An aerial photograph of a lush green forest with a winding asphalt road. A large, semi-transparent circular overlay with a topographic map pattern is positioned in the upper left quadrant. The text is centered within this overlay.

Integrating Ecosystem Services (IES) into Development Planning

TRAINING MATERIAL



IMPRINT

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Registered offices

Bonn and Eschborn, Germany

T +49 228 44 60-0 (Bonn)

T +49 6196 79-0 (Eschborn)

Dag-Hammarskjöld-Weg 1-5
65760 Eschborn, Germany

T +49 6196 79-0

F +49 6196 79-11 15

E info@giz.de

I www.giz.de

GloBe – Department Sector and Global Programmes
Division Climate Change, Environment & Infrastructure

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Authors

First version: Marina Kosmus, Isabel Renner, Silvia Ullrich

New edition: Isabel Renner, Marina Kosmus, Alejandro von Bertrab

Editing and review Alejandro von Bertrab

Responsible Marina Kosmus, Alejandro von Bertrab

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INTRODUCTION

Integrating Ecosystem Services into Development Planning.

A practice-oriented training based on the Harvard Case Methodology

Nature is the source of life. Human wellbeing depends largely on the benefits that ecosystems provide. Services such as water purification, soil fertility, pollination and erosion prevention – to name just a few – are essential for food production, climate change adaptation and the protection of infrastructure and human settlements from extreme weather events. Yet society and policies often fail to recognize the value of nature's services, meaning that they are under-emphasised or even ignored altogether in decision-making. As a result, biodiversity and ecosystems are being degraded worldwide, jeopardizing their capacity to render key services. Restoring ecosystems or substituting their natural services is expensive or, in many cases, impossible.

A better ability to assess and value the benefits of ecosystem services can help development planners understand in which ways human actions depend on and impact ecosystem services, consider the trade-offs among options, and choose policies that are able sustain such services. An ecosystem services focus promotes the implementation of environment-friendly measures and policies, and helps consider the value of ecosystems and biodiversity across different sectors and stakeholder groups. As such, it offers an important tool for mainstreaming biodiversity into decision-making.

Our approach

The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) developed a guide for development planners and policymakers on Integrating Ecosystem Services (IES) into Development Planning. It advocates a stepwise approach through which it is possible to recognize, demonstrate and capture the value of biodiversity and ecosystem services for development planning. This training combines the theoretical and practical elements of the IES stepwise approach and guides through the application of each step:

1. **Defining the scope and setting the stage** – What are the main development and management issues that the IES process needs to address and for which purpose? Who are the relevant stakeholders and how should they participate in the IES process?
2. **Screening and prioritising ecosystem services** – How does the development plan (including associated economic activities and livelihoods) depend and impact on ecosystem services?
3. **Identifying ecosystem service conditions, trends, and trade-offs** – What are the current conditions and likely future trends in ecosystem service demand and supply? What are the main drivers of change and which trade-offs are foreseeable?
4. **Appraising the institutional and cultural framework** – Which organisations and institutions govern ecosystems and their services? Who participates in decision-making and in what role?
5. **Preparing better decision making** – What are ecosystem-related risks and opportunities and how can they be factored into decisions?

6. **Implementing change** –Are the proposed policy options realistic, feasible, acceptable and consistent with the development plan? Who will be involved in implementing the policy measures and in what role?

Training concept

The training is based on the Harvard Case Methodology, which conveys teaching messages mainly through interactive practical work by participants. The training exercises are based on the fictitious country of Bakul, a case portraying situations closely related with real development challenges. All modules follow a similar sequence, including the following elements:

- The introduction, given by the trainer(s), provides the necessary **theoretical background** and introduces participants to the case work and the exercises.
- The **case work** gives participants the opportunity to work through the different aspects linked to IES in a systematic manner. Participants assume the roles of “case work experts” or involved stakeholders in charge of the specific tasks.
- The groups present their results to the **plenary**. Trainers ask questions, offer alternatives and corrections when necessary.
- In the **reflection phase**, participants reassume their own real-life positions. They reflect on the exercises and link them to their own experiences.

Objectives

The training course introduces the theoretical and practical starting points of integrating ecosystem services into development planning. The objective of the training is to recognize the correlation between ecosystem services and development as a crucial factor for development planning. Specific objectives include:

- Provide an overview of the IES approach, its applicability, background and potential outcomes.
- Learn how to recognize the linkages between ecosystem services and development activities and understand related risks and opportunities.
- Become familiar with tools and methods for assessing, valuing and integrating ecosystem services into development planning.
- Reflect on policy options and instruments to promote policies that integrate ecosystem services.
- Ground the approach in the context of partner countries and identify and agree upon steps for implementation.

Training materials

Training materials are available in different languages. A comprehensive training package includes the IES manual, PowerPoint slides, factsheets, literature lists, and this exercise booklet.

OVERVIEW OF THE IES APPROACH (THE SIX STEPS)

The stepwise IES approach aims to provide practitioners with a practical and policy-relevant framework for integrating ecosystem services into development planning. The table below summarises these steps. They are described in detail in the IES manual.

STEP	SUMMARY	EXPECTED OUTCOME	GUIDING QUESTIONS
<p>STEP 1: Defining the scope and setting the stage</p>  <p>STEP 1</p>	<p>Step 1 involves undertaking the groundwork that is required to get the IES process started. The main tasks are: defining the objective(s), outlining the scope of work and identifying main stakeholders to be involved. At the end of Step 1, the design and next steps in the IES process should be defined, including the division of tasks and responsibilities. The availability of the necessary human and financial resources and other inputs should also be clarified as far as possible.</p>	<ul style="list-style-type: none"> • Clear definition of management challenge or issues to be addressed • Documented and agreed objective, scope and expected outcome of the IES process. • Documented and agreed work plan, including resource requirements. • Stakeholder map and engagement plan. • Communications plan. 	<ul style="list-style-type: none"> • What are the main development and management issues that the IES process needs to address and for which purpose? • Who are the relevant stakeholders and how should they participate in the IES process? • What are the milestones and expected outcomes of the IES process? • What staff, funds and other inputs are required to carry out the IES exercise? • How will key messages be communicated to target groups?
<p>STEP 2: Screening and prioritizing ecosystem services</p>  <p>STEP 2</p>	<p>At the end of Step 2 priority ecosystem services will have been identified. The main task is to screen the development plan so as to identify its ecosystem services risks and opportunities.</p>	<ul style="list-style-type: none"> • Matrix showing ecosystem service dependencies and impacts in relation to the development plan. • Agreed list of priority ecosystem services. • Summary of potential areas of conflict or competition, which may result in trade-offs. 	<ul style="list-style-type: none"> • How does the development plan (including associated economic activities and livelihoods) depend and impact on ecosystem services? • Which stakeholders stand to be affected by the development plan and by changes in ecosystem services? • What costs and benefits are associated with these changes and how will they be distributed between different groups? • Do potential areas of conflict, competition or synergies emerge? • Which are the most important ecosystem services for the development plan and why?
<p>STEP 3: Identifying conditions, trends and trade-offs</p>  <p>STEP 3</p>	<p>Step 3 looks at the cause-and-effect relationships that operate between ecosystem services and the development plan. The status and main trends in the supply and demand for ecosystem services are analysed. Drivers of ecosystem change and key stakeholders are also identified. A particular concern is to identify where there may be synergies</p>	<ul style="list-style-type: none"> • Information on ecosystem services conditions and trends. • Overview of the main drivers of change, related stakeholders. • Analysis of ecosystem services synergies and trade-offs in the context of the development plan. 	<ul style="list-style-type: none"> • What information and evidence on ecosystem service conditions and trends exists and what are the main information gaps? • What are the current conditions and likely future trends in ecosystem service demand and supply? • What are the main drivers of change? • What trade-offs might arise between development goals and ecosystem services and how will these affect different stakeholders?

STEP	SUMMARY	EXPECTED OUTCOME	GUIDING QUESTIONS
	and trade-offs between the between different groups, goals or services.	<ul style="list-style-type: none"> • Key messages for different audiences. 	
<p>STEP 4: Appraising the institutional and cultural framework</p>  <p>STEP 4</p>	<p>Step 4 complements the information that has been gathered in Step 3. It appraises institutional, policy, legal and cultural characteristics, and identifies the resulting incentive structures in relation to ecosystem services and the development plan. These factors mediate and influence how people manage, use and impact on ecosystems and their services, and may act as drivers of either positive or negative ecosystem change</p>	<ul style="list-style-type: none"> • List of key institutional, policy, legal and cultural characteristics and the resulting incentive structures (that influence how people manage, use and impact on ecosystems and their services). • Identification of underlying causes and drivers of ecosystem degradation • Overview of stakeholders' positions, interest, needs, values and rights. • Information on existing and possible areas of conflict or cooperation relating to ecosystem use, management and incentives 	<ul style="list-style-type: none"> • Which organisations and institutions govern ecosystems and their services? • Who participates in decision-making and in what role? • Which policies, regulations and incentives influence ecosystem use and management? Who or what do they target? How are they enforced? • Are there conflicts or inconsistencies between different institutional, policy, legal and cultural frameworks and associated incentive systems? • Which other needs, interests, values and rights drive ecosystem management choices?
<p>STEP 5: Preparing better decision-making</p>  <p>STEP 5</p>	<p>Step 5 summarises and analyses the information that has been gathered in the previous steps. Based on this information, risks and opportunities for the development plan are investigated. It suggests policy options which can serve to maintain or increase the flow of ecosystem services, and identifies suitable entry-points for guiding or influencing decision-making.</p>	<ul style="list-style-type: none"> • Analysis of risks and opportunities associated with the development plan • Shortlist of policy-options and corresponding entry-points into decision-making. • Communications messages on policy options. 	<ul style="list-style-type: none"> • What are the ecosystem service-related risks and opportunities to the development plan? • Could economic valuation be useful? If so, how? • What are the most feasible policy options and entry points for reducing or avoiding risks and capturing ecosystem service opportunities? • How can policy measures, instruments and interventions build on existing experiences?
<p>STEP 6: Implementing change</p>  <p>STEP 6</p>	<p>Step 6 involves developing a strategy to operationalise the policy recommendations generated in step 5. It involves preparing a work plan, as well as a stakeholder engagement and communication strategy for the implementation of concrete measures to integrate ecosystem services into the development plan.</p>	<ul style="list-style-type: none"> • Implementation strategy and operational work plan. • Communication strategy specifying target audience, key messages and possible champions and allies to encourage and operationalise the required changes. 	<ul style="list-style-type: none"> • Are the proposed policy options realistic, feasible, acceptable and consistent with the development plan? • Are the necessary financial, technical, human resource and institutional capacities in place to deliver the selected policy options? • Who will be involved in implementing the policy measures and in what role? • How will the impacts of the policy measures be monitored? • How will learning be generated, shared and communicated?

ECOSYSTEM SERVICES AND THEIR SYMBOLS

Adapted from MEA (2005) and TEEB (2010). Copyright of ecosystem services illustrations: Jan Sosse. For more information please write to teeb@ufz.de

- 1. Provisioning services are ecosystem services that describe the material outputs from ecosystems. They include food, water and other resources.**

	Food	Ecosystems provide the conditions for growing food – in wild habitats and in managed agro-ecosystems
	Raw materials	Ecosystems provide a great diversity of materials for construction and fuel.
	Fresh water	Ecosystems provide surface and groundwater.
	Medicinal resources	Many plants are used as traditional medicines and as input for the pharmaceutical industry.

- 2. Regulating Services are the services that ecosystems provide by acting as regulators, e.g. regulating the quality of air and soil or by providing flood and disease control.**

	Local climate and air quality regulation	Trees provide shade and remove pollutants from the atmosphere. Forests influence rainfall.
	Carbon sequestration and storage	As trees and plants grow, they remove carbon dioxide from the atmosphere and effectively lock it away in their tissues.
	Moderation of extreme events	Ecosystems and living organisms create buffers against natural hazards such as floods, storms, and landslides.
	Waste-water treatment	Micro-organisms in soil and in wetlands decompose human and animal waste, as well as many pollutants.
	Erosion prevention and maintenance of soil fertility	Vegetation cover helps avoiding soil erosion, which is a key factor in the process of land degradation and desertification.
	Pollination	Some insects and animals transfer pollen, allowing fertilization of crops. 87 out of the 115 leading global food crops depend upon animal pollination, including important cash crops such as cocoa and coffee.
	Biological control	Ecosystems are important for regulating pests and vector borne diseases.

3. Habitat or supporting services underpin almost all other services. Ecosystems provide living spaces for plants or animals; they also maintain a diversity of different breeds of plants and animals.



Habitats for species

Habitats provide everything that an individual plant or animal needs to survive. Migratory species need habitats along their migrating routes.



Maintenance of genetic diversity

Genetic diversity distinguishes different breeds or races, providing the basis for locally well-adapted cultivars and a gene pool for further developing commercial crops and livestock.

4. Cultural Services include the non-material benefits people obtain from ecosystems. They include aesthetic, spiritual and psychological benefits.



Mental and physical health

Natural landscapes and urban green spaces plays an important role for maintaining mental and physical health.



Outdoor recreation

Visiting of natural landscapes provides opportunities for recreation, leisure and enjoyment.



Aesthetic appreciation and inspiration for culture, art and design

Language, knowledge and appreciation of the natural environment have been intimately related throughout human history.



Spiritual experience and sense of place

Nature is a common element of all major religions; natural landscapes also form local identity and sense of belonging.

INTRODUCTION TO THE CASE STUDY

Bakul

From Bykipedia, the free encyclopedia

Bakul, officially the Republic of Bakul (Bakulesi: Sath-alanalat dschoik Bakul), is a representative democratic republic. The political history of the country has been turbulent. Since its independence from colonial powers in 1964, it has had numerous political turnovers.

Bakul is a developing country with a market-oriented economy. From the start, the economic development of Bakul has been strongly influenced by external markets. Historically, the country's economic performance has been tied to exports, which provide hard currency to finance imports and external debt payments. Periods of high economic growth have been realized due to commodity export booms such as sugar and timber. Although these exports have provided substantial revenue, self-sustained growth and a more egalitarian distribution of income have proven elusive. This development pattern, with inadequate export diversification, has left the economy vulnerable to sudden shocks.

Its capital city is Hanku, which was declared a World Heritage Site by UNESCO in the 1970s for having the best-preserved and least altered historic centre worldwide. The beautiful beach promenade of Hanku is especially renowned and hosts plenty of restaurants (Bakulesi and international cuisine), cafés and hotels. The cuisine in Bakul is excellent and has recently received international acclaim due to its diversity in natural ingredients and mix of ancient and modern culinary arts.

REPUBLIC OF BAKUL	
Capital:	Hanku (3 Million)
Population:	15 Million (2010 estimate)
Total Area:	300.000 km ²
Official Language:	Bakulesi
Political parties:	Social Rights Party (SRP), rather conservative and ruling since the last elections Power to the People (PTP), which is popular in the rural northern districts
Independence:	1964

Demographics

Bakul is a multi-ethnic country formed by a combination of different groups over centuries.

- As of 2016, the total population is 15 million, with 55 % living in urban areas and 45 % in rural areas.
- The population growth rate is currently 1.9% per year and features a slow decline.
- 31.3% of Bakul's total population is classified as poor, including 9.8% which fall under the extreme poverty line (2016).
- Bakulesi is the main language of the country and coexists with several indigenous languages.
- The main indigenous groups include the Tabakalues and Hankules (Northern part of the country), and Bankas and Kulres (Southern part of the country).
- Urban areas are home to a growing middle class, as well as growing areas of extreme poverty, especially due to the influx of unskilled and semi-skilled rural immigrants.

Economy

Bakul is a developing country with a market-oriented economy. The IMF estimates 2016 per capita income at US\$5,195. It has a medium Human Development Index score of 0.723 based on data from 2016. Historically, the country's economic performance has been tied to exports, which provide hard currency to finance imports and external debt payments. Although these exports have provided substantial revenue, self-sustained growth and a more egalitarian distribution of income have proven elusive.

The current administration is trying to increase social spending and improve social conditions through promotion of key cash crops such as palm oil and the development of new income sources such as tourism and textiles. However, a good proportion of Bakul's industry is oriented towards servicing domestic markets and since income per capita is low, it is difficult to achieve the necessary growth. In addition, levels of education and medical services still need improvements for the majority of the population.

- Agriculture, forestry and fisheries: Presently, the main export commodities are palm oil, tropical fruits, sugar, fish and shrimp, and, to a lesser degree, timber and cacao. Fluctuations in world market prices can have a substantial domestic impact. Small-scale fishing and subsistence agriculture remain the backbone of the economy for more than 45% of the population living in rural areas. Timber companies are having difficulties renewing licenses since most of the remaining forests are either in remote areas, or within indigenous territories. Nevertheless, most of the benefits coming from ecosystems in terms of goods and services do not have a visible impact in national accounts.
- A large proportion of industrial activities is oriented towards servicing the domestic market, with exports reaching countries within the region. However, this might change soon as the Ministry of Transport plans to expand the existing Historic Harbour. The objective is to achieve a handling capacity of 60 million tons of cargo/year by 2025.
- Tourism is gaining importance as the nation's fastest growing industry in terms of revenue. It is mainly based on the country's archaeological monuments, ecotourism in the rainforest, adventure tourism in the Mighty Mountains and beach tourism. Along the coast, beach resorts are plentiful with a couple of new luxury resorts that have been recently built on the south-eastern coast. Another tourist hot spot is located just north of Hanku city: the Nelam wetlands. They are part of the Ramsar List of Wetlands of International Importance and a mecca for birdwatchers. British tourists particularly love this beautiful and varied landscape with its countless birds.

Governance and administration

Bakul is a representative democratic republic that gained independence in 1964. Due to the central government's weak enforcement of national laws and international treaties, there is a strong presence of NGOs and advocacy organisations.

Administratively, Bakul is divided into three provinces: Indare, Exportul and Belandu. The three provinces have considerable autonomy but limited taxation powers. Although each province manages its own funds, the national government provides most of the development budget. Ministries regulate and promote most sectors at both national and provincial levels. The most important ministries are the Office of the Prime Minister and the Ministries of Planning, Finance and Economy, Industry, Water Resources and the Ministry of Agriculture, which is also responsible for Fisheries. The government founded the Ministry of Environment in 2004. Unfortunately, resources allocated to this Ministry are insufficient and enforcement of environmental regulations is almost non-existent.

1. Indare province

Indare province is known for its lovely hillsides, the crystal-clear waters of the Coroné River, the Nelam-wetlands and its beautiful beaches. Following is a list of key features of the province.

- While the lowlands' natural vegetation is tropical evergreen forest, tropical mountain rainforests cover the eastern foothills of the Mighty Mountains. These forests are very rich in species and are considered biodiversity hotspots.
- Hanku city is located on the banks of the river Milaku, just south of the Nelam-wetlands. These are known internationally for their flora and fauna and are recognized as an Endemic Bird Area (EBA) with the largest number of restricted-range birds of any EBA in the continent. During the last decade, the water quality of the Milaku River dramatically decreased and the water company of Hanku city is planning to build a new water treatment plant.
- The economy of the province relies mainly on industrial and artisanal fisheries as well as agriculture. Smallholders descendants from different indigenous groups dominate agricultural production. Farmer livelihoods are based on subsistence agriculture complemented with cash crops such as cacao and tropical fruits as well as timber.
- In recent years the tourism sector has been growing rapidly. Tourists love the province's beautiful beaches and national parks. However, tourism infrastructure is still poorly developed and many potential visitors are left without options to explore the wetlands.
- Nowadays, foreign investors and wealthy entrepreneurs from Moneila city in the south have been witnessed in this part of the country. According to some reliable sources, they are buying land from smallholders in order to use it for palm oil plantations.

2. Exportul province

The province of Exportul is the centre of the agribusiness industry; run by both local medium-scale farmers and foreign investors. Following is a list of key features of the province.

- In the last two centuries, timber extraction, the rubber economy and land conversion for banana and sugar cane plantations have changed the landscape in a radical way. Today, most of the original vegetation cover has been depleted for palm oil and other cash crops. In order to enhance development, the province has reformed land titling procedures to minimize the risk of conflict and increase investment. However, after years of intensive use, soil fertility is decreasing and there are water supply problems, especially because of longer dry periods.

- The main commercial centre of the region, Moneila city, has been growing rapidly and is now the economic and financial heart of the country, attracting foreign and domestic capital geared towards agribusiness and luxury tourism resorts along the coast.

3. Belandu province

The highland province of Belandu is well-known for its excellent dairy products. It is characterized by subsistence agriculture with a strong indigenous group participation. The textile industry is becoming more important. The main city is Kalu. Following is a list of key features of the province.

- Farmers have been migrating to this area over time, clearing the forest for pastures and increasing the number of cattle. Presently there are approximately 3,000 farmer families with farm sizes varying from 10 to 50 hectares. Uncontrolled expansion of cattle farming has led to heavy problems with erosion and river contamination, in particular the Milaku River. The textile industry might be a cause of water pollution in this area as well.
- Forests still cover large parts of the region, but soon may be restricted to steep slopes and remote areas. The province hosts the water catchment areas of important rivers such as the Milaku und Coroné. In this area, highland vegetation can be found between the upper forest line and the permanent snow line. The Hankulen Community Ecological Reserve (HANCER) is situated in the northern part. This reserve is co-managed by the national service for protected areas and the local indigenous communities. HANCER is home to endemic species and the source and catchment area of the Coroné River, which crosses the northern part of the country and flows into the Nelam-wetlands..

Environment

Bakul is one of 17 [megadiverse countries](#) in the world and it has more biodiversity per square kilometre than that of any other nation. Total number of bird species in the mainland area amount to 1,600 (15% of the world's known bird species) including the endemic Bakulu bird (it was declared national bird by the government in 2001). In addition, Bakul is home to over 16,000 plant species, 106 endemic [reptiles](#), 138 endemic [amphibians](#) and 6,000 butterfly species. The current [protected areas](#) system (14% of the country's area) includes six national parks, four communal reserves and three ecological reserves. Well-known areas include the Nelam-wetlands and Tabakalues reserve (Indare), the HANCER reserve (Belandu) and Reskul national park (Exportul).



A large number of landholders (especially small-scale landholders and indigenous communities) in Indare and Belandu provinces do not have legal land titles and enforcing property rights is haphazard, especially in remote areas. Insecure property rights (especially land use and tenure rights) often prevail resulting in violent land conflicts and expropriation procedures. At the same time these conflicts reduce the present value of forests and foster forest conversion into agricultural and pasture lands. Landowners clear the forest preventively in order to assert the productive use of land and in order to reduce expropriation risk. Squatters invade land plots, clear the forest and may afterwards gain official recognition with formal property titles. To avoid social unrest during the last decades the government has acknowledged indigenous territories in some parts of the country. However, some of these territories overlap with national parks and conservation policies sometimes conflict with these groups' interests.

Land conversion, deforestation, and subsequent soil and water depletion are some of the main environmental problems the country faces. The national environmental authority, the Ministry of Environment, has established complex regulations for timber operations and some for palm oil plantations. Unfortunately, resources allocated to the Ministry are insufficient to address the problems and enforcement is weak. Overseas development assistance and international donations have financed important conservation efforts, particularly the strengthening of sustainable timber operations and the creation of the National Park System (NPS).

Climate

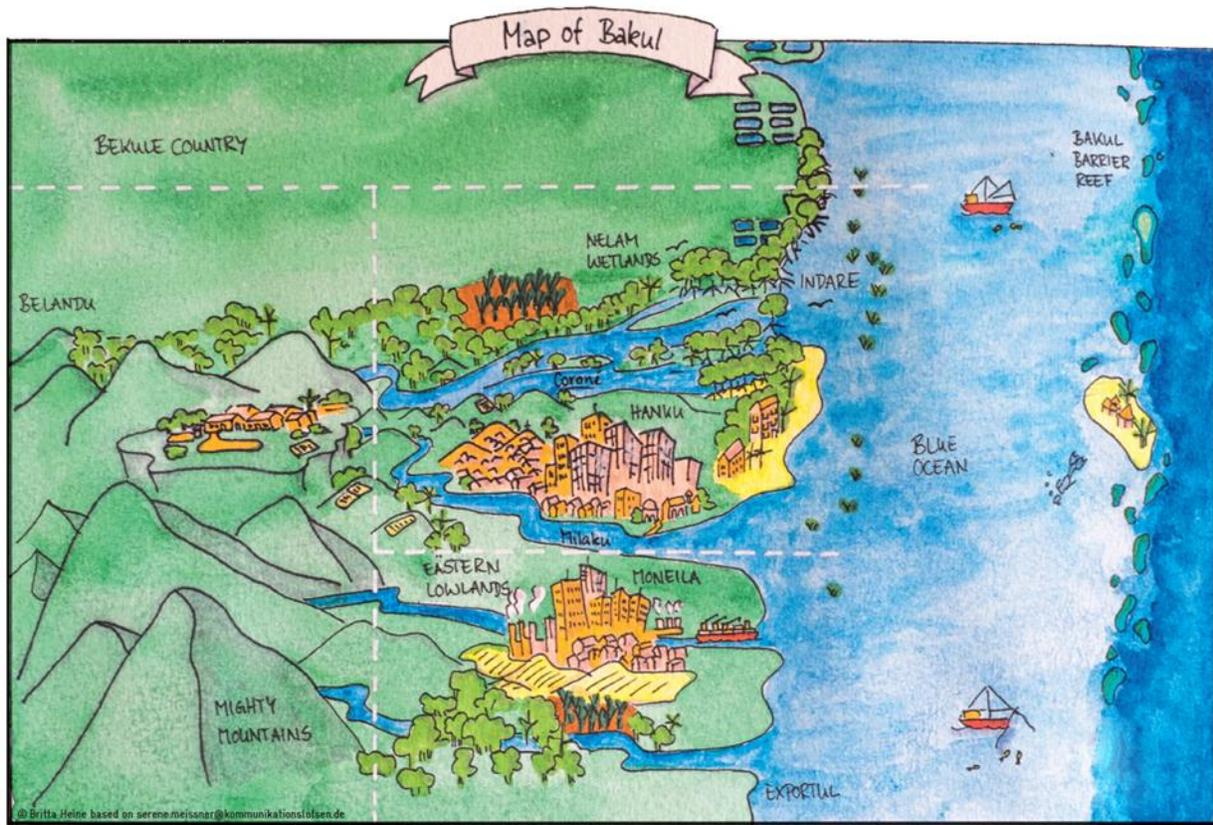
The great variety of Bakul's climate zones is largely determined by altitude. In the mountain valleys, the weather is mild all year around. The rainforest areas of the lowlands are characterised by strong humidity. The coastal area has a tropical climate with a strong rainy season. Bakul's **seasons** are defined by how much rain falls during a particular period.

The year can be split into two distinct periods, the dry season known to the residents as summer, and the rainy season, known locally as winter. The summer goes from December to April, and winter goes from May to November, which coincides with the cyclone season. During this time, it rains constantly and sometimes severely in some regions. Average **rainfall** in Bakul varies considerably, from 1,350 mm in Indare province to over 4,500 mm in the extreme south of Exportul province. Seasonal differences in rainfall are greatest in the northern and central regions of the country where, between January and April or May, which can witness less than 100 mm of rainfall per month. The dry season is shorter in the south, normally only lasting from February to March.

Temperatures vary according to elevation and proximity to the coast. Average temperatures in the coastal regions range from 24 °C in January to 27 °C in July. Temperatures are slightly higher inland. Overall, the seasons are characterized more by differences in humidity and rainfall than by temperature.

In a nutshell: Key features of Bakul

Area	300,000 km ² (a size similar to the Philippines, Ecuador or Ivory Coast)
Population	15 Million; with 55 % living in urban and 45 % in rural areas
Population Growth Rate	1.9% per year; mainly in urban areas due to continuing rural to urban migration and natural growth
Government	<ul style="list-style-type: none"> • Representative Democratic Republic • Three provinces: Indare, Exportul and Belandu with considerable autonomy, yet limited taxation powers
GDP per capita	US\$5,195 (2016)
Composition of economy	<ul style="list-style-type: none"> • Market-oriented economy; tied to exports • Main export crops: palm oil, fish and shrimp, rubber, timber and, to a lesser degree, cacao and tropical fruits • Small-scale fishing and subsistence agriculture remain key pillars of the economy for more than 45% of the population living in coastal and rural areas • Tourism is gaining importance as the nations fastest growing industry in terms of revenue.
Human Development Index	0.723 (2016)
Portion of population living below national poverty line	31.3% of Bakul's total population is classified as poor, including 9.8% that is extremely poor.
Geography	<p>Bakul is a tropical country with a great variety of ecosystems:</p> <ul style="list-style-type: none"> • Mighty Mountains: a high-altitude belt (up to 2000 meters) running north south along the west of the country, large parts are still covered by forests with a mild climate all year round. • Low-lying lands to the east with a humid climate in the rainforest areas. • Coastline: Coroné Delta and the Nelam Wetlands (Endemic Bird Area) with its large Mangrove forest in the north and palm oil plantations and agricultural lands for cash crops in the south as well as many beaches and islands and the world-famous Bakul barrier reef including the Bakul Barrier Reef Protected Area.
Biodiversity	<ul style="list-style-type: none"> • The variations in elevation and climate lead to a wide diversity of ecosystems each with different vegetation types and species. • Bakul is one of 17 <u>megadiverse countries</u> in the world according to Conservation International, and it has more biodiversity per square kilometre than that of any other nation. • The current <u>protected areas</u> system (14 % of the country's area) includes 6 national parks, 4 communal reserves and 3 ecological reserves, among others. Well-known areas include the Nelam-wetlands and Tabakalues reserve (Indare), the HANCER reserve (Belandu) and Reskul national park (Exportul).



STEP 1 & 2

DEFINING THE SCOPE AND SETTING THE STAGE / SCREENING AND PRIORITIZING ECOSYSTEM SERVICES



STEP 1



STEP 2

Exercise 1: Getting familiar with Bakul

This exercise comprises a plenary discussion with following questions as guide.

1. What are the main economic activities and trends in the country?
2. Which ecosystems and ecosystem services are most important for the economy of Bakul?
3. Can you identify possible trade-offs between economic activities and ecosystem services?
4. Which main stakeholder groups are involved and who is winning, who is losing from the current development patterns?

STEP 2

SCREENING AND PRIORITIZING ECOSYSTEM SERVICES



Exercise 2: Where the story begins¹

The last several months have been especially hard for the province of Indare. The dry season lasted longer than usual and one of the two main rivers of the province, the Milaku River, almost dried out. Afterwards, the wet season was unusually rainy. In the last month a large part of the Milaku River catchment area and even the capital Hanku have seen their worst flooding in living memory. The Milaku was totally out of control and affected life in the city for four days; the water purification plant had to be shut down.

During a meeting of the **Indare Province Development Committee**, several members expressed their serious concern about these recent events. They proposed to revise at least part of the development plan in light of these devastating trends. Among other issues, the government's **5-Year-Development-Plan** prioritizes the promotion of biofuels, the construction of a larger water purification plant for drinking water in Hanku city, tourism development as well as the enhancement of timber and cocoa export.

One representative from the Ministry of Environment stated that, "the region's ecosystems are already under stress, especially from the combination of agricultural and urban expansion. People are not aware that the consequences of this trend go far beyond its local impacts. Costs and benefits will ripple throughout the region and society in unexpected ways. We need to show very clearly the choices that are at stake."

INDARE DEVELOPMENT COMMITTEE MEMBERS

1. **Chair:** Governor of Indare
2. **Vice-Chair:** Director of provincial and municipal development
3. **Permanent Secretary:** Director of provincial and municipal rural development

PERMANENT MEMBERS

- All governors of districts and communes
- Director of provincial and municipal commercial unit
- Director of provincial and municipal economic and financial unit
- Director of provincial and municipal water resources and meteorological unit
- Director of agriculture, forestry and fishery unit
- Director of energy unit
- Director of tourism unit
- Director of environment unit
- Director of provincial and municipal health unit
- Director of provincial and municipal public work and transport unit
- Representatives of the Indigenous federations
- Representatives of IOs, NGOs

¹ Text partially adapted from WRI (2008): Ecosystem services. A Guide for Decision makers. Washington D.C.

Another committee member replied that the economic gains from the biofuel initiative, new crops and processing plants were clear. There would be more and better jobs in the city and clear gains for farmers.

The representative replied, “I agree with you, but we should not forget that in this process there will be also stakeholders that will lose. Small-scale farmers, fishers and tourism operators will suffer the consequences. We should learn from the social and environmental costs associated with the development pattern of our neighbour province Exportul. The price of food will probably increase, harming the poorer sectors of society. We are going to have stronger floods, longer drought periods, higher costs for water treatment and further development of informal settlements in the city. Uncontrolled expansion of biofuel crop production will actually strengthen unsolved social and environmental problems. “

“We already have a lot of problems with the timber companies; biofuels are going to be even more difficult as international demand is high and a lot of money is involved. Some of our people have already talked about leaving their lands and if this trend continues we are going to lose our forests and homes,” said one of the representatives of the Indigenous federation.

This was the the beginning of a long and intense discussion...

Finally, the Committee decided to revise the development plan. With funding provided by an international development agency, they organized a call for proposals in order to get a rapid assessment regarding the connections between the development plan and the environment. The ultimate objective is to understand the risks and opportunities that the development plan poses to the sustained provision of ecosystem services and subsequently foster policy changes to address these issues. The following development objectives were selected for an initial assessment:

1. Improve quality and quantity of water through the construction of a larger water purification plant for Hanku city
2. Promote biofuels encouraging private sector participation (crop production and construction of biofuel plants)
3. Develop community tourism (particularly in the Tabakalues reserve and the Nelam wetlands)
4. Promote timber exports
5. Improve the quality and productivity of cocoa for export
6. Improve food security

INDARE'S 5-YEAR-DEVELOPMENT-PLAN

Vision:

A hub of international trade driven by a highly productive, diversified, knowledge based, private sector-led economy, steered by morally-upright, visionary and competent leaders alongside law-abiding and self-reliant citizens living in an environmentally-community.

Development concerns and challenges:

- High rural unemployment and low wealth creation
- Inadequate spatial, physical and economic integration
- Low agricultural productivity
- Low export performance

Major objectives:

1. Improve the standard and access to basic education
2. Improve quality and quantity of water flows through the construction of a larger water purification plant for Hanku city
3. Agriculture and fishery support services for increased productivity and income
4. Promote of biofuels encouraging private sector participation (crop production and construction of biofuel plant)
5. Develop community tourism (particularly in the Tabakalues reserve and the Nelam wetlands)
6. Promote timber exports
7. Improve the quality and productivity of cocoa for export
8. Improve food security
9. Prevent crime and launch anti-criminality campaign

Your task:

You are a consulting team that wants to submit a proposal to revise the development plan of Indare. The objective of the first part of this assessment is to review the viability of selected development objectives/measures considering their dependency and impacts on ecosystem services.

1. Identify the linkages between two or three development objectives and ecosystem services (trainers will indicate which development objectives each team will analyse). The linkages are based on two dimensions: the development measures either depend on or have an impact on different ecosystem services. These dependencies and impacts can be strong or weak. Consider if there is competition for ecosystem services among the different development measures. Use the table below to record your findings.
2. Based on the ranking you come up with, select up to six priority ecosystem services.
3. Is the current scope of assessment (Province of Indare, administrative boundaries) appropriate for the revision of the development plan? You can make suggestions.

Summarize your results in order to present it to the Development Committee during the next meeting. Agree on one or two spokespersons from your group. You will have 5-10 minutes for your presentation. Try to be brief and work hard on sound and convincing arguments (both technical and political!) in order to get the contract for a detailed assessment of the ecosystem services you identified.

Matrix for identifying impacts and dependencies

Ecosystem service <i>List ALL ecosystem services here</i>	Development objectives/ measures						Sum of scores
	No. 1		No. 2		No. 3		
	D	I	D	I	D	I	
Sum of scores							

- D = Depends on the respective ecosystem service.
- I = Impacts on the respective ecosystem service.
- 2 = Moderate to strong relevance
- 1 = Weak relevance
- 0 = Not relevant or connected

Note: Each row corresponds to an ecosystem service, while each column relates to a key development goal or activity from Indare’s development plan. Assigning a score to each of the cells according to dependence/impact (0 = neutral, 1= weak relevance, 2= moderate to strong relevance) is a way of prioritising the most important ecosystem services. The rows with the highest aggregate score show those ecosystem services that are of key importance due to various sector’s dependence on them and how

much they are impacted by different activities This prioritization helps zoom into ecosystem services that are more crucial and hence allow you to focus the subsequent, more detailed, analysis. The highest aggregate score of the columns provide you with information on development issues and stakeholders that are more dependent or are having the greatest impact on ecosystem services.

STEP 3

IDENTIFYING CONDITIONS, TRENDS AND TRADE-OFFS



Exercise 3: Carrying on with the assessment

Congratulations! Your presentation was successful and the Development Committee awarded you a contract for a more detailed assessment.

The results of the first assessment showed that a detailed analysis of the conditions and trends of ecosystem services is required in order to review the development plan and possibly identify alternative policies and measures. The Governor of Indare is especially keen on getting more information about ecosystems in his province, since investors are constantly pressing him to allow more palm oil plantations destined for biofuels. However, in spite of all the money in play, the governor is surprisingly cautious, as he is still dealing with consequences of the recent flooding.

Your team already conducted a literature review and identified several studies and legal documents (primarily environmental impact assessments) on the relationships between different sectors' activities and the environment. Literature included information on palm oil plantations, biofuel processing plants, timber extraction, water treatment, tourism and cocoa, among others. National and municipal databases and satellite images provided data on land use changes, food production, soil quality and other important socio-economic factors, such as income trends and demographic changes. A report of the Hanku municipality, that one of your team members was able to obtain, showed the risks posed to water treatment facilities from increases in sedimentation and river pollution. Semi-structured interviews provided information on stakeholder groups that were set to lose or win from the current development plans, either because some ecosystem services they depend on would be affected by other activities or because they were part of favoured sectors. Examples of such relations included the effects of biofuel plantations on soil quality and micro-climatic regulation and how this may affect small-scale subsistence farmers in the long-term while providing important financial rewards for biofuel entrepreneurs in the short-run. How the recreational value of beaches declines if pollution increases was another example. This situation would affect both tourists and hotel operators and would contradict efforts to promote sustainable tourism in the country.

A more complete picture of the current environmental state of the province is finally taking shape. Essentially, you have found that the current situation is neither great nor terrible. The most pressing

worry however, comes from the trends in the drivers that are causing the degradation. The pressure of almost all of these drivers is increasing. The conversion of forests to palm oil plantations, the use of pesticides and fertilizers, overexploitation of fisheries by industrial fleets, global climate change, population growth and economic growth are all becoming more intense. If these trends continue unchanged it will not be long before the provision of ecosystem services starts to decline, with foreseeable negative consequences on the quality of life in Indare province.

Based on various internal discussions and consultations, including your initial findings, and reflecting on the level of dependence and impacts of economic activities on ecosystem services, the Development Committee agreed on the following list of priority ecosystem services to be looked at in more detail:

1. Fresh water provision
2. Raw materials for biofuels
3. Erosion prevention and maintenance of soil fertility
4. Moderation of extreme events
5. Recreation
6. Food provision

Your task:

Trainers will assign two to three priority ecosystem services to each group for further analysis.

1. What are the conditions and main trends in the supply and demand for the selected ecosystem services?
Think about the current state of each ecosystem service and what would happen if current trends continue in the future. Be aware that many of the conditions and trends are going to be site specific and highly dependent on local conditions. Consider upstream-downstream relationships in watersheds.
2. What are the direct and indirect – or underlying causes – drivers² of change of ecosystem services and underlying causes?
Remember that drivers can cause both degradation and maintenance or conservation of ecosystems; and certain drivers may be affecting some and benefitting others.
3. Which stakeholders³ are related with which drivers?
You can use the following table to organize the results. Remember: as in real life situations, you probably will not find the all the information you need on the case. Look at the key trends and changes in the province of Indare and Bakul that are described in this course material and, if necessary, make assumptions.

² A driver is any natural or human-induced factor that directly or indirectly causes a change (MEA 2005). Direct drivers are those that have a direct impact on nature, such as land use change, pollution, invasive species and the impacts of climate change. Indirect drivers include those factors that underlie decisions to behave in a certain way, such as market prices, laws and regulations, consumer preferences and tastes. The latter are also called underlying causes of change.

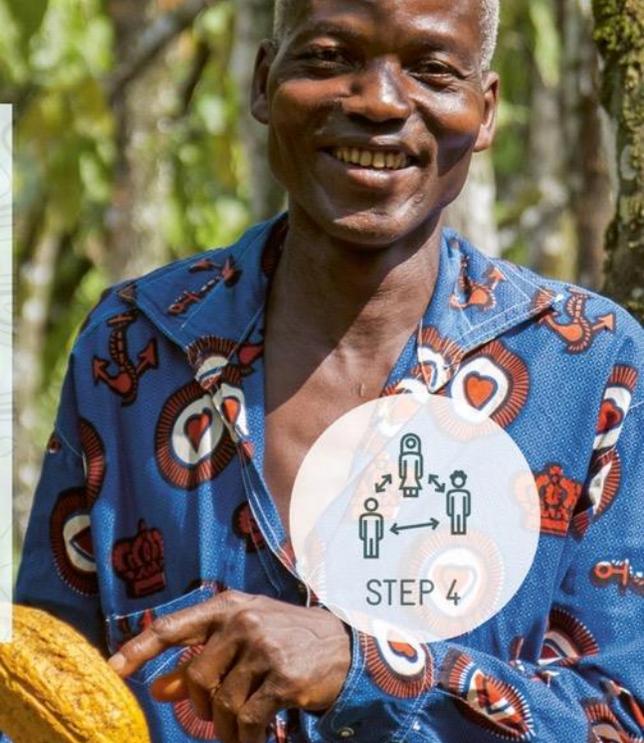
³ Stakeholders can be groups or individuals that either affect or are affected by certain decisions or situations, and can be classified socioeconomically by, say, occupational group/sector, income level, and employment status.

Matrix for recording ecosystem service conditions and trends, drivers and stakeholders

Ecosystem service (ES)	Ecosystem that generates the service	Current condition of the ES (++)/+/--)	Trends in the provision of the ES (→ ↗ ↘)		Drivers of change and underlying causes	Stakeholders and actions (related to the drivers of change) and/or other motivations
			Supply	Demand		

STEP 4

APPRAISING THE INSTITUTIONAL AND CULTURAL FRAMEWORK



Exercise 4: Stakeholder meeting at the Town Hall

The Development Committee decided to organize a stakeholder meeting and to invite representatives from different stakeholder groups in order to express their opinions. The purpose of the meeting is to obtain a better understanding of stakeholder's positions and interests with regard to development planning in Indare province and to explore existing and possible conflicts and alliances.

Your task:

During this exercise, you will not be part of the consultancy team. Instead, you will represent one of the stakeholder groups invited to the workshop. You received the invitation letter to the workshop, but there is neither an agenda nor information on the objectives and participating groups.

Prepare a very short statement (not more than a few lines) where you point out the main interests and needs of your stakeholder group with regard to the development planning in Indare Province.

Base your statement on the information generated during the previous steps and the additional information (following pages). You can be creative too. Try to put yourself in the position of your stakeholder! Do not forget to choose one person to present the results during the stakeholder workshop in plenary.

Invitation

You are cordially invited to a meeting organized by the Development Committee of Indare province. The event will take place at the City Hall this evening.

On behalf of the Development Committee of Indare, I look forward to your attendance.

Sincerely,

Mr. B. Smith
Director of provincial and
municipal rural development

Permanent Secretary
of the Development Committee of Indare

Additional information on the cultural and institutional framework

General issues:

Land tenure in Bakul is based on the Land Use Act of 1982 under which land is owned by the national government, communities or private individuals. Land rights are acquired through purchase, inheritance, appropriation, and designations for personal use within communal lands. An exception to the traditional land rights are the newly demarcated indigenous territories where indigenous people have power over how their land and resources are used, and must be involved in any decision-making process related with the land. Donor agencies and NGOs have been helping indigenous groups establish these boundaries and procure their land titles.

A large number of landholders however (especially small-scale landholders and indigenous communities) do not hold legal titles. Farmers often have to lease land from landowners. Groups such as these do not have real land use options and risk losing their land if they do not demonstrate an active use of the land, such as by farming. As land cultivation is driven by commercial production of profitable crops, it is dominated by mono-culture. In many cases, smallholders do not have enough land to grow their own food. Decreasing per hectare yields and the need to complement family incomes have led to significant rural-urban migration and migration to open forestland. Farmers have moved to the fringes of remaining forest, as forestland is considered to be promising for cash crop cultivation.

Due to the increasing demand for land, the lack of law enforcement, and the difficult registration process; informal mechanisms for utilization and administration are prevalent. Land is often leased to migrants, usually without a written tenancy agreement. The absence of well documented and demarcated boundaries between parcels often leads to boundary conflicts. Urban informality is also a significant problem. In the last decade a great deal of precarious housing has sprung up in suburban areas around Bakul's cities

Bakul's forests and timber exploitation is regulated and promoted by the Forestry Division (FD) under the Ministry for Agriculture. The division conducts inventories, issues licenses for timber extraction and collects royalties and stumpage fees for felled timber trees. Forestry statistics show that managed forests make up to 45% of the remaining forests of Bakul.

Bakul's policy framework for biodiversity and forest conservation is the Forest and Wildlife Policy published in 2005. Despite the existent legal basis, biodiversity conservation faces multiple challenges, such as weak law enforcement and lack of effective monitoring. Besides lacking financial resources, there is an absence of political willingness in Bakul's government towards forest and biodiversity conservation. The low priority of environmental issues is further aggravated by the recurrent popular opinion that Bakul faces larger problems than biodiversity conservation. So far, important conservation efforts, particularly the strengthening of controls on timber operations and the creation of the National Park System, have been financed through international development agencies.

The **fisheries sector**, both artisanal and industrial, is one of the most important economic sectors of Indare; contributing substantially to production and income generation in the coastal region. Local demand for fish continues rising due to population growth and the relatively cheap price relative to other available protein sources. The fisheries sector has also grown due to unemployment and drought in inland areas; both of which have compelled people to move to the coast.

The Indare province is home to two **indigenous groups** – the Tabakalues and the Hankules. Both groups are forest-dwellers; they depend strongly on the forest for their existence, their culture and their beliefs. Among other things they believe that the spirits of their dead ancestors find refuge in the forest and remain there, watching the tribe and ensuring that all rules remain in observance. The Tabakalues way of life has been strongly influenced by a long period of contact with the colonists. While they struggle to retain their identity and cultural practices, they are also attracted to modern life, which often drives them to live in fringe settlements closer to cities. Most families of both groups live on simple subsistence economy. The Government declared part of the Tabakalues land as indigenous territory -the Tabakalues Reserve. Most indigenous communities still do not have secure land titles.

Main stakeholder groups

Bakul Nature Conservation (BNC, Environmental NGO): Like other environmental NGOs, BNC is up in arms against the biofuel complex. BNC argues that the refinery will employ no more than 100 people, as most of the production process is automated. In addition, senior staff will come from overseas. The development goals on cash crop promotion are seen as a disgrace, since they will only foster more monoculture, further displacing small farmers and devastating the forest. This will surely mean that more floods like last month's will likely occur in the future. The wetlands will be degraded and this will have disastrous impact on its biodiversity. The Nelam-wetlands are world-famous for their species diversity, especially with regard to birds. The survival of the national Bakulu bird, which only exists in this area, is in serious danger. Only five breeding pairs are left and the bird is extremely sensitive to disturbances. Food prices will go up as land is used to produce biofuel for export instead of food. In their opinion, the new water treatment plant would not be necessary if further logging in upstream regions would come to a halt and so water quality would improve and current levels of sediment run-off would be reduced. Even international NGOs are joining the criticism, as they are concerned about the forest and the wetlands. BNC together with other NGOs is threatening to bring this case before the international community.

Biofuel Company: The biofuel company is trying to persuade the governor to launch a biofuel promotion strategy. If they set up a new plant in Indare, they argue that they will be able to create new income opportunities for the local population. In the beginning, 2,000 new jobs would be created, and after the first two years, the number of job opportunities would continue to increase. New jobs created could even reach five digits if you consider indirect job creation. The company ensures that the facilities they operate have the highest environmental standards and are ISO 14001 certified. The support of social community projects is part of their company's social responsibility strategy. They insist that their presence will have a significant impact on Indare's economy. The company has already partially financed the building of its plant as the Province Agricultural Development Unit (PADU) has assured them that the final approval of the operation permit is already on its way and a mere formality.

Cocoa cooperative of smallholders (COCOS): The cooperative was set up to represent the interests of the smallholders and improve the cocoa value chain. The farmers are afraid that if water quantity and quality worsens and soil fertility declines there will be no more available land for agricultural purposes. They fear that they might be forced to sell their land and migrate, maybe even to the city, the same trend that has happened in the neighbouring province of Exportul. They are also worried that

cocoa prices might fluctuate a lot and are reluctant to continue investing in maintaining cocoa plantations. In the past, the government has often made promises that they have not kept and as a result, many farmers have lost their land. For this reason, the farmers do not trust the state at all.

Fishing cooperative: The fishers are very concerned about the decreasing water quality and the depletion of fisheries in the delta and in coastal areas. Primarily formed by coastal fishers, they are worried that they can no longer easily catch fish and crabs where they used to and need to spend a lot more time or go to different places to come back home with a decent catch. In their opinion, the increasing utilization of fertilizers and pesticides has driven away the fish in and around the delta and competition from bigger international fishing fleets are putting a lot of pressure on sea fish stocks. They are also afraid that the plan to expand the city port will materialize and what this will mean for their communities.

Governor: The flood control infrastructure had failed miserably and the governor is worried about the public's harsh reaction to the flooding. In addition, there have also been recent public outcries against the promotion of biofuel production in the province. He suspects that the larger NGOs in Bakul are behind this sudden change in political mood but still does not understand why environmentalists would oppose biofuels. He had been assured this was a "green" industry. But what is the alternative? In addition, the indigenous people have organized major protests against the illegal encroachment of timber companies and the general political disinterest in their issues. Donor agencies and NGOs were carefully watching the situation and supporting the indigenous people who have been blocking main roads and calling for international support. With all of the social interest in these current events the governor ponders whether or not the "environmental issues" are a good subject for elections at the end of the year.

Provincial and Municipal Rural Development Unit (PMRDU): The biofuel initiative will create new jobs in the processing plants and more revenues for farmers. Due to the increasing worldwide demand for biofuel, the director sees a potentially unlimited need for palm oil and with it clear economic gains. He also sees the opportunity to attract national and foreign investors and thereby boost the economy of Indare. The province of Exportul had historically held the concentration of the agribusiness industry and had always been one-step ahead when it came to economic development. If not in Indare, the complex would likely be built in Exportul. Why not push for construction of the complex in Indare so that they might benefit from this investment in terms of income increases, jobs created and incentives from the national government.

The Federation of Indigenous People of Bakul (FIPB): FIPB represents all indigenous communities of Bakul and is therefore the leading indigenous national representation. The indigenous groups are concerned about the increasing pressures from powerful timber companies and agricultural interests on their territory. They are afraid of losing their land if the trends continue. FIPB is calling for the state to finally recognize their ancestral land use rights by declaring their entire territory as official indigenous land. Together with the NGO, SOS Indigenous People of Bakul, and some support from the Unit of Tourism and Recreation, several communities in Indare have started to develop community tourism plans. Young people have already been trained as tour guides and have started to work with local travel agencies guiding tourists in adventure trips through the forests of the Tabakalues reserve and the Mighty Mountains. The Tabakalues and Hankules are afraid of losing this opportunity, which would lead to an increased migration of young people to the city and without them their cultural heritage would be lost.

The **Province Agricultural Development Unit (PADU) of Indare** is the representation of the Ministry of Agriculture (MoA) on a provincial level. Its main objectives are the improvement of agricultural and fisheries productivity as well as the creation of income and employment opportunities. As the agricultural sector generates 45 % of the national GDP it is of crucial importance for Bakul's economy. The director of PADU welcomes the development goals on promotion of biofuels and the enhancement of timber and cocoa exports. This increases the relevance of PADU in provincial decision-making and could enable the director to honour informal agreements that he has made with the timber and cash crop lobbies. In informal meetings the director had come to an agreement with the biofuel investors on means of production. His biggest worry is finding a way to convince the smallholders to lease or sell their land to big agricultural concerns tied with the biofuel companies. The PADU is partially responsible for the conversion of forests to farmland, as it has actively promoted cocoa plantations in the province even though in most of these areas the soil is unsuitable for sustainable production. The main incentives for potential cocoa farmers are its favourable pricing system and the provision of fertilizer and scholarships for their children from the PADU. This has led to a massive change in land cover, pollution of streams and degradation of soils. The extension officers of PADU have tried to introduce agroforestry cultivation schemes into the region. However, there is a lack of knowledge and practical experience, which limits the implementation potential. There are several NGOs coordinating projects to improve land use planning systems and land security and are also promoting income-generating activities and helping farmers improve their marketing strategies.

Timber Companies: The timber companies are worried, since valuable timber resources in the forest production reserves are declining. The timber lobby is trying to persuade the government to grant them concessions for the remaining native forests. Most of the requested forest areas are within indigenous territories. The timber companies have been offering to compensate the indigenous community financially or by helping them in the leasing of new land but it is complicated, as large NGOs and other international institutions back the Federation of Indigenous People of Bakul (FIPB). They are generally suspicious of the interests of the timber lobby.

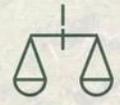
Unit for Environment: The opinion of the director usually does not seem to count when it comes to investment or development decisions. The director is well-informed about the relation between deforestation upstream, increasing precipitation and last month's floods. She is worried that if deforestation continues and the forest is replaced with oil palms, things will only worsen. Wondering how to enhance the mainstreaming of ecosystem services into development planning, the director is looking in many directions for solutions into how her unit's voice can be heard.

Unit of Tourism and Recreation: Tourism is becoming an important economic branch for Indare, especially ecological and community based tourism in and around protected areas. Together with tourism operators, the Unit has plans to design an ecotourism strategy for the province as it is seen as the most promising tourism segment for Indare. The director is afraid that they will have to abandon their plan to enhance ecotourism in the region if biofuel plantations expand in the province and deforestation continues. The tourism sector in general would be affected by the landscape changes and the foreseen environmental impacts, such as the decrease in water quality and species habitat. The communities are worried about their plans for promotion of community based tourism. With the current development patterns, this does not seem to be realistic anymore. Small tourism operators around Nelam-wetlands and in the mountain region fear that tourist numbers will decrease and that they will lose their main income source.

Water Enterprise Hanku: During the last decade, the water quality of the Milaku River dramatically decreased due to erosion and pollution. A technical assessment concluded that a new water treatment plant is needed. However, the water company is a semi-public enterprise and there is no funding available. The company is sliding into the red and water treatment costs are continuously increasing. No improvement of the situation is expected. With the construction of a new plant, water tariffs would need to go up significantly. An enhancement of the water quality before it actually reaches the plant by say, promoting reforestation and improving water resource management upstream, would improve operations and reduce costs.

STEP 5

PREPARING BETTER DECISION-MAKING



STEP 5

Exercise 5: Applying economic valuation in Indare

The initiatives of the development committee exploring the linkages between the development plan and ecosystem services have prompted interest by several groups. The newly launched campaign of the governor's office about the natural treasures of Indare is reaching a very wide audience and appears to be attaining its goal of bringing nature to the forefront of discussions about development.

The Bakulesi University of Indare invited an expert in economic valuation to give a conference. As a result, several organizations have started to promote economic valuation as an important tool for decision-making. These include:

- The NGO Bakul Nature Conversation made an agreement with the corresponding Provincial Environmental Unit to run studies on the economic value of the Tabakalues reserve and the Nelam-wetlands. The idea is to build arguments against further encroachment of these natural areas particularly in light of the expansion of palm oil plantations.
- A cocoa cooperative is looking for funding. They want to apply economic valuation in order to prove that agroforestry systems actually contribute to improving the provision of ecosystem services. They have asked the Province Agricultural Development Unit for support, but still have not gotten an answer.
- The water company plans to show how the treatment costs associated with removing sediments and pollution in the Milaku watershed can be offset if natural soil retention and water regulation improve upstream. Furthermore, they are looking for alternatives in water treatment techniques as funding is currently inadequate for an entirely new treatment facility.

Your task:

Please discuss the following questions:

1. Which decision-makers do you intend to reach with the results? What type of information do you need to approach or influence the decision-maker (biophysical information, monetary figures, etc.)?
2. Which valuation methods would you suggest to use and what information/inputs would you need?
3. What are some of the expected results?
4. Why did you choose those methods? Describe their pros and cons?
5. Who should be involved in the economic valuation?
6. Can you identify possible risks associated with conducting economic valuation?
7. Can you think of other ways to highlight the value of ecosystems and ecosystem services?

Refer to the tables in the annex to identify suitable methods. You can also browse the ValuES methods navigator on-line (www.aboutvalues.net/method_navigator) to find information on suitable methods, as well as the pros and cons of different methods.

STEPS 5 & 6

PREPARING BETTER DECISION-MAKING / IMPLEMENTING CHANGE



STEP 5



STEP 6

Exercise 6: Putting the pieces together

Based on the information generated during the assessment process, the consulting teams start preparing their final reports, including recommendations on how to revise the content of Indare's 5-Year Development Plan. The assessment process brought to light risks and opportunities related to ecosystem services that were not previously considered.

Your task:

Your consulting team should now develop a proposal on how to revise the development objectives and take into account risks and opportunities related with ecosystem services. Use the findings from the previous assessment stages to select policy options, instruments and concrete measures that will most effectively sustain the provision of ecosystem services to meet the socioeconomic needs of the province.

1. Look at the different risks and opportunities related with the provision and use of ecosystem services associated with the development objectives you worked on during exercise 2.
2. What needs to change? What are the related drivers (and underlying causes) that should be tackled?
3. Describe different policy options and reflect on how easy or difficult it might be to implement them. You can discuss about how to implement them by looking at factors such as relative ease of implementation, urgency, risk of losing an opportunity to effect change, available resources or other interesting criteria. Keep in mind that a mix of complementary measures might be required.
4. Identify entry points to key decision-making processes.
5. Identify key stakeholders to be involved in the activities and those with whom you would need to communicate to effect change.
6. Prepare your key messages and present your recommendations to the development committee.

You can recreate the matrix below to do your analysis. Try not to present everything on the matrix when you are in front of the development committee. Tease out the most important findings and

prepare compelling messages. Remember, the members of the development committee usually have very little time.

Matrix for identifying policy options and entry points into decision-making processes

Development objective	Related risks and opportunities	What do we want to change? Drivers to tackle	New/different policy option(s)	Entry points into decision-making	Key stakeholders and stakeholder groups

Examples of policy tools that can support the integration of ecosystem services

TYPE OF INSTRUMENT	EXAMPLES
Command and control instruments	Laws, regulations, restrictions, sanctions, prohibitions, permissions, standard-setting and enforcement, non-market-mechanisms
Planning instruments	Development plans, sector programs, spatial planning, national budgets, integrated ecosystem management plans, protected area planning, Strategic Environmental Assessments (SEA)
Economic and fiscal instruments	Introduction or exemption of fees, taxes and charges, permits, market-based incentives, subsidies, compensations, payments for ES, access and benefit-sharing, biodiversity offsets, performance bonds, revenue sharing
Informative measures	Environmental education, extension programs, green accounting, reports on the state of the environment
Cooperative / Voluntary measures	Voluntary environmental agreements, international standards and protocols developed by NGOs and supranational government

Source: Adapted from GTZ 2010; Pavan Sukhdev 2010

Optional section for exercise 6: Effective communication

Now your task is to think about an appropriate communication strategy.

1. Identify the key results of the assessment. What are the key messages you want to communicate? What do you want to achieve with communicating the results? Think about the implications the results might have for the development plan.
2. Discuss about appropriate means of communication: How are you going to communicate the main findings – to the development committee and to other key stakeholder groups? What communication products and channels will be most effective to reach your target audience(s)? You also may consult the text box below.

NON-TECHNICAL COMMUNICATION PRODUCTS AND COMMUNICATION CHANNELS

Possible communication products include:

- Policy briefs
- Brochures
- Posters
- Presentations or slideshows
- Videos
- Newsletters
- Press releases for the media
- Sample interview responses for media coverage
- Maps, charts and info graphics
- Website material
- Visuals that display trade-offs (e.g., spider diagrams, bar charts, summary tables)

Avenues for communicating and disseminating results and recommendations include:

- Traditional media
- Social media (e.g., Facebook, Twitter)
- Launch events
- Stakeholder workshops or other public meetings
- Partners' networks
- Targeted private meetings
- Relevant conferences and events
- Information campaigns—advertisements / social marketing
- Tourist education (e.g., on importance of coral reefs and responsible diving)
- Websites

Source: Waite et al. (2014)

GLOSSARY OF TERMS

Access and Benefit Sharing (ABS): The ABS principle of the Convention on Biological Diversity (CBD) aims at ensuring a fair and equitable sharing of the benefits arising from the use of genetic resources. This means that, where genetic resources are used for scientific or commercial purposes, the country of origin is to be compensated (GIZ 2012).

Adaptive management: A process of iterative planning, implementing, and modifying strategies for managing resources in the face of uncertainty and change. Adaptive management involves adjusting approaches in response to observations of their effect and changes in the system brought on by resulting feedback effects and other variables.

Agrobiodiversity: The diversity of plants, insects, and soil biota found in cultivated systems. Alien species: Species introduced outside its normal distribution (UK National Ecosystem Assessment 2011).

Biodiversity: Means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (CBD, Article 2).

Certification: Certification of ecological and socially responsible management places businesses apart from their competitors and can allow them to realise added value. A well-known example is the certification of forest enterprises based on the standards of the Forest Stewardship Council (FSC). Certified wood products enter higher-grade markets.

Command and control policy: Refers to environmental policy that relies on regulation (permission, prohibition, standard setting and enforcement) as opposed to financial incentives, that is, economic instruments of cost internalisation (OECD 2008).

Development refers to actions that aim to improve human well-being. It encompasses social, economic, and environmental issues, such as economic growth, poverty reduction, infrastructure expansion, energy independence, and adaptation to climate change (WRI 2008). Development planning is seen here as the process of preparing and carrying out a project that seeks to improve the living conditions in a community, region or nation. Development planning comprises strategic and measurable goals that have to be met within a certain time period. The planning process always requires the involvement of stakeholders. The development plan makes reference to all actions that are part of the planning process (projects, policy instruments, activities).

Direct-use value (of ecosystems): The benefits derived from the services provided by one or several ecosystems that are used directly by an economic agent. These include consumptive uses (e.g. harvesting goods) and non-consumptive uses (e.g. enjoyment of scenic beauty). (TEEB 2010).

Discount rate: A rate used to determine the present value of future benefits, for instance a foreseen cash flow or the flow of benefits to society from a standing forest throughout time (TEEB 2010). The basic underlying idea is that we value something that we may have in the future less than something that we can have right now. The practice of discounting applies

first and foremost to an individual deciding how to allocate scarce resources at a particular point in time. In general, an individual would prefer to have something now, rather than in the future, though with some exceptions (the value of anticipation, for example). Discount rates are expressed as percentages and represent the proportion of the value that each individual is prepared to forego every year until the benefit is received. For example, a 5% discount rate implies that the present value of something that you expect to receive in 10 years' time is only about one tenth as valuable in present terms. The discount rate reflects not only our preference of having something today but also the risk involved of not receiving the foreseen benefit in the future.

Driver: Any natural or human-induced factor that directly or indirectly causes a change in an ecosystem (UK Ecosystem Assessment 2011).

Driver, direct: A driver that unequivocally influences ecosystem processes and can therefore be identified and measured to differing degrees of accuracy (UK Ecosystem Assessment 2011). Land clearing, fishing and urban growth are examples of direct drivers.

Driver, indirect: Also known as causes of change, an indirect driver is a factor, which causes something else to change and therefore has influence on direct drivers. Market prices, consumer preferences, taxes are examples of indirect drivers, since they generate incentives to act in a certain way. For instance, higher fish prices may be an incentive to fish more, while fuel subsidies may also be an incentive to overfish since the cost of fishing remains depressed

Ecological infrastructure: A concept referring to both services by natural ecosystems (e.g. storm protection by mangroves and coral reefs or water purification by forests and wetlands) and to nature within man-made ecosystems (e.g. microclimate regulation by urban parks) (TEEB 2010).

Ecosystem approach: A strategy for the integrated management of land, water, and living resources that promotes conservation and sustainable use of nature's benefits to society. An ecosystem approach is based on the application of appropriate scientific methods focused on levels of biological organisation, which encompass the essential structure, processes, functions, and interactions among organisms and their environment. It recognises that humans, with their cultural diversity, are an integral component of many ecosystems (UK Ecosystem Assessment 2011).

Ecosystem assessment: A 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 (UK Ecosystem Assessment 2011).

Ecosystem based adaptation (EbA): The use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people to adapt to the adverse effects of climate change. As one of the possible elements of an overall adaptation strategy, ecosystem-based adaptation uses the sustainable management, conservation, and restoration of ecosystems to provide services that enable people to adapt to the impacts of climate change (CBD, IUCN 2010).

Ecosystem: A community of plants, animals and smaller organisms that live, feed, reproduce and interact in the same area or environment (IUCN 2010). It is a dynamic complex of animals, plants and microorganisms and their non-living environment interacting as a functional unit, and depending on one another. If one part is damaged it can have an impact on the whole system. Humans are an integral part of ecosystems. Ecosystems can be terrestrial or marine, inland or coastal, rural or urban. They can also vary in scale from global to local. Examples of ecosystems include forests, the open oceans, coasts, inland water bodies, wetlands, drylands, desert, cultivated lands (also known as agroecosystems). Ecosystems interact among each other. Ecosystem conditions are very dynamic and in flux.

Ecosystem degradation: An ecosystem's persistent reduction in the capacity to provide ecosystem services (MA, 2005).

Ecosystem restoration: The process of assisting the recovery of an ecosystem that has been degraded damaged or destroyed (SER Primer 2004).

Ecosystem services: The benefits people obtain from nature. These services come from natural (e.g. tropical forests) and modified ecosystems (e.g. agriculture). While there is no single agreed method of categorising all ecosystem services, the Millennium Ecosystem Assessment (MEA) framework of provisioning, regulating, supporting and cultural services is widely accepted and seen as a useful starting point.

Emissions certificates: An example for trade with emissions certificates with regard to emergent and developing countries is the Clean Development Mechanism (CDM). CDM enables private or government investors to implement projects for emissions reductions in developing countries and get credit for the reductions for their obligations laid down in the Kyoto Protocol of the UN Framework Convention on Climate Change in industrialised countries. Units consist of certified emissions reductions (CERS) in metric tonnes of CO₂ equivalents (tCO₂e).

Endemic: Restricted to a particular area. Used to describe a species or organism that is confined to a particular geographical region, such as a lake, an island or a mountain (IUCN 2010). When referring to a species as endemic, it is important to state the area. For instance, the axolotl salamander (*Ambystoma mexicanum*) is endemic to the lake of Xochimilco in Mexico City.

Environmental and conservation funds: Financing mechanisms that foster sustainable and effective management as well as the protection of ecosystems and our environment. There are at least two main areas of application for environmental and conservation funds: i) Financing environmental protection measures and environment-related projects. This includes environmentally-sound investments in urban-industrial areas in an effort to improve companies' or the state's business activities (e.g. energy, water and wastewater services) and to improve the quality of life in cities and industrial centres. ii) Financing conservation measures, especially the long-term financing of operating costs for protected areas within the context of conservation area management, but also financing other measures such as efforts to combat desertification (GTZ 2004).

Existence value: The value that individuals place on knowing that a resource exists, even if they never use that resource (also sometimes known as conservation value or passive use value) (TEEB 2010).

Externalities: A consequence of an action that affects someone other than the agent undertaking that action and for which the agent is neither compensated nor penalized through the markets. Externalities can be positive or negative (TEEB 2010).

External benefits or positive externalities: Are side effects from production and consumption activities that benefit other people. An example of a positive externality would be when somebody takes care of his or her garden and his or her neighbour can benefit from the nice view or the song of birds, without having to pay or work for receiving that benefit.

External costs or negative externalities: Are external or side effects that damage other people from production and consumption activities. An example of negative externalities would be the side effects of production processes such as pollution (noise, fumes and vibration) endured by people living next to a quarry.

Global change: A generic term to describe global scale changes in systems, including the climate system, ecosystems, and social-ecological systems.

Governance. Governance is the body of rules, enforcement mechanisms and corresponding interactive processes that coordinate people's behaviour (Huppert, Svendsen and Vermillion 2003). Governance is not only what a central government or a dictator would do; it happens in large and small groups and at different scales, from local to global. Consequently, governance is formed whenever people need to interact with others to establish, say, standards and rules for using a natural resource (GTZ 2004).

Governance of ecosystems: The process of regulating human behaviour according to shared ecosystem objectives (TEEB 2010).

Habitat change: Change in the local environmental conditions in which a particular organism lives (IUCN 2010). Habitat change may be gradual or sudden. Gradual change can occur due to, for instance, slight modifications in average seasonal temperatures or precipitation. More sudden habitat changes may be driven by humans, such as land clearings or pollution, or due to extreme events, such as droughts, fires, hurricanes, mudslides and volcanic eruptions.

Habitat: The place or type of site where an organism or population naturally occurs (IUCN 2010).

Human well-being: A context and situation dependent state of being, comprising, among other things, access to basic material for a good life, freedom of choice, health, good social relations, security, peace of mind, a clean and healthy environment and spiritual experience (TEEB 2010).

Incentives: Factors that motivate human behaviour. They can be positive and foster certain behaviour, but they can also act as disincentives and deter people from doing something

they would otherwise do. Incentives can be material or monetary, but also non-material or non-monetary. Reputation and appreciation are examples of non-material incentives. We assume that people act under bounded rationality, which means that they always try to increase their individual utility, restricted by their actual opportunities and capabilities. In many cases, people cannot maximise their utility since they have access to a limited amount of information, or because their willingness to make an effort and spend time on a particular decision is low. But at large, people strive for an increased overall individual utility (GTZ 2004).

Indirect-use value (of ecosystems): The benefits derived from the goods and services provided by an ecosystem that are used indirectly by an economic agent. For example, the purification of water by soil filtration (TEEB 2010).

Institutions: Formal and informal rules (North 1990) including the corresponding measures of enforcing them. Institutions can guide human behaviour and reduce uncertainty (Furubotn and Richter 1998). They can take various shapes and forms -meeting your colleagues for lunch every day at a particular time, established procedures of conflict resolution in a school class, the right of way in traffic, agreements on the use of a particular grazing area- all these guidelines of human behaviour can be considered institutions (GTZ 2004).

Landscape: An area of land that contains a mosaic of ecosystems, including human-dominated ecosystems. The term cultural landscape is often used when referring to landscapes containing significant human populations or in which there has been significant human influence on the land (UK Ecosystem Assessment 2011).

Land use: The human use of a piece of land for a certain purpose (such as irrigated agriculture, recreation and housing) (UK Ecosystem Assessment 2011). Note that the term is not synonymous with land cover. The latter refers to the physical material at the earth's surface (grass, asphalt, trees, water, etc.).

Market-based instruments: Mechanisms that create a market for ecosystem services in order to improve the efficiency in the way the service is used. The term is used for mechanisms that create new markets, but also for responses such as taxes, subsidies or regulations that affect existing markets (UK Ecosystem Assessment 2011).

Market failure: A situation in which the allocation of goods and services is inefficient and there are other outcomes that make at least one person better-off. In the realm of ecosystem services, a market failure could be the inability of a market to capture the correct values associated with a specific ecosystem service (UK Ecosystem Assessment 2011).

Natural capital is the extension of the economic notion of capital (physical and human means of production) to environmental goods and services. Capital is a stock of resources that yields a flow of goods or services into the future. Natural capital is thus the stock of natural ecosystems that yields a flow of valuable ecosystem services into the future. For example, stocks of trees or fisheries provide a flow of new trees or fish. Natural capital may also provide services such as waste recycling, water catchment and erosion control. Since the flow ecosystem services improves if the ecosystem is functional, the structure and diversity of the system are important components of natural capital.

Natural resources: Those parts of nature that have an economic or cultural value to people. In an economic sense, man-made capital and labour are also resources. However, they are not of a 'natural' origin. Some natural resources require the use of man-made capital and/or labour in order to transform them and make them accessible and useful (GTZ 2004). In this manual, however, we focus on the flows of benefits and costs from using those resources, rather than on the stocks of resources themselves.

Non-use value: Benefits which do not arise from direct or indirect use but rather from not using the resource (TEEB 2010). For instance, knowing that a rare species of monkey is in the wild, even though you might never see them.

Opportunity cost: Refers to the value of the next-best alternative. It is the cost incurred by not enjoying the next-best alternative to the alternative chosen. Foregone benefits of not using forested land in a different way, say, as farm land, is the opportunity cost of having a standing forest. It is a central element when analysing management decisions that result in trade-offs between different qualities and quantities of ecosystem services.

Payments for ecosystem services (PES): Payments for ecosystem services are policy instruments that aim to bring about sustainable land use through direct incentives. The core concept of PES is that those who provide ecosystem services should be compensated for doing so and that those who benefit from the services should pay for their provision. One of the most common examples in this regard is in the realm of water provision. Upstream caretakers of forested areas should be compensated by downstream communities that benefit from the high-quality water flowing from the conserved forest. The amount of compensation should be an approximation of the opportunity cost of forest caretakers for leaving the forest intact rather than using it in some other way, such as clearing it to free up the land for farming.

Policy-maker: A person with power to influence or determine policies and practices at an international, national, regional or local level (UK Ecosystem Assessment 2011).

Policy/policies: A policy is a statement of intent by a group of people. It encompasses the ideas, principles and plans of what to do in a particular situation to reach a certain outcome. Different development sectors, such as industry, agriculture, the environment, energy, education and health, might have their own policies at any scale (national, regional or local). In such cases we speak of sector policies. Sector policies usually look into the current situation and prescribe necessary steps and tasks to achieve goals to improve or change the current state of affairs. The classical policy cycle begins by defining a problem or issue, setting an agenda to solve it, designing and implementing the policy, raising awareness about the policy and evaluating outcomes to, in-turn improve policies. In reality, however, the policy cycle is not necessarily linear and policy unfolding can be a highly complex endeavour.

Politics: Refers to the procedures and processes that unfold as a result of and during exchanges -usually debate or dialogue- between people or groups of people with the aim of negotiating outcomes, resolving differences or trying to reach any kind of agreement. This exchange eventually results in making decisions to implement actions. The notion of power is central to politics, as it is also about gaining influence to turn a given situation to a party's own favour or improving someone's status. Negotiations hardly ever occur in a level playing field; power asymmetries among different actors are the norm. Politics occurs at all levels, from the local household level to the global arena.

Precautionary principle: The management concept stating that in cases “where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation,” as defined in the Rio Declaration (UK Ecosystem Assessment 2011).

Private goods: Goods that yield benefits to people and are characterised by high levels of rivalry and excludability. Rivalry means that one person's consumption of the good reduces the quantity available to others. Excludability means that the producer can restrict use of the product and only make it available to those he/she chooses or are willing to pay for it and excluding those outside of the set criteria.

Property rights: Refers to how a given resource or good is used and owned. Property rights confer the right to use the good, to earn income from it, to transfer it to others and to claim your rights over the good. Many argue that establishing clear property rights might be a way of reducing degradation by internalizing externalities (see a description of the term above) and relying on the incentives that owning a resource conveys, such as land, to protect and nurture it.

Public goods: A good or service in which the benefit received by any one party does not diminish the availability of the benefits to others, and where access to the good cannot be restricted (TEEB 2010).

Resilience (of ecosystems): The level of disturbance that an ecosystem can undergo without crossing a threshold to a situation with different structure or functions. Resilience depends on ecological dynamics as well as the organisational and institutional capacity to understand, manage, and respond to these processes (UK Ecosystem Assessment 2011).

Species: An interbreeding group of organisms that is reproductively isolated from all other organisms, although there are many partial exceptions to this rule in particular taxa. Operationally, the term species is a generally agreed fundamental taxonomic unit, based on morphological or genetic similarity. Once a new species has been described and accepted it receives a unique scientific name (UK Ecosystem Assessment 2011).

Species diversity: Biodiversity at the species level, often combining aspects of species richness, their relative abundance and their dissimilarity (UK Ecosystem Assessment 2011).

Species richness: The number of species within a given sample, community or area (UK Ecosystem Assessment 2011).

Sustainability: A system's ability to remain diverse and productive through time. The term originated in the field of ecology but has spread worldwide as the guiding principle of **sustainable development**. In this context, sustainability refers to the endurance of biological, political, cultural and economic systems and their interactions through time. The concept of sustainable development was popularized by the World Commission on Environment and Development (also known as the Brundtland Commission) with the publication of the Commission's report titled *Our Common Future* in 1987. Sustainable development has not lost its usefulness as a guiding principle for development and the concept is now enshrined in the UN's Sustainable Development Goals (SDGs) as part of its Agenda 2030 for Sustainable Development published in 2015. The SDG cover a broad range of development issues, including

poverty, hunger, health, gender equality, economic growth, education, climate change, environment, water, sanitation, energy and social justice.

Threshold/tipping point: A point or level at which ecosystems change, sometimes irreversibly, to a significantly different state, seriously affecting their capacity to deliver certain ecosystem services (TEEB 2010).

Total economic value (TEV): A framework for estimating the value of a good or service, or a bundle of goods and services, considering various constituents of value, including direct use value, indirect use value, non-use value, option value and bequest value.

Trade-off: A choice that involves losing a given quantity of a certain quality of an ecosystem service in return for gaining another service. In other words, it describes an exchange where you give up one thing in order to get something else that you also desire.

Traditional knowledge: The knowledge, innovations and practices of indigenous and local communities around the world that are deeply grounded in history and experience. Traditional knowledge is dynamic and adapts to cultural and environmental change. It incorporates other forms of knowledge and viewpoints. Traditional knowledge is often used as a synonym for indigenous knowledge, local knowledge or traditional ecological knowledge.

Transaction costs: Refers to a cost incurred in making any economic trade. The resources spent for the creation, maintenance and functioning of institutions can be understood as transaction costs (Furubotn and Richter 1998).

Use value: The value that is derived from using or having the potential to use a resource. This is the net sum of direct use values, indirect use values and option values (TEEB 2010).

Valuation, economic: The process of estimating a value and expressing it in monetary terms for a particular good or service in a certain context (TEEB 2010).

Willingness-to-pay (WTP): An estimate of people's preparedness to pay in exchange for a certain service for which there is normally no market price, for example, the WTP for the protection of an endangered species (TEEB 2010).

ANNEX

METHODS OVERVIEW

Overview common economic valuation methods

APPROACH	METHOD	ELEMENT OF TEV CAPTURED	APPLICATION	BENEFITS	LIMITATIONS
Market price (marketed goods, trace impact of change in ecosystem services on produced goods)	Market values	Direct and indirect uses	Money paid for ecosystem goods and services that are traded in commercial markets, e.g., timber, fish.	Market data readily available and robust.	Limited to those ecosystem services for which a market exists.
	Change in productivity (production function)	Indirect use	Value is inferred by considering the changes in quality and quantity of a marketed good that results from an ecosystem change (e.g., increases in fisheries income resulting from improvements in mangrove habitats).	Market data readily available and robust.	Data-intensive and data on changes in services and the impact on production often missing.
Revealed preference (uses market based information to infer a non-marketed value)	Travel cost	Direct and indirect uses	It assumes that the value of a site is reflected in how much people are willing to pay to travel to the site. Costs considered are travel expenditures, entrance fees and the value of time.	Based on observed behaviour.	Generally limited to recreational benefits. Difficulties arise when considering multiple destination trips.
	Hedonic price	Direct and indirect uses	Value of environmental amenities (air quality, scenic beauty, cultural benefits, etc.) that affect prices of marketed goods (e.g., the higher market value of waterfront property, or houses next to green spaces).	Based on market data, so relatively robust figures.	Very data-intensive and limited mainly to services related to property.
Cost based	Avoided damage costs	Direct and indirect uses	Value is based on the costs of actions taken to avoid damages if a specific ecosystem service did not exist (e.g., the costs to protect a property from flooding).	Market data readily available and robust.	Can potentially overestimate actual value.
	Replacement/ substitute costs		Value is based on the cost of replacing the ecosystem service (function) or providing substitutes (e.g., previously clean water that now has to be purified in a plant)		

APPROACH	METHOD	ELEMENT OF TEV CAPTURED	APPLICATION	BENEFITS	LIMITATIONS
	Costs of Illness human capital		Health costs (morbidity and mortality) due to changes in ecosystem services (e.g. air or water pollution).		
Stated preference	Contingent valuation	Use and non-use	Involves directly asking people how much they would be willing to pay to prevent loss of, or enhance, an ecosystem service (e.g. willingness to pay to keep a local forest intact).	Able to capture use and non-use values.	Bias in responses, resource-intensive method, hypothetical nature of the market.
	Choice modelling	Use and non-use	People chose from a 'menu' of options with differing levels of ecosystem services and differing costs. Menus might be derived from policy options where a set of possible actions might result in different impacts on ecosystems.		
Transfer of values	Benefits transfer (not a valuation method in itself)	All	Transferring a value from studies already completed in another location or context and adjusting them to local conditions (e.g. estimating the value of a forest using the calculated economic value of a forest somewhere else but of a similar size and type).	Can reduce the need for primary valuation studies and provide information swiftly.	Degree of accuracy of the valuation might not be sufficient for making a decision.

Overview cultural and social ecosystem services assessment methods

APPROACH	METHOD	APPLICATION	ADVANTAGES	DISADVANTAGES
Ethnographical Methods (Process of observing and working towards understanding the world from the perspective of the people under consideration.) and Ethnoecological Methods (Process of understanding how people conceptualize, value, and use their local environments.)	Action Research	Based on a learning-by-doing approach. A researcher is actively participating in community processes over a given period of time in order to gain insights into community practices and beliefs.	Implementable in almost any setting at relatively low costs.	May be time consuming and may require to involve many people.
	Participant observation	Can be used to derive values by looking at people's behaviours and consumption patterns.		
	Daily Note Taking	A researcher delegates the task of keeping daily notes and records of actions to community members over a period of time. Analysing these data sets will help to better understand the perspectives of community members.	Data collection spread over larger time frames allows for better capturing the entire spectrum of people's values and beliefs.	Not representative of 'society' or 'culture' as a whole. Possible bias through misinterpretation of actions or missing information.
	Writing of a descriptive monologue	A researcher delegates the task of writing a short monologue about a specific topic or specific cultural interaction to community members.		
	Questionnaires	Asking people directly how important they think ecosystem services are by means of a questionnaire.	Implementable in almost any setting at relatively low costs.	People may act or express themselves differently when being observed.
	Interviews	A single person or a group of people is interviewed about their values, beliefs and preferences concerning ES through the use of either closed- or open-ended questions.		

APPROACH	METHOD	APPLICATION	ADVANTAGES	DISADVANTAGES
	Key Informant Interviews	A person with in-depth knowledge about a community in question (e.g. a community leader) is interviewed in order to deepen the understanding of, how a community consumes resources or deals with governance issues, and can give recommendations.	Survey results can be compared and be used for statistical analysis.	Several biases possible referring to the design of the questionnaire or interview (e.g. response bias, strategic bias, design bias).
	Cultural Consensus Analysis	Based on the theory that some beliefs and values are cultural. The method is applied by asking different individuals a series of questions to which they have to provide a specific answer. If there is a sufficiently high level of agreement amongst the responses, that can be seen as a common cultural belief or value.	Values and preferences derived directly from (different) societal actors.	May require expert input.
	Cultural Domain Analysis	People indicate how they think different items or products fit together in categories. Through the analysis of matrices a researcher can then derive how a group of people judge and value different items or products.	Can capture different aspects of values, beliefs and preferences.	Getting a large and representative sample size may be time consuming.
	Social Network Analysis	Social structures are investigated by visualizing 'networks' (i.e. institutions, actors, ES) in a graph and then linked to each other through 'ties' (i.e. relationships, interactions). This can help to visualize how a society or community interacts with these 'networks' and values them.	Includes the perceptions of most relevant stakeholders if done thoroughly and ensuring representation of all involved parties.	Can be "incomplete" or not representative of an entire culture or society.
	Stakeholder Analysis	Stakeholders are all those people affected by a project/policy/study/decision, or who have an important influence on its outcome. Stakeholder provides essential information on the economic, social and political context of a project or study area. Stakeholder analysis is an important first step in many ecosystem service assessments. It helps to identify and understand stakeholders: how they are affected by ecosystem services, how they influence them, and their role in (public) decision making. Stakeholder analysis allows fine-tuning of the assessment design. It also provides vital information for effectively and meaningfully engaging stakeholders in the assessment process itself. Stakeholder involvement in assessments has to be considered according to their rights, their interests, their knowledge, as well as any strategic goals pursued by the assessment.		
Geographic Methods (Identify and map ES relevant information spatially.)	GIS and Remote Sensing	Geo-Information Systems (GIS) analyse and represent spatial and geographical data in an integrated way. Many different data types can be inputted in a GIS, including ecosystem areas, ES flows, boundaries, socio-economic variables, societal preferences in specific areas, among others.	Involvement of relevant stakeholders in the design ensures public acceptance, legitimacy and relevance of the results.	Can be expensive and time consuming.
	Participatory Mapping and Modelling	Involvement of stakeholders in the design and content of analytical models or maps that represent ES, benefit flows, beneficiaries and trade-offs under different spatial and temporal conditions.		

APPROACH	METHOD	APPLICATION	ADVANTAGES	DISADVANTAGES
	Protected Area Benefits Assessment Tool – PABAT	The Protected Areas Benefits Assessment Tool (PABAT) helps to identify the different types of benefits provided by Protected Areas (PA). The tool identifies who benefits and by how much. It also provides information regarding the degree to which particular benefits are linked to protection strategies. Stakeholder involvement and input helps achieve a high quality assessment. The PA-BAT aims to assess legal resource use and the benefits that potentially accrue from that use. The assessment may also identify neglected ecosystem services. If the assessment is repeated over time, changes in quality or quantity of either supply or demand of ecosystem services can be monitored. The tool needs to be adapted to site-specific circumstances. It is possible to apply the tool to areas under no form of protection.	<p>Easy to understand due to visual output.</p> <p>Promotes ownership amongst a community or group of stakeholders.</p> <p>Visual output that can be used to influence decision-making processes.</p>	<p>Modelling: Essentially depends on the availability of relevant data in the right format, quantity and quality, as well as the quality of the model itself.</p> <p>Can be “incomplete” or not representative of an entire society or culture.</p> <p>Difference in opinions can be difficult to reflect in a “final output”.</p>
	TESSA Toolkit	The TESSA-toolkit focuses on a site-scale-level, such as a wetland, using information gathered locally. The toolkit can help assess climate regulation, flood protection, water provision, water quality improvement, harvested wild and cultivated goods and nature-based recreation. The toolkit is accessible to non-experts and practitioners on the ground, as it provides a ‘user manual’ with a workbook structure. TESSA is relatively low cost to apply compared to many other methods. It delivers scientifically robust results, often based on field measurements, rather than scenarios. Guidance on how to pull together data from individual ecosystem services into an ecosystem service overview is also provided.	<p>High flexibility, questions can be adapted to specific local conditions or information needs.</p> <p>Provides insights into the overall value of ecosystem services at a specific site.</p>	<p>May not capture complexity of the situation.</p> <p>Can require extensive knowledge and expertise.</p> <p>Difficult to assess all ecosystem services spatially.</p>
	Participatory Rural Appraisal	Participatory Rural Appraisal (PRA) offers various tools for practitioners, government officials and community members to jointly analyse a local situation and plan projects/programmes/activities that are sensitive to local context. PRA is highly relevant for small-scale ecosystem service appraisals. PRA tools can be applied to examine the locally perceived state, the demand and the use of ecosystem services. PRA is not a fixed combination of methods, rather an evolving set of tools, which are marked by their relative simplicity, adaptability and low-tech/low-cost character. Typically, they comprise qualitative field research methods stemming from social anthropology and sociology, such as ranking exercises, transect walks, participatory mapping, trend analyses and seasonal calendars. In PRA, facilitators seek to support community members to undertake their own analysis and identify their own plans for action. Extensive mentoring, training and practical assistance may be necessary as preparatory work for PRA facilitation team to ensure that the PRA process leads to the desired results.		

APPROACH	METHOD	APPLICATION	ADVANTAGES	DISADVANTAGES
Historical Methods (Reveal how and why values of nature and its benefits have formed and changed over time.)	Archival Work	Reading of original archival records to gain a better understanding of a society or culture. It is generally more difficult than internet research, as the identification of relevant documents and archives can be time consuming.	Large amount of information availability.	Results may not be representative of 'society' or 'culture' as a whole, but rather of individual stakeholder groups or organizations.
	Document Analysis or Problem-Oriented Discourse Field Analysis	Screening of relevant existing literature to identify values and beliefs of different actor groups on specific topics in regards to ES. Problem-oriented discourse field analysis can further be used to identify actors' knowledge and potential conflicts. Academic literature, grey literature and social media can be examined.	Allows exploring past and present tendencies and preferences.	May be time consuming.
	Media Analysis	Media (newspaper, TV channels) and social media outputs are analysed over a period of time in order to capture the perceived value and beliefs of society on ecosystem services.		
Narrative Methods (Descriptive methods which capture the importance of nature and its benefits to people through stories, verbal or visual summaries.)	Storytelling (Oral History)	Participants are asked to share stories about past experiences. The group then reflects upon the presented information to discuss societal values and beliefs related to these experiences.	Based primarily on opinions of relevant stakeholders and general public.	The way information is presented may cause a bias in responses.
	Participatory Scenario Analysis	Two or more different future scenarios are presented to participants. The group then reflects upon the presented information and discusses which scenario would be preferable under which conditions.		Difficult to present all information and capture complexity correctly.
	Scenario Development and Scenario Planning	Some scenario development approaches are developed for the assessment and/or management of ecosystem services, while others are easily adapted to reflect ecosystem services issues. Scenario approaches range from highly exploratory to decision-oriented and from intuitive to analytical. They vary in the degree of complexity. Different contexts require different scenario approaches. All approaches involve a common set of steps for scenario development. This process includes: selecting a scenario approach, developing storylines based on available data, identifying uncertainties and drivers of change, and discussing scenario outcomes. Scenario planning is an effective tool to analyse future prospects of changes in ecosystem service provisioning and trade-offs. However, a scenario cannot forecast the future. Rather, it reflects different possibilities of what the future could look like.	Allows for weighing and judging different options. Can help in decision-making processes.	Can be time consuming. Results can be highly influenced by individuals with a stronger voice.
	Focus Groups	Deliberative group setting in which information is exchanged between group members, and the group then discusses in an iterative process until a consensus is reached. Deliberative group sessions help in expressing shared values instead of individual values. Usually done in a small group of people (4-8) and facilitated by an instructor or mediator.	Ensures public acceptance and local / regional relevancy of results. Allows exploring different scenarios and their implications.	Due to complexity of ecosystems, it is difficult to create comprehensive and realistic scenarios for the future in terms of ES supply and demand.
	Citizen's Juries	A number of experts and relevant stakeholders present information to a group of citizens who then respond by giving a recommendation or 'verdict'.	Can help create awareness.	

APPROACH	METHOD	APPLICATION	ADVANTAGES	DISADVANTAGES
	Deliberative Multi-Criteria Analysis	Techniques that involve groups of stakeholders designing formal criteria against which to judge the non-monetary (and sometimes monetary) costs and benefits of different management options as the basis for highlighting the value of ecosystem services.		
Preference Methods (Analyse perceptions, knowledge and values associated with nature's benefits.)	Freelisting	Community members are asked independently to list items that they think belong to a certain category or list which items they prefer most of a given category. Based on the most common answers, a researcher can derive a certain extent of societal preferences and values in regards to the topic in question.	Helps to gauge society's preferences and can be used to develop new products or strategies. Can capture all aspects of values, beliefs and preferences. Results can be compared and be used for statistical analysis.	Design may require expert input. Getting a large sample size may be time consuming. Several biases possible referring to the design of the method (e.g. response bias, strategic bias, design bias). Often suffers from a lack of information regarding method adaptation and complexity of results, such as explanations of why a scenario is preferred or why people act the way they do.
	Paired Comparisons or Triad Tests	In order to gain knowledge about the values of different items or products, a researcher can arrange these items or products into multiple sets of two. A respondent can now indicate his preference out of all possible paired combinations. The item that has been chosen most is the most preferred. In triad tests, respondents choose a "best", "middle" and "worst" item from all possible combinations of three items.		
	Pile Sorting	Participants divide items or products into a number of value-categories based on their perceived value.		
	Delphi Survey and Value Compass	Set of techniques that revolve around a group of participants (often experts) that discuss an issue at hand iteratively until a consensus is reached. The group ranks different values and then discusses the degree to which these values are important in a specific community.		
	Rankings	In ranking exercises, two or more products or entities are presented to an individual or a group of people who can then choose which of the options are preferred to others or if some of them have an identical value.		

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Registered offices

Bonn and Eschborn, Germany
T +49 228 44 60-0 (Bonn)
T +49 6196 79-0 (Eschborn)

Dag-Hammarskjöld-Weg 1-5
65760 Eschborn, Germany

T +49 6196 79-0
F +49 6196 79-11 15
E info@giz.de
I www.giz.de

E info@aboutvalues.net
I www.aboutvalues.net

