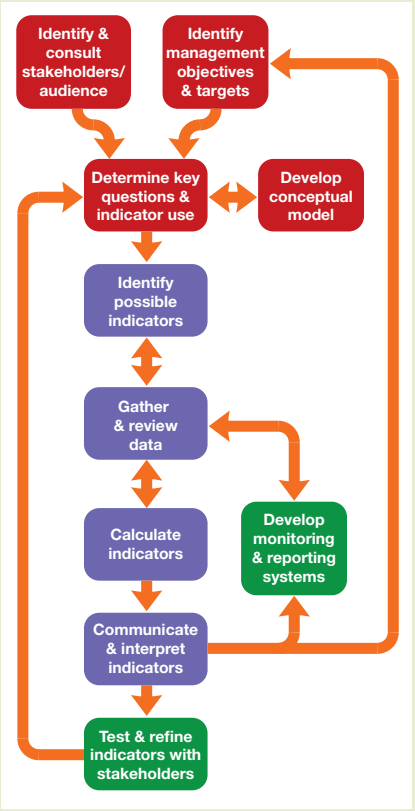


Figure 4.4.
Framework for national indicator development and use

ECONOMIC APPROACHES TO DEMONSTRATING THE VALUES OF BIODIVERSITY AND ECOSYSTEM SERVICES

Background

In some cases, physical data on the state, functions and services from nature is enough to demonstrate the values of biodiversity and ecosystems, such as availability of clean water, fish stock levels, and health benefits. Where community or citizen preferences are clear and heard this can also be sufficient to safeguard or invest in biodiversity (TEEB 2010). The clear evidence on the loss of biodiversity and erosion of natural capital (MA 2005, TEEB 2011A) underlines, however, that these approaches have been insufficient to halt biodiversity loss to date (TEEB 2011A).

Why use these approaches

Many decisions have been taken that have failed to take into account both public and private goods and values. The biodiversity loss has in most cases led to significant human, social and economic losses (ten Brink, 2012). Exploring the economic value of ecosystem services is just an additional way of assessing the role and importance of nature. Generally, decision-making will need to rely on a mix of qualitative, quantitative and monetary approaches and information to get a full picture. Monetary analysis focuses on translating qualitative (non numerical data) and quantitative data (numerical data) into monetary units using a range of techniques, with a view of helping to inform decision-making as part of a wider evidence base.

For many decisions and for many decision-makers, having a monetary estimate of the values of nature will help offer an important additional evidence base for decision-making – whether for policy development and implementation, instrument design, planning, land use and land use conversion decisions and investment choices (ten Brink et al., 2012). Monetary estimates have proved to be an important additional evidence base in particular for:

- policy development (e.g. cost-benefit analysis of different policy options) and implementation;
- design and use of policy instruments (e.g. spatial planning and zoning choices also involving establishment of protected areas; payments for ecosystem services schemes);
- land use conversion decisions (e.g. permitting decision and associated consultation process);
- informed investment choices (e.g. for restoration, sustainable management, and new investment for ecosystem based solutions)

It is of particular importance to clearly identify the policy questions an assessment is meant to inform upfront and adapt the assessment and approaches selected. For decisions for which valuation could be valuable an appropriate focus/mix of tools as well as right scale and scope are important. All these aspects might differ depending on whether one is looking e.g. at the value of restoring a wetland, or estimating the costs and benefits of land use change of forests, the value of coral reefs for tourism or assessing the value of a protected area to a region to help create evidence base and arguments for attracting funding or gathering support for the protected area.

Types of methods

As identified by The Economics of Ecosystems and Biodiversity (TEEB) studies, a variety of economic valuation methods have been developed, refined, and applied to biodiversity and ecosystem services in a range of different contexts. Which approach to choose will depend on, the scale/ significance of the decision, the type(s) of benefit(s) being measured and the time and resources available (some approaches more time and resource intensive than others). Each methods pose different challenges, which can affect the valuation estimates; for certain issues, more than one method can/should be used to facilitate comparison.

The approaches to valuation generally used for determining the monetary value of biodiversity and ecosystem services broadly fall into three categories: **direct market valuation approaches** (for provisioning services already traded in the market), **revealed preference approaches** (e.g. looking at how environmental conditions affect house prices or how much people are willing to spend on travels to visit a natural site) and **stated preference approaches** (e.g. survey to estimate people's willingness to pay for the increased provision of an ecosystem service). While table 4.4 below provides an overview of methods used, these are presented in more detail below.

Table 4.4. Overview of the main monetary valuation approaches and methods

	Revealed preference approaches	**Stated preference approaches**
Direct methods	◆ Direct market valuation ◆ Restoration/replacement costs ◆ Avoided costs, production function based	◆ Contingent valuation
Indirect methods	◆ Protection expenditure and preventative behaviour ◆ Travel costs ◆ Hedonic pricing	◆ Choice modelling / experiment methods ◆ contingent classification, comparisons in pairs

Source: authors of this report, building on CAS, 2009

Each category has its weaknesses and strengths and their suitability needs to be determined on a case by case basis. Other valuation methods include '**production function' based approaches**, which involve looking at the service provision by a biological resource, and **deliberative monetary valuation approaches** that can provide useful insights into the values people derive from ecosystems. Economic values for ecosystem services may be estimated directly for the site and issues in question, or may use values already developed in other studies of a similar ecosystem and context in which a valuation has been done. This method is known as the '**benefits transfer method**' (also known as 'value transfer'). The information obtained through valuation and/or the use of benefits transfer method can be used in particular to inform policy assessments – including cost-benefit analysis – so that decision-makers may consider trade-offs and take better-informed decisions.

It is important to approach monetary assessments of values with a sense of proportionality. Initially, it might be worthwhile carrying out a rapid assessment upfront to identify the real needs and what would correspond to the right focus and level of detail/ precision/robustness required for a given use/ decision. For example, for the assessment of a specific ecosystem or site, a rapid assessment framework should pursue three objectives: First, it should help obtain a general view of the full range of services provided by e.g. an ecosystem or specific site, including an initial assessment of their relative importance. Secondly, it should give guidance on how to interpret the first-

stage results and communicate them to relevant stakeholders. Finally, it should help identify which ecosystem services could be selected for further in-depth analysis and choose the methods most appropriate for their assessment in light of time and resource constraints (Kettunen et al., 2009; Kettunen and ten Brink 2013). Various tools for rapid assessments have been developed over the years and include, for example:

- Defra's *Introductory guide to valuing ecosystem services (Defra 2007)*, which looks at how the framework for the valuation of the natural environment could be improved by offering a comprehensive and systematic means to ensuring that ecosystems and the services they provide are taken into account in policy appraisal
- *The Social and Economic Benefits of Protected Areas: an Assessment Guide*, this provides a concrete, step-wise and practice-oriented guidance on how to identify asses and communicate the various benefits of protected areas, with a specific focus on their socio-economic valuation
- *WRI's Guidelines for Identifying Business Risks and Opportunities Arising from Ecosystem Change* (WRI, 2012), which focuses on helping managers proactively develop strategies to manage business risks and opportunities arising from their company's dependence and impact on ecosystems
- *WBCSD's Guide to Corporate Ecosystem Valuation*, which focuses on companies and the benefits and value of ESS they depend upon and impacts; and

Revealed preference approaches – direct methods

The direct methods focus on observed values in actual markets.

The market price based method is based on the assumption that market prices can be used to measure the value of ecosystems' provision of goods that can be traded and/or relate to markets. Timber, fish, crops, and a range of forest products are the first to come to mind, with part of the value stemming from the ecosystems (e.g. soil quality) and part from man-made inputs (e.g. fertilisers). The value of genetic information linked to medicines or crops can also be assessed, though here the estimate of what share of the market value relates to biodiversity and what share to research and product development efforts can be complicated (and a hot topic of discussion).

The cost-based method is a useful and increasingly used approach which involves the estimation of the costs incurred if an ecosystem service would have to be recreated by artificial means (regulating services: e.g. for water purification or water retention). The costs of different approaches of achieving the same objective (e.g. via substitute products or different sources) are compared and the potential avoided costs are estimated.

Avoided cost approaches are also useable for calculating **avoided damage**, for example from natural hazards. This is an increasingly important issue to assess in the context of climate change and sure to become increasingly important for insurance companies as well as local to global investments. There is a major opportunity in ecosystem based adaptation for climate change and making use of promised global money transfers linked to the UNFCCC commitments.

Assessing **restoration or replacement costs** can also be a useful exercise for appreciating the value of what has been lost – e.g. the cost of getting the ecosystem back to the state of providing clean water, or replacing the loss of one ecosystem with investment or restoration of another. This is only a 'proxy' for value, as the cost of restoration or replacement is not related to the value we get from it. In addition it should not be seen as 'equivalent', as 'perfect' restoration or 'perfect' replacement is not strictly speaking possible given some losses are irreversible (e.g. species loss), or difficultly reversible (e.g. passing an ecological critical threshold or tipping point), and replacement sites will generally not be able to offset every aspect of the loss. There is therefore not a perfect match. As with other valuation methods, the use of restoration costs has to be used pragmatically and in full awareness of its limits. For examples, if a species becomes extinct, the method would have replacement costs estimated as being effectively infinite. It is better for this particular issue that metrics other than the economic ones are used.

Revealed preference approaches – indirect methods

In some cases values are implicit and simply need to be made explicit by using what is commonly called 'revealed preference' approaches. The "**revealed preference**" **approaches** are based on actual observed behaviour data, including some methods that deduce values indirectly from behaviour in surrogate markets, which are hypothesised to have a direct relationship with the ecosystem service of interest.

The travel cost method involves looking at people's travelling expenses for going to a specific site or ecosystem (i.e. both the direct costs and the opportunity costs). It is used to reveal the values that people attribute to nature or a specific service. People spend time and money to see a protected area, beautiful landscape or coral reefs, and a statistical analysis of different users' travel times and costs can help obtain robust insights into values associated with the sites. Similarly the value of clean water can be estimated by the time costs of collection.

The Hedonic Pricing method focuses on how environmental characteristics (property features) are reflected in property prices. In urban areas, the house values are generally higher where they are close to nature. This can be assessed by doing a statistical analysis of house prices and looking for the correlation with distance to protected areas or other green infrastructure (method known as 'hedonic pricing method'). The values can be important where close to the sites and fall with distance (which can be characterised by a 'distance decay function').

Stated preference approaches - direct method

'Stated preference' methods contrast with revealed preference approaches in that they are based on hypothetical rather than actual behaviour data, where people's responses to questions describing hypothetical markets or situations are used to infer value - e.g. a sufficiently large group of people is asked how much they would be willing to pay for a range of environmental improvement choices, or how much they would be willing to accept as compensation for a loss in ecosystem service provision. This direct method, called **contingent valuation method** (CVM), is a way of getting people to be explicit about their willingness to pay (or willingness to accept compensation). CVM can provide some useful insights (and have been used to help with traditional infrastructure projects such as water supply and standard market analysis for products), but have, as all tools, their limits. The willingness to pay is of course limited by capacity to pay and hence may not reflect a person or communities' sense of value; willingness to accept compensation generally is significantly higher and even then has the problem of how to deal with those that reject compensation. Moreover, in the context of stated preference methods, a careful design of the questionnaire used is crucial for obtaining meaningful results.

Stated preference approaches - indirect method

Stated preference approaches also include methods such as the choice modelling method, which may also be used to estimate non-market environmental benefits and costs. In these types of methods people may be asked to choose from a 'menu' of options with differing levels of ecosystem services and differing costs. Respondents indicate their order of preference and values are inferred from trade-offs people are willing to make.

The 'benefits transfer method'

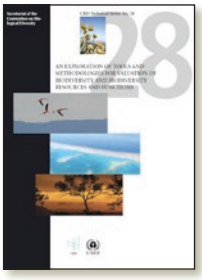
Site-specific studies – while they are increasingly being undertaken – are still relatively few. Where there are time constraints or no resources available for specific assessments, the 'benefit transfer' (increasingly known as 'value transfer') method may be used. Here the values of one site are 'transferred' to another; e.g. estimating economic values in the study location (e.g. a site in the Netherlands) by using values already developed in other studies (e.g. from a site in the UK). The basic rationale is that there may be sufficient commonalities in different areas to allow values from one area to be transferred to another. However, this needs to be done with care as values can vary widely depending on local specificities (ten Brink et al. 2011). In addition to site-to-site benefits transfer, there is also increasing interest in transferring whole 'production functions' - i.e. an equation that describes the level of derived benefit and its relationship to a range of drivers of value, such as site area, habitat type, ecological state, proximity to population, income levels, prices etc (see White et al, 2011; Kumar, 2010; de Groot et al 2012).

The use of different tools and benefit transfer approaches adds uncertainties to the results, which should be presented as ranges. Transparency is needed as regards assumptions and approaches used, and the results need to be viewed in this context. Some results will offer valuable illustrative 'ball park' estimates, others will be 'experimental'; a range of methods have the potential to offer robust results, but whether this is so now depends greatly on the available base data on site values (Kettunen and ten Brink 2013).

Johan Swanepoel/ Shutterstock.com

Where can I get further information?

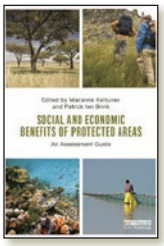
The TEEB initiative's website[23] has become a key resource on the Economics of ecosystems and biodiversity. It provides information on the main TEEB Study reports, published since 2010, including those targeted at different end users (policy-makers at various levels of governance and business). The **TEEB Implementation Phase**[24] responds to country requests to build national, regional and local government capacity, to produce tailored economic assessments of ecosystems and biodiversity, and provide support for mainstreaming this information into policymaking. To this purpose, a Guidance Manual for TEEB Country Studies will be available at the end of May 2013. A number of studies are currently under way that will build on initial findings to provide a deeper analysis of specific sectors and biomes.



The **CBD Technical Series no. 28**[25] focuses on the issue of economic Valuation and explores the tools and methodologies for valuation of biodiversity and biodiversity resources and functions. It is a good introduction to the various methods discussed in this guide and also highlights where in decision-making the results of valuation exercises can be used.

The **2009 report by the Centre d'Analyse Stratégique on Economic approaches to biodiversity and ecosystem services**[26] provides a policy relevant analysis and discussion of the different valuation methods and their use in policy-making.

Defra has produced a series of **detailed practical guidelines for valuing environmental impacts via value transfer methods**.[27] They are intended to assist economists, policy analysts, scientists and other technical experts to understand and use value transfer methods for decision-making .The guidelines apply equally to policy and project appraisal (the assessment of whether an action is worthwhile) and evaluation (assessment of whether an action was worthwhile).



The purpose of **Social and Economic Benefits of Protected Areas: an Assessment Guide**[28] is to increase the global awareness of and information on the benefits and socio-economic values of PAs and PA networks. This guide aims to do so by synthesising wide-ranging global evidence on benefits provided by PAs and providing concrete, step-wise and practice-oriented guidance on how to identify asses and communicate the various benefits, with a specific focus on their socio-economic valuation. Available August 2013

[23]http://www.teebweb.org/
[24]http://www.teebweb.org/teeb-implementation/
[25]http://www.cbd.int/doc/publications/cbd-ts-28.pdf
[26]http://www.cbd.int/doc/case-studies/inc/cs-inc-report-en.pdf
[27]https://www.gov.uk/ecosystems-services
[28]http://www.routledge.com/books/details/9780415632843/

INTEGRATION OF THE VALUES OF BIODIVERSITY AND ECOSYSTEMS INTO NATIONAL ACCOUNTING FRAMEWORKS

Background

Natural capital is a critical asset, especially for low-income countries where it makes up a significant share (36%) of total wealth. For these countries, livelihoods of many subsistence communities depend directly on healthy ecosystems. Incorporating natural capital into national accounts can support better decisions for inclusive development (World Bank, 2012).

The Strategic Plan for Biodiversity 2011–2020 provides a clear target on natural capital accounting. It recommends that by 2020, biodiversity values are to be integrated into national and local development and poverty reduction strategies and incorporated into national accounting and reporting systems.

At the Rio+20 Conference in June 2012, fifty-seven countries and the European Commission supported a communiqué that called on governments, the UN system, international financial institutions and other international organisations to strengthen the implementation of natural capital accounting around the world and factor the value of natural assets like clean air, clean water, forests and other ecosystems into countries systems of national accounting. Similarly, the Gaborone Declaration in support for natural capital accounting, adopted in May 2012 by 10 African countries, (Gaborone Declaration 2012) is also an important commitment to progress.

Why use this approach

Natural capital accounting can provide detailed statistics for better management of the economy. For example land and water accounts can help countries interested in increasing hydro power capacity to assess the value of competing land uses and the optimal way to meet this goal. Ecosystem accounts can help biodiversity-rich countries design a management strategy that balances trade-offs among ecotourism, agriculture, subsistence livelihoods, and ecosystem services like flood protection and groundwater recharge. Ecosystem accounting not only provides a tool to maximise sustainable economic growth but is also a means to measure who benefits and who bears the cost of ecosystem changes, helping governments gauge whether their growth is inclusive (World Bank, 2012).

It is widely recognised that the global economy needs to deliver progressive reductions of environmental risks to acceptable levels if we are to avoid ecological scarcities and breaching ecological thresholds. Year-on-year improvements must be achieved and measurably demonstrated. Many countries have already recognised this need and have committed to strengthening indicators and accounting systems for natural capital.

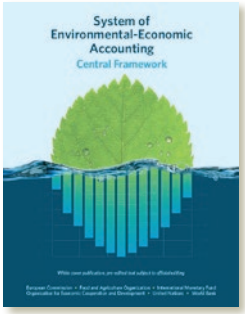
Central to this is the need for countries to develop their own natural capital assessments and accounting in their policy frameworks and decisions on the ground, hence their inclusion in the Aichi Biodiversity Target 2.

Given considerable incentives for businesses to take biodiversity into consideration in their decision-making (TEEB, 2012), a range of companies have also committed to developing their own natural capital accounting frameworks. The data generated could ultimately be linked to and feed into countries' national accounting systems, facilitating consistency, robustness and a more comprehensive coverage. At the Rio+20 Conference in June 2012, 86 private companies also committed to collaborate globally to integrate natural capital considerations into their decision-making processes and joined fifty-seven countries and the European Commission in supporting the above mentioned communiqué. Emerging developments include corporate sustainability reporting and accounting, such as the Puma's Environmental Profit and Loss Account (EP&L) and the Natural Capital Declaration of the financial sector (Puma, 2011; Natural Capital Declaration, 2012).

Where can I get further information?

The System of Environmental-Economic Accounts (SEEA)

http://unstats.un.org/unsd/envaccounting/seea.asp

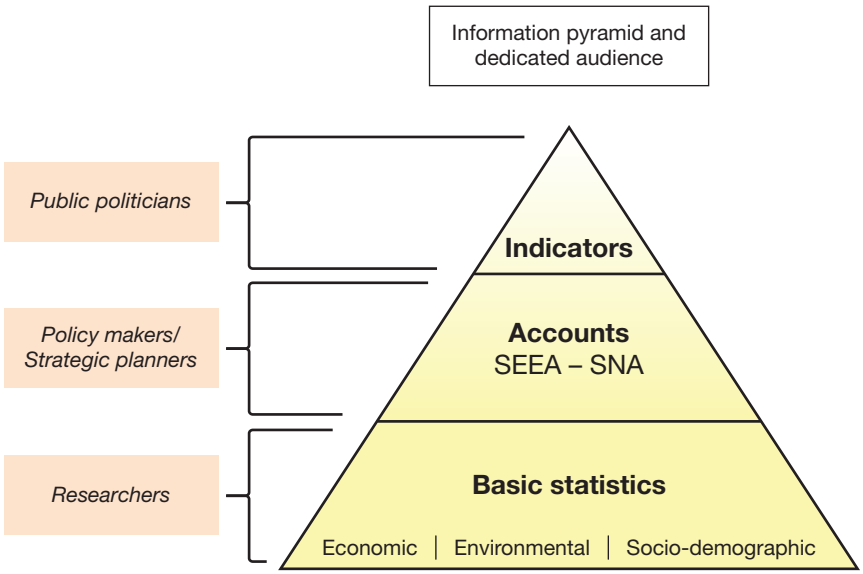


The UN Statistical Commission has recently adopted the System for Environmental-Economic Accounts (SEEA). The SEEA provides an internationally agreed method, on par with the current System of National Accounts (SNA), to account for material natural resources like minerals, timber, and fisheries.

The SEEA contains the internationally agreed standard concepts, definitions, classifications, accounting rules and tables for producing internationally comparable statistics on the environment and its relationship with the economy. The SEEA framework follows a similar accounting structure as the System of National Accounts (SNA) and uses concepts, definitions and classifications consistent with the SNA in order to facilitate the integration of environmental and economic statistics.

As shown in figure 4.5 below, the SEEA main purpose in a policy-making context is to serve as a system for organising statistical data for the derivation of coherent indicators and descriptive statistics to monitor the interactions between the economy and the environment and the state of the environment to better inform decision-making.

Figure 4.5: Information pyramid and dedicated audience

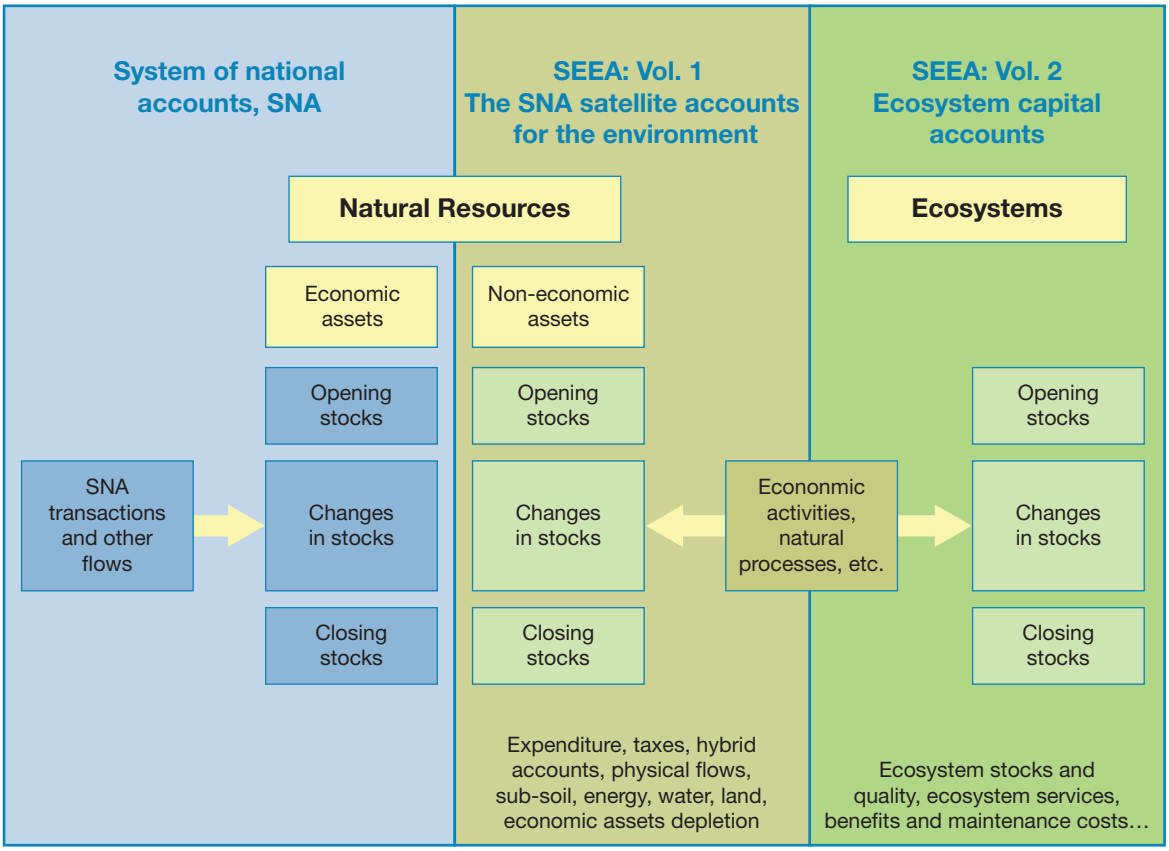


Source: Michael Vardon (2007), Indicators and the SEEA for water, Regional workshop on water accounting, UNSD

The SEEA does not propose any single headline indicator. Rather it is a multi-purpose system that generates a wide range of statistics and indicators with many different potential analytical applications. It is a flexible system in that its implementation can be adapted to countries' priorities and policy needs while at the same time providing a common framework and common concepts, terms and definitions. The new SEEA, which sets an international standard for environmental accounting, includes three volumes:

- Volume 1 (published in March 2012): the core environmental resource accounts, which measure in physical terms the energy, water and material flows that cross the boundary between the economy and the environment and circulate within the economy
- Volume 2 (expected by late 2013): the Ecosystem Capital Accounts, which aim to measure the state of ecosystems and their capacity to provide ecosystem services, besides calculating the costs of avoiding or repairing environmental damages
- Volume 3 (expected after Volume 2 is completed): extensions and applications of the accounts, i.e. various monitoring and analytical approaches that could be adopted using SEEA data in order to be used to inform policy analyses

Figure 4.6: SEEA: Vol. 1, Vol. 2 and relation to the System of National Accounts (SNA)



Source: Adapted from RM HASSAN – UN The System of Environmental and Economic Accounting (UN 2003) RANESA Workshop June 12-16, 2005 Maputo and Jean-Louis Weber (2011)

Countries that have started implementing the SEEA have a road map to guide them through this process. They begin by establishing institutional structures with clear lines of responsibility and commitments across government departments. At the national level, considering the many institutions that either produce or use environmental information, it is important to create appropriate institutional arrangements for coordination purposes. Usually the national statistical offices or other agencies that compile national economic accounts are important coordinators in the compilation of the SEEA (SEEA Brochure, 2012).

Rather than taking on the challenge of compiling all natural capital accounts at once, countries are prioritising which sub-accounts to begin with, based on important development challenges facing them (SEEA Brochure, 2012). But the first step is to build a commitment in countries in support of the SEEA implementation to help meet their sustainable development monitoring needs. The NBSAPs are an appropriate document for fleshing out specific targets regarding accounting, identifying the country's priorities or set an agenda for doing so and identify who is going to take forward what aspects of natural capital account development.

While the partial or full implementation of SEEA Volume 1 would allow countries to better understand the trade-offs of their decisions that affect natural resources and associated services in a wide range of areas, the targeted development of ecosystem capital accounts (Volume 2) may be of particular relevance for countries in which populations are particularly dependent on the services delivered by the country's ecosystems. Given the absence of harmonised approaches in this area, countries might however wish to engage in the WAVES initiative to get due support (see below). NBSAPs can usefully acknowledge that the development process for some accounts may need to improve over time and foresee regular outputs and revisions over the period to 2020. Aiming for ecosystem capital and land-use accounts seems worthwhile given their importance to monitor progress towards some of the Aichi biodiversity targets (e.g. target 5 on increasing the forest cover, target 14 on conservation and restoration of ecosystems that provide essential services and target 14 on contribution of biodiversity to carbon stocks). It might therefore be worth, given the importance of those targets and the need to monitor efforts to achieve them, outlining, in the NBSAP the progressive steps that will lead to increasingly robust and useful ecosystem capital accounts – which would generally involve broadly aiming for physical stock accounts first, followed by flow accounts in physical terms (for selected ecosystem services) and monetary values for selected ESS in a final stage.

The WAVES initiative: Wealth Accounting and the Valuation of Ecosystem Services[29]

WAVES is a global partnership[30] that aims to promote sustainable development by ensuring that the national accounts used to measure and plan for economic growth include the value of natural resources. The initiative calls for countries to implement the SEEA where there are already agreed methodologies and join in developing methodologies for including natural capital which currently cannot be included – such as ecosystem services, which are also part of the SEEA. This then lays the basis for producing indicators for monitoring performance at the national level and for sector specific analysis leading to a more optimised use of natural assets. The wider use of such complementary measures, including net domestic product and genuine savings (one of the macro-economic indicators that can be produced using information under the SEEA) would provide a more accurate and realistic indication of the level of economic output and total inclusive wealth, including stocks of physical, human and natural capital (UNEP, 2011).

By working with central banks and ministries of finance and planning across the world to integrate natural resources into development planning through environmental accounting, the initiative aims to enable more informed decision-making that can ensure genuine green growth and long-term advances in wealth and human well-being.

The WAVES partnership includes both developing countries - Botswana, Colombia, Costa Rica, Madagascar, and the Philippines—all working to establish natural capital accounts— and developed countries like Australia, Canada, Denmark, France, Japan, Norway, Spain, and the United Kingdom that are already exploring natural capital accounting and have valuable lessons.

[29]www.wavespartnership.org/waves/sites/waves/files/images/Moving_Beyond_GDP.pdf

[30]The partnership brings together a broad coalition of UN agencies, governments, international institutes, non-government organisations and academics.

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