Integrating Ecosystem Services (IES) into Development Planning

Agrarian Landscapes

TRAINING MATERIAL
Zentralistan

IMPRINT

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- Economic Valuation of Ecosystem Services. Manual for Trainers. Emerton 2018.

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INTRODUCTION

Integrating Ecosystem Services into Development Planning in Agrarian Landscapes

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 to understand in which ways human actions depend on and impact ecosystem services, consider the trade-offs among options, and choose policies that are able to 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.

Agrarian landscapes

The importance of the agricultural sector is widely recognized. More than 3 billion people live in rural areas, and near 2.5 billion derive their livelihoods from agriculture (FAO, 2013). Also, by 2014, agriculture and its related activities accounted for near 30% of the global employment (World Bank, 2018). Moreover, agriculture uses near 11% of land surface for production (FAO, 2011). Even though the development of the sector is crucial for meeting the demand of food for a growing population, there are multiple challenges associated to its use of resources and impacts. For example, agricultural production accounts for 70% of freshwater withdrawals (FAO, 2011) and is responsible for near 80% of deforestation worldwide (FAO, 2017). When inadequately planned, the use of ecosystem services for agriculture implicates a decrease of availability in quantity and quality of those crucial to other activities and stakeholders, and more importantly, in the long term, for the agricultural sector itself.

Even though agriculture accounts for 4% of the global GDP, in some developing countries the sector accounts for 30% of the economy or more (World Bank database, 2017). In these countries, the lack of recognition of the importance of ecosystem services for the sector poses even more significant risks to their population and their livelihoods. Accounting for the contributions of ecosystem services, minimizes the risks and increases the long-term opportunities for agriculture, other economic activities and the population.

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. The present training builds on this guide and advocates a stepwise approach through which it is possible to recognize, demonstrate and capture the value of biodiversity and ecosystem services for devel-

opment planning in economies where agriculture plays a major role. This training combines the theoretical and practical elements of the IES stepwise approach, with a focus in agrarian landscapes, 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 prioritizing ecosystem services** – How does the development plan and current agricultural practices depend and impact on ecosystem services?

3. **Identifying conditions, trends, and trade-offs** – What are the current conditions and likely future trends in ecosystem services demand and supply? What are the main drivers of change and which trade-offs are foreseeable?

4. **Appraising the institutional and cultural framework** – Which organizations 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?

Objectives

The training course introduces the theoretical and practical starting points of integrating ecosystem services into development planning in economies where agriculture plays a crucial role. The objective of the training is to recognize the correlation between ecosystem services and development activities, with emphasis in agriculture, as a crucial factor for development planning. Specific objectives include:

- Provide an overview of the IES approach, its applicability in development planning and potential outcomes.
- Learn how to recognize the linkages between ecosystem services and development activities, accentuating those related to agriculture, and understand related risks and opportunities.
- Become familiar with tools and methods for assessing, valuing and integrating ecosystem services into development planning.
- Learn key factors for the analysis of the legal, institutional and cultural framework in which related stakeholders make decisions that affect ecosystem services, and for the identification of drivers.
- 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.

Methodology

The training course utilizes a mixture of interactive lectures, open discussions, groupwork, case studies and real-world examples. During the group discussions, participants can share their knowledge and learn from each other's experience.

Also, 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 ficti-

tious country of Zentralistan, a case portraying situations closely related with real development challenges. In this training, a closer look is taken to one of Zentralistan provinces, Egana, which economy highly depends on agriculture.

All modules follow a similar sequence, including the following elements:

1. The **introduction** to the module, given by the trainer with the help of a power-point presentation or other visual aids, covers the theoretical background of the module and introduces participants to the case study and the exercises. For this training, the module introductory slides (Power-Point) align with the training manual and handouts. Their basic message should not be changed, but it can be extended with, for instance, regional case examples that fit better to participants experience and understanding.

2. The **exercises** based on the case study, give participants the opportunity to work through different aspects highlighted in the theoretical background. During the exercises, participants typically work in groups and adopt the role of 'case study experts' or involved stakeholders in charge of a specific task.

3. In the **presentation of results**, work groups present their findings to the plenary. The presentation should highlight major findings and/or questions from the case work. It is important that this step is introduced as a chance to share experiences and for mutual learning instead of a 'test'. Trainers ask probing questions and can offer alternatives and corrections when necessary.

4. During the **reflection**, participants reassume their own real-life position. They reflect on their experiences during the exercise and link them to their own work and context.

5. **Recap** of the **key messages** of the previous presentations and link it to the next module/presentation.

OVERVIEW OF THE IES APPROACH (SIX STEPS)

The stepwise IES approach aims to provide practitioners with a practical and policy-relevant framework for integrating ecosystem services into development planning, emphasizing the case of economies where agriculture plays a major role. The table below summarises these steps. They are described in detail in the IES manual.

STEP	SUMMARY	EXPECTED OUTCOME	GUIDING QUESTIONS
STEP 1: Defining the scope and setting the stage STEP 1	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.	• 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.	• 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?
STEP 2: Screening and prioritizing ecosystem services STEP 2	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.	• Matrix showing ecosystem service dependencies and impacts in relation to the development plan (including economic activities, with emphasis in agriculture). • Agreed list of priority ecosystem services. • Summary of potential areas of conflict or competition, which may result in trade-offs.	• How does the development plan (including associated economic activities and livelihoods, with emphasis in agriculture) 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 (including associated economic activities and livelihoods, with emphasis in agriculture), and why?
STEP 3: Identifying conditions, trends and trade-offs	Step 3 looks at the cause-and-effect relationships that operate between ecosystem services and the development plan (including associated economic activities and	• Information on ecosystem services conditions and trends.	• What information and evidence on ecosystem service conditions and trends exists and what are the main information gaps?

STEP	SUMMARY	EXPECTED OUTCOME	GUIDING QUESTIONS
STEP 3	livelihoods, with emphasis in agriculture). 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 and trade-offs between the different groups, goals or services.	• Overview of the main drivers of change, related stakeholders. • Analysis of ecosystem services synergies and trade-offs in the context of the development plan. • Key messages for different audiences.	• 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 4: Appraising the institutional and cultural framework	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 (including associated economic activities, with emphasis in agriculture). 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.	• 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 related to ecosystem use, management and incentives.	• 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?
STEP 5: Preparing better decision-making	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.	• Analysis of risks and opportunities associated with the development plan (economic activities, with emphasis in agriculture). • Shortlist of policy-options and corresponding entry-points into decision-making. • Communications messages on policy options.	• What are the ecosystem service-related risks and opportunities to the development plan (economic activities, with emphasis in agriculture)? • 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?

STEP	SUMMARY	EXPECTED OUTCOME	GUIDING QUESTIONS
STEP 6: Implementing change STEP 6	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 measures to integrate ecosystem services in the development plan (economic activities, with emphasis in agriculture).	• 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.	• 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 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 FAO (2018), MEA (2005) and TEEB (2010). Copyright of ecosystem services illustrations: Jan Sosse. For more information please write to *teeb@ufz.de*

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 collecting, hunting, harvesting and growing food in wild habitats (like fish, honey, mushrooms, wild fruits) and in managed agroecosystems (like maize, rice, meat, etc.). **Agroecosystems** require additional external inputs to grow food, such as human seed dispersal, fertilizers, irrigation, livestock management, etc.
	Raw materials	Ecosystems provide a great diversity of materials for construction and fuel (for example, timber, biofuels, oils, etc.), or as inputs for other products (for example, fibres like cotton and wool). **Agroecosystems** require additional external inputs to provide raw materials, such as human seed dispersal, fertilizers, irrigation, livestock management, etc.
	Fresh water	**Ecosystems** provide surface and groundwater. Only when adequately managed and, in comparison to uncovered soils, **agroecosystems** and **grasslands** can maintain water retention capacity.
	Medicinal resources	**Ecosystems** provide many plants that can be collected to be used as traditional medicines and as input for the pharmaceutical industry, for example, honey, eucalyptus, mushrooms, algae, quinine, etc. When grown in **agroecosystems**, medicinal resources require external inputs to be produced.

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	In vegetation-covered-**ecosystems**, trees remove pollutants and absorbs toxic gases from the atmosphere. They also decrease diary variations in temperature and humidity. When **agroecosystems** change the vegetation cover by deforestation, they decrease the capacity of local climate and air quality regulation. Nevertheless, some crops also have a potential to clean the air. Moreover, when maintained in agroecosystems, trees benefit crops' productivity by absorbing pollutants and regulating the temperature.
	Carbon sequestration and storage	In vegetation-covered-**ecosystems**, as trees and plants grow, they remove carbon dioxide from the atmosphere and effectively lock it away in their tissues. When **agroecosystems** change the vegetation cover by deforestation, they decrease the capacity of carbon sequestration and storage. Nevertheless, improved agricultural practices allow plant biomass and soil to store carbon. Also, when maintaining trees, the fallen leaves in the fields allow accumulation of carbon in the soil.
	Moderation of extreme events	**Ecosystems** and living organisms create buffers against natural hazards such as floods, storms, landslides and droughts. When **agroecosystems** change the vegetation cover by deforestation, they decrease the capacity of moderation of extreme events. Nevertheless, adequately managed agroecosystems and grasslands can maintain a vegetation control, protecting the crops and reducing risks of droughts and floods due to the maintenance of water retention capacity.

	Waste-water treatment	Micro-organisms in **ecosystems**' soil and root systems in trees, decompose human and animal waste, as well as many pollutants. When **agroecosystems** change the vegetation cover by deforestation, they decrease the capacity of waste water treatment. Moreover, agricultural effluents and livestock are a big source of water pollution. Nevertheless, agricultural systems can be designed to decrease waste water and water pollution.
	Erosion prevention and maintenance of soil fertility	Vegetation cover in **ecosystems** helps avoiding soil erosion, which is a key factor in the process of land degradation and desertification. When **agroecosystems** change the vegetation cover by deforestation, they decrease the capacity of erosion prevention and maintenance of soil fertility. Soil degradation leads to a decrease in farming productivity, nevertheless, agricultural systems can be managed to restore and maintain the soil.
	Pollination	**Ecosystems** provide habitat for insects, birds and bats, that transfer pollen, allowing fertilization of crops. In **agroecosystems**, pollinators are crucial for 87 out of the 115 leading global food crops. Yet, pollination is under stress due to habitat destruction, intensification of agriculture and pesticide misuse. Nevertheless, agricultural systems can adopt practices to maintain pollinators.
	Biological control	**Ecosystems** are important for regulating pests and vector borne diseases. By being more complex and diversified, ecosystems provide the conditions for parasites and predators to decrease populations of pests and diseases. Pests, diseases and weeds limit crop production. Diversified **agroecosystems** provide better opportunities of biological control than monocultures by, among others, providing food and habitat to parasites and predators of plagues and pests.

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	**Ecosystems** provide everything that an individual plant or animal needs to survive. Migratory species need habitats along their migrating routes. When **agroecosystems** change the vegetation cover by deforestation, they decrease the habitat for species. Nevertheless, adequately managed agroecosystems can try to recreate natural ecosystems' diversity and habitats. This can also allow higher yields and long-term production.
	Maintenance of genetic diversity	**Ecosystems** provide genetic diversity to distinguish different breeds or races, providing the basis for locally well-adapted **agroecosystems** and a gene pool for further developing commercial crops. Managing **agroecosystems** to maintain the genetic diversity and the interactions between different species, allows productivity increase, adaptation capacity of the crop and reduction of pests and diseases.

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

	Mental and physical health	**Ecosystems** provide natural landscapes and urban green spaces which play an important role for maintaining mental and physical health. When **agroecosystems** change the vegetation cover by deforestation, they can decrease spaces useful for encouraging mental and physical health. Nevertheless, when adequately managed, agroecosystems and grasslands can host spaces for encouraging mental health benefits and sports.
	Outdoor recreation	**Ecosystems** provide natural landscapes which provide opportunities for recreation, leisure and enjoyment.

		When **agroecosystems** change the vegetation cover by deforestation, they can decrease spaces useful for recreation. Nevertheless, some agrarian landscapes can also offer farm tourism due to the natural beauty of some plantations.
	Aesthetic appreciation and inspiration for culture, art and design	Language, knowledge and appreciation of the natural environment provided by **ecosystems**, have been intimately related throughout human history. **Agricultural landscapes and agropastoral** systems have high cultural values for many societies. Even many cultivars are maintained for ceremonial purposes of communities.
	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. In **agroecosystems**, some cultivars are central for many religions, and world views of communities. Agricultural practices and livestock create a sense of belonging in many societies and are a crucial pillar of many aspects of social significance.

INTRODUCTION TO THE CASE STUDY

Introduction to the case study: Zentralistan

Zentralistan

Zentralistan, officially the Republic of Zentralistan (Zentani: Tushkistat szati Zentralistan) is a developing country covering an area of 400.000 km^2. It became independent in 1998 and was established as a democratic Republic. Administratively, Zentralistan is divided into three provinces: Nishtak, Egana and Warif. The three provinces have considerable autonomy, as well as limited taxation powers.

Demographics

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

Since its independence, Zentralistan has seen a gradual immigration, especially from Sunnystan and other neighbouring countries.

- As of 2016, the total population is 10 million, with 30% living in urban areas and 70% in rural areas.
- According to 2016 data, 31.3% of its total population is classified as poor, including 9.8% of extremely poor.
- Zentani is the primary language of the country.

Republic of Zentralistan	
Capital:	Capitalska (3 Million)
Population:	15 Million (2016 estimate)
Total Area:	400.000 km^2
Official Language:	Zentani
Independence:	1998

Economy

Zentralistan is a developing country with a market-oriented economy. Its economy is dominated primarily by agriculture, dairy and cattle farming, which accounts for 25% of the GDP, 30% of exports and employs 70% of the population. 83% of farmers practice small-scale agriculture, and 17% work on middle to large-scale farms. Arable land suitable for crop production is around 22% of total agricultural land. The remaining 78 % of agricultural land is mostly pasture.

Even though agriculture is the most important sector in the country, output and efficiency is still considered low as irrigation infrastructure and machinery are in poor conditions. Therefore, Zentralistan still relies on imports of corn, wheat, fruits and other crops for meeting its increasing food demands.

Presently, the main production crops are cotton and wheat. Most of the cotton, which is also the main export product in Zentralistan, is produced in large-scale farms, occupying near 50% of arable land. Even though cotton and wheat have always been subsidized by the national government, recently, the authorities have been encouraging private and foreign investments to increase the land used for cotton production and raise the productivity of the sector. On the other hand, subsistence agriculture, (mainly of potatoes, vegetables, fruits and rice), small scale fishing, wild berries and nuts harvesting (and storage) and pasture-based cattle breeding, remain the backbone of the economy of most population living in rural areas. Traditional forms of nomadic pastoralism are still practiced by many breeders in the east part of the country, and for many small-scale farmers, cattle keeping is also a way of investing or saving money.

Generally, four types of agrarian units can be distinguished in Zentralistan:

a) irrigated croplands mainly used for cotton and wheat production (monocultures, in the eastern part of Warif Province and western part of Egana Province);

b) rainfed agriculture producing potatoes, rice, vegetables, etc. (wetlands of Siul and Erosh River watershed, and south of Egana Province);

c) rangelands for livestock and dairy breeding (large scale all over the western part of the country and in smaller units in the northern lands of Egana Province) and

d) mountain agroecosystems, characterized by fruit tree plantations and use of non-timber forest products (harvest of wild berries, nuts and medicinal plants) (in the Nishtak Province and northern parts of Egana Province, in the adjacent areas of the Siul Reserve).

Important industrial sectors are the cotton processing and textile industry, coal mining, and to a lower extent, food processing. Textile industry has been constantly growing. It utilizes 40% of the national cotton production and produces mainly for export. Recently, foreign investors have increased their interest due to the low costs for labour in Zentralistan. In respond to this, the national government is planning to ease credits and paper work to increase the investments and the number of factories along the Siul River. The few food processing factories are oriented towards serving the domestic markets but since income per capita is quite low, this market has not had growing perspectives for the forecoming years.

During the last years, tourism has been gaining economic importance. Until now, national tourism has been increasing in the Mighty Mountain region, but ecotourism in the Tuklak, Katakir and Siul Reserves is attracting more and more foreign tourists. Nevertheless, infrastructure is still not adequately developed to meet the demands of the visitors.

Geography

Zentralistan is a landlocked country. It is divided into three provinces: The Nishtak Province, the Egana Province and the Warif Province. The country is characterized by plains of steppe and grasslands in the west, forests in the central region and mountain ranges that form Zentralistan' s border to Sunnystan in the north. The Mighty Mountains (6000 m) are a high-altitude belt running east-west along the north of the country. In winter, much of the region is covered under a snow blanket. The east of the country is characterized by the watersheds on the two main rivers, Siul River and Erosh, and fertile lowlands. Siul and Erosh rivers arise in the Mighty Mountains and end in the Ursi Lake.

Climate

The climate can be characterized as continental with very cold winters and hot summer. But due to the geographical features of the country there is a great variety of climate zones, largely determined by altitude. Temperatures across most of the steppes follow a gradient from north to south. Winters (from December to February) are severe in the northern parts of the country averaging as low as -20°C in January, covering crop and pasturelands with snow. Further south, conditions become milder, but average midwinter temperatures seldom rise above zero. Summers (from June to August) are long and bring above-zero temperatures throughout the country, with an average of up to 25-30°. In general, low rainfall combined with sudden extreme precipitation, heat and cold spells are major challenges for people living in Zentralistan.

Biodiversity and environment

Mountains above 3000 meters cover 40% of Zentralistan. The variations in elevation and climate lead to a wide diversity of ecosystems each with different vegetation types and species. Zentralistan is one

of 17 "mega biodiverse" countries in the world according to Conservation International. Spectacular red tulips (Tulipa micheliana) display the beauty of some of the spring vegetation. One very rare type is the Zentani wild tulip, the national symbol of Zentralistan. The diversity of fauna is equally rich and includes threatened species such as snow leopards, Siberian ibex, Bukhara urial, and numerous birds, fishes, reptiles and amphibians. The current National Park System (NPS) comprises 5% of the country's area. The three most important protected areas are the Katakir Reserve (Nishtak Province), and the Siul and the Tuklak Reserves in the Egana Province.

Land conversion, deforestation, soil degradation, desertification and water pollution are some of the main environmental problems the country is facing.

An increase in agricultural land for cotton and grazing land for cattle have led to a major land conversion and deforestation in Zentralistan. Moreover, a large number of landholders still have some administrative problems to secure their lands. Such insecurity regarding property rights, together with difficulties to access credits for their cash crop production, pressure them to accept conditions and credits from private investors to produce cotton.

Some other landholders who used to practice small scale agriculture also face difficulties to access investment and extension services to increase their productivity and generate more income by ensuring a supply chain for their products. This, combined with a constant decrease in soil fertility, has led them to change their subsistence crops to export-oriented crops, which are financially supported by the national government.

There is also the case of landholders that have no experience in farming, which only leaves them the option to lease their land for monoculture production or for livestock grazing. Most of the times, their land is given back completely degraded, which forces them to look for jobs in the textile industry or in the city, and in some other cases, to migrate to Sunnystan.

For some years now, the water of the Siul river have presented a dramatic increase in pollutants. After some cases of illness, the population in the Egana Province have stopped drinking water from the tap and is desperately trying to have reserves of bottled water. Many citizens blame it on the uncontrolled discharge of waste water by agriculture and the overgrazing of livestock near the rivers. Others insist that the textile industries upstream of the rivers do not meet the water discharge regulations, while others are convinced that the city's infrastructure for water purification is obsolete or non-functional.

Finally, during the last few decades frequency of meteorological hazards in Zentralistan has increased. While river floods and landslides have been more frequent in the mountain and foothill areas (mainly occurring in the spring and summer), droughts have been increasing in the Warif and Egana Provinces (with 20-25% deficit in seasonal precipitation).

The national environmental authority, the Ministry of Environment (created in 2004), has lobbied for complex regulations on water discharges, and for promoting an update on the land planning of the provinces with a sustainable focus. Unfortunately, resources allocated to the Ministry are insufficient and enforcement of environmental regulations is lacking. Key tasks of managing and monitoring natural resources have been delegated to local communities like pasture users' associations, forest users

associations or water user associations. While decentralization is generally being welcomed, the recent situation shows that local communities are not (yet) capable of managing ecosystems in a sustainable way, with the main reasons being the lack of managerial and financial resources as well as other development priorities. International development assistance supports the country in strengthening the forestry sector and improving sustainable agriculture practices. In the recent past, international donors have financed important conservation efforts, particularly the creation of the National Park System (NPS).

Governance and administration

The political history of Zentralistan has been turbulent. During nine decades, Zentralistan (at that time, "the Great Stan") was a one-party governed country. Since the removal of the government in 1998 numerous political turnovers marked its way to a democratic republic. Despite its steady and successful development process, the coherence and enforcement of national laws and international treaties through the central government is still weak. For example, Zentralistan counts with a law on soil and pastures management, as well as an agrarian reform and a plan for sustainable use of biodiversity. Nevertheless, the responsibilities of enforcement and monitoring are not clear, and the Ministry of Agriculture and Environment are confused due to a possible overlapping of functions. This has also led them to strong discussions in terms of budget allocation. This situation has favoured a strong presence of development organizations supporting the country, mainly on governance issues.

As previously indicated, Zentralistan is divided into three provinces: Nishtak, Egana and Warif.

Warif Province

The Warif Province is characterized mostly by dry steppe vegetation. The huge, mostly state-owned plantations of cotton and wheat are located in the eastern part of the Province. Both crops are highly promoted by the government and depend on irrigation. Irrigation water is provided mainly by the Siul River.

Dropping water level (e.g. due to inadequate management of the Siul watershed) and old irrigation infrastructure and machinery present a growing problem for cotton and wheat production. The irrigation infrastructure comprises an interconnected irrigation system of canals and drainage collectors, with freshwater and drainage (return) water flows. Cotton and wheat production areas are highly affected by salinization due to irrigation and use of fertilizers and pesticides from agriculture lands in both, Warif and Egana provinces.

Unsustainable practices of agriculture, stockbreeding and dairy farming have accelerated the process of desertification in the Warif Province. That is the reason why many of the private investors are starting to look for new lands and opportunities for cotton production in the neighbouring Egana Province.

Nishtak Province

The highland Nishtak Province is well-known for its beautiful Mighty Mountains. The highest peaks are up to 6000 meters and are snow covered year-round. The mountain areas are sparsely populated, giving home to some small-scale farmers living from subsistence agriculture. Up to 3000 m the mountain landscape is characterized by deep valleys and moist northern slopes. The southern slopes are drier and covered by a mountain steppe or forests in lower altitudes.

Highland vegetation can be found between the upper forest line (up to 2700m) and the permanent snow line (~5200m). There is a high pressure on forests as farmers from Egana and Warif Province are increasingly migrating to Nishtak Province. The uncontrolled firewood extraction and grazing livestock

has started to severely degrade and erode the buffer zones of the Tuklak Reserve, near to the border with Egana Province.

The small ski resort, Skitja, and the Katakir Reserve are very popular local recreation destinies for habitants of Capitalska, the vital and steady growing capital of the country, situated at the foothills of the Mighty Mountains.

Egana Province

The Egana Province is the economic heart of the country and includes the majority of Zentralistan's population. The lands next to the two main rivers, the Siul and the Erosh, are the most arable. Both rivers cross the province from North to South, ending in the Ursi Lake.

In the last years, most of the original vegetation cover of the province has been depleted for cotton and wheat production. Such intensive crops are mainly situated in the west of the province, next to the Siul river, which eases the access of water for irrigation. Mostly financed by the private investors and subsidized by the provincial government, these farmers seize the easiness for changing land uses as well as the subsidies in inputs like pesticides and fertilizers. Also, they will be beneficiaries of the credits offered by the provincial government, who is promoting the creation of a value chain of cotton by facilitating the permits and public services for building the necessary infrastructure for new textile industries.

After years of intensive use, these lands start to face similar problems as the cotton production in the Warif province: soil degradation and salinization. Some lands have reduced their soil nutrients to the point of being sold or abandoned. This has pushed investors to try to find new land for growing cotton. Since there is no more available land for agriculture, their options consist in leasing the land from small scale farmers situated in the north of the province or in the downstream from the Siul river.

In the northern area of the province, small farmers have fruit plantations and harvest and storage nuts and medicinal plants from the forest of the Siul Reserve. Nevertheless, they cannot access funding and extension services for creating value chains that increase the value of their products. This, together with the deforestation and the pressure from investors, has encouraged some of them to change their production to cotton and some others to lease their lands.

Some other farmers in the northern area of Egana are cattle breeders and produce dairy for subsistence and for the national market. The livestock owners in this region created a cooperative that has allowed them to work in a more organized way and has created a community sense. Nevertheless, the lack of adequate livestock management has led to overgrazing and the degradation of land. In search of new pasture lands, cattle farmers are moving towards the North, leading to illegal grazing in the adjacent lands of the Siul Reserve, causing forest degradation. Moreover, the grazing of cattle next to the Siul river has contributed to water pollution, which has affected agriculture, fishing and habitants downstream. Recently, given the demand from international tourists to visit the Siul Reserve, these farmers have also been providing touristic services for visiting the area and the northern forests of the province. Tourists love the combination of forests with high altitude mountains. However, tourism infrastructure and services are still poorly developed. Electricity, clean water and waste treatment plants and roads are still needed to increase to meet the demands of the rising number of visitors.

Lately, the NGO Zentralistan Nature Conservation (ZNC) has been pressuring the provincial authorities to allocate budget for the preparation of a management plan for the Siul Reserve and its buffer zones,
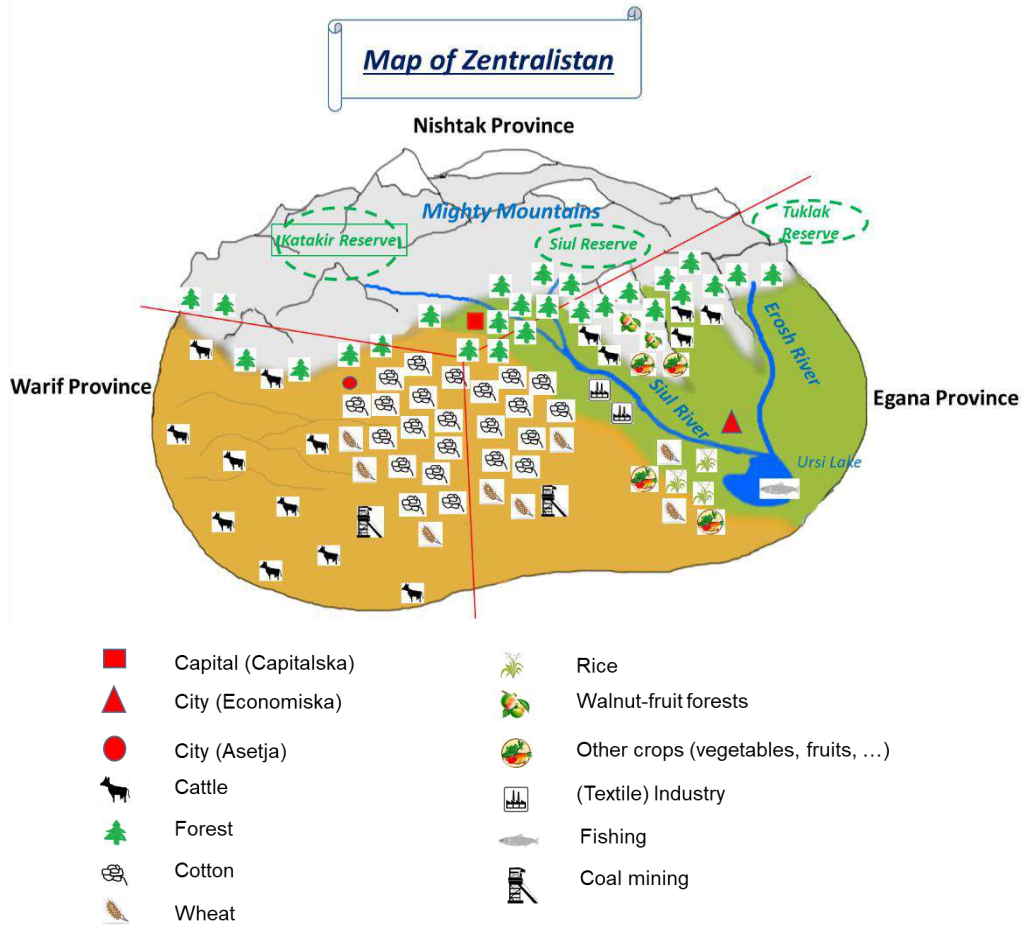
which allows sustainable activities, such as the harvest of non-timber products and ecotourism. Without it, it is more difficult to legally protect the forest and the livelihoods that depend from it from deforestation caused by the increasing pressure of cotton expansion and grazing pastures.

In the south of the province, west from the Siul river, small farmers produce rice, vegetables and potatoes for local commercialization and self-consumption. Most of them do not have financial means to acquire the expensive agrochemicals to support their production, which has made them vulnerable to pests and diseases. Due to low profit margins and difficulties to access credits and extension services for production and distribution, some have decided to change their crops to wheat, which receive financial support from the government. Some others, who don't have experience and lack capacity development, have leased their land to the large-scale farmers. The rice produced by these farmers is not only for self-consumption but is also sold in the whole province. Together with the rice imports from Sunnystan, production in this area of Egana is vital to meet the demand requirements of the whole province. Also, rice produced by the small-scale farmers is crucial for the diet of the people throughout the province. It is a main ingredient in the internationally known traditional dishes of Egana: Dschaze and Plauv.

Lately, the NGO ZNC, financed by the Provincial Environment Unit and international donors, has been implementing pilot projects with these farmers to strengthen their agricultural activities by converting to agroecological schemes, and helping them to design a value chain for rice. This initiative aims to protect their land rights, ensure that they can have alternative sources of income and promote a localized form of development in line with nature conservation.

There is mounting evidence that water quality of the Siul river and the Ursi Lake has been decreasing, especially during longer dry seasons. Recently, a study commissioned by the Provincial Agriculture, Livestock, Forestry and Fisheries Unit, had found evidence of serious water contamination resulting from the misuse of agrochemicals in crops, overgrazing close to the river and water discharges of the industries upstream. Not only is the water pollution a problem, but the water extraction for cotton production and processing in Warif and Egana, has also led to an alarming decrease of water availability during the last years. Failing irrigation systems and lack of maintenance has also aggravated salinization and water pollution. This situation has decreased the productivity of small-scale farms downstream and the livelihood of the communities along the river. The local authorities tried to keep it a secret, but the story has turned into a national scandal after some of the population in the communities downstream got serious illnesses after drinking tap water. Moreover, algae and eutrophication have increased in the Ursi Lake, reducing fish availability and affecting fishermen livelihoods. Even though there are regulations on water discharges, agrochemical uses in agriculture and livestock management, there is no clarity on who whether it should be the Provincial Agriculture Unit or the Provincial Environment Unit who enforces such regulations. The Provincial Environment Unit has declared their willingness to do so, but they have no budget for enforcement. The fish cooperative and small-scale farmers downstream have been voicing their discontent over this situation and have been pressing the development committee of the province to look into this problem.

Currently, the government is analysing the option of building water purification plant along the Siul river. This would provide better water quality for the communities along the river, agriculture and Economiska. Nevertheless, the water company, a semi-public enterprise, has no available funding. Moreover, the water purification costs are continuously increasing, and the construction of the plants would also mean higher tariffs.

Map of Zentralistan

Nishtak Province

Mighty Mountains

Katakir Reserve

Siul Reserve

Tuklak Reserve

Warif Province

Erosh River

Siul River

Egana Province

Ursi Lake

■	Capital (Capitalska)	🌾	Rice
▲	City (Economiska)	🍑	Walnut-fruit forests
●	City (Asetja)	🥕	Other crops (vegetables, fruits, …)
	Cattle	🏭	(Textile) Industry
🌲	Forest		Fishing
	Cotton		Coal mining
🌾	Wheat		

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STEP 1 & 2

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

Exercise 1: Getting familiar with Zentralistan

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

1. What are the main economic activities and trends in the country? What are the main types and scales of agriculture?

2. Which ecosystems and ecosystem services are most important for the economy and well-being of the inhabitants of Zentralistan? Which ones are the most important for the different types and scales of agriculture?

3. Can you identify possible trade-offs between economic activities, types/scales of agriculture and ecosystem services?

4. Which main stakeholder groups are involved and who is winning, and who is losing from the current development patterns?

STEP 2
SCREENING AND PRIORITIZING ECOSYSTEM SERVICES

Exercise 2: Where the story begins[1]

The last months have been especially hard for the province of Egana. The dry season has lasted longer than usual, and the Siul River almost dried out. Agriculture, fishermen, communities, population of Economiska and industries depending on the Siul river suffered from water scarcity.

During a meeting of the **Egana 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 cotton and wheat production, the textile industry, the construction of water purification plant for the Siul river, support the development of fisheries, ensure food security in the province, increase investments in the livestock and dairy industry as well as the enhancement of the production of non-timber products.

One representative from the Provincial Environment Unit stated that, "the region's ecosystems are already under stress, especially from the combination of agricultural and livestock 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."

EGANA DEVELOPMENT COMMITTEE MEMBERS

1. **Chair:** Governor of Egana
2. **Vice-Chair:** Director of Provincial Development Unit
3. **Permanent Secretary:** Director of Provincial Rural Development Unit

PERMANENT MEMBERS
- All governors of districts and communes
- Director of Provincial Commercial Unit
- Director of Provincial Economic and Financial Unit
- Director of Provincial Water Resources and Meteorological Unit
- Director of Provincial Agriculture, Livestock, Forestry and Fishery Unit
- Director of Provincial Tourism Unit
- Director of Provincial Environment Unit
- Director of Provincial Health Unit
- Director of Provincial Public work and Transport Unit
- Representatives of the Farmers Association of Egana
- Representatives of the Livestock Breeders Association of Egana
- Representatives of NGO

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[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 agricultural expansion, as well as the promotion of the dairy industry, were clear. There would be more and better jobs in the city and clear gains for farmers, which would also avoid a massive migration.

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 communities along the Siul river will suffer the consequences. We should learn from the social and environmental costs associated with the development pattern in the Warif province. The price of food will probably increase, harming the poorer sectors of society. We are going to have longer drought periods and higher costs for water purification. Uncontrolled expansion of monocultures will actually strengthen unsolved social and environmental problems, which could have a negative impact even on the success of the business itself."

"We already have a lot of problems with the agribusiness companies; more cotton and wheat plantations 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 Farmers Association.

This was 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 the quality and quantity of water flows through the construction of a water purification plant for the Siul River.
2. Promote textile industry by encouraging private sector participation (cotton production and construction of more processing plants).
3. Improve food security by supporting small-scale farms.
4. Increase investments in livestock and dairy industry.
5. Promote fishery support services for increased productivity and income.
6. Enhance conditions for non-timber products production and develop the supply chain for increasing exports.

EGANA´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 water purification plant for the Siul.
3. Promote textile industry by encouraging private sector participation (cotton production and construction of more processing plants).
4. Improve food security by supporting small-scale farms.
5. Increase investments in livestock and dairy industry.
6. Promote fishery support services for increased productivity and income.
7. Enhance conditions for non-timber products production and develop the supply chain for increasing exports.
8. 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 Egana. 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 analyze). 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 Egana, 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 *List ALL ecosystem services here*	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 Eganas'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 prioritizing 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.

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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 Egana is especially keen on getting more information about ecosystems in his province, since investors are constantly pressing him to allow more cotton plantations and to release permits for building the processing plants. However, in spite of all the money in play, the governor is surprisingly cautious, as he is still dealing with consequences of the recent drought.

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 cotton and wheat plantations, textile industry plants, rice crops, livestock breeding, water purification, etc. 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 Economiska municipality showed the risks posed to water purification 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 cotton 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 textile industry entrepreneurs in the short-run. How the recreational value of mountain forests declines if deforestation increases was another example. This situation would affect both tourists and 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 and grasslands to agriculture, the use of pesticides and fertilizers, overgrazing, global climate change and population growth are all be-coming 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 Egana 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 Develop-ment Committee agreed on the following list of priority ecosystem services to be looked at in more detail:

1. Food
2. Fresh water
3. Raw materials
4. Erosion prevention and maintenance of soil fertility
5. Inspiration for culture
6. Habitat
7. Local climate and air quality regulation
8. Recreation

Your task:

Trainers will assign three to four 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 spe-cific and highly dependent on local conditions. Consider upstream-downstream relationships in watersheds.

2. What are the direct drivers of change of ecosystem services and underlying causes (indirect driv-ers)?

Remember that drivers can cause both degradation and maintenance or conservation of ecosys-tems; and certain drivers may be affecting some and benefitting others.

3. Which stakeholders[2] 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 Egana and Zentralistan that are described in this course material and, if necessary, make assumptions.

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[2]   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 gener-ates the service	Current condition of the ES (++/+/-/--)	Trends in the provi-sion of the ES (→ ↗ ↘)		Drivers of change and un-derlying causes	Stakeholders (related to the drivers of change) and/or other motivations
			Supply	Demand		

STEP 4
APPRAISING THE INSTITUTIONAL AND CULTURAL FRAMEWORK

STEP 4

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 Egana 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 plan in Egana.

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 statement in plenary during the stakeholder workshop. Each representative will have no more than 3 minutes to present his/her statement.

> *Invitation*
>
> You are cordially invited to a meeting organized by the Development Committee of Egana province. The event will take place at the City Hall this evening.
>
> On behalf of the Development Committee of Egana, I look forward to your attendance.
>
> Sincerely,
>
> Mr. B. Smith
> Director of provincial and municipal rural development
>
> Permanent Secretary
> of the Development Committee of Egana

Additional information

One of the biggest projects of Zentralistan's government is the ongoing land reform. During the Great-Stan era, almost all the land was owned by the state. Since 1998 land redistribution is going on. Much of the farmland (40 % of the arable lands) has been privatized and transformed into small-holder and peasant-farms. Nevertheless, most of the economically important lands, used for cotton and wheat production, are still state owned and remain big-sized collective farms or farms operated by state enterprises.

Today, the Land Code established in 2003 regulates the land tenure. According to the Land Code, the following types of land always remain in state ownership: Forest reserves, reserves of minerals, pro-tected areas and pasture lands. Foreign entities are becoming more and more interested in the coun-try and are allowed to lease and invest in agriculture lands (term is 5-8 years).

The privatization comes along with different challenges. New land owners often lack knowledge on sustainable, good agriculture practices and extension services are practically non-existent. Addition-ally, small-scale farmers lack financial resources to invest in improved machinery. Subsequently productivity often remains low.

One structural challenge is that registration of private land titles is a lengthy, bureaucratic and costly process. Therefore, in many cases property rights remain insecure. The absence of well documented, demarcated and permanent boundaries between land tenants often leads to conflicts. Especially in remote areas, like the Siul Reserve, where law enforcement and presence of government institutions is low, illegal extraction of firewood and grazing livestock is leading to massive forest degradation. Also, in and around the densely populated areas (Capitalska and Economiska) illegal land acquisition by poor internal migrants is a severe problem, resulting in social conflicts between the government and the communities.

Zentralistan is a country rich in biodiversity. It has a high concentration of species of flora and fauna. Zentralistan's government and international donors made first efforts to protect this ecological diver-sity by creating the National Park System (NPS) in 2002. The NPS includes different protected area categories, such as National Parks and Reserves. The two biggest protected areas are the Katakir Re-serve in Nishtak, and the Siul and the Tuklak Reserves in Egana. Representing 5% of the country's area, the NPS comprises only forested and mountainous areas. It does not include semi-desert or steppe ecosystems although a significant portion of the world's natural steppes are found within Zen-tralistan. Effectiveness of the NPS is still unsatisfactory due to institutional weakness, weak law en-forcement, lack of funding and low management capacity in the responsible institutions. Therefore, biodiversity in National Parks and reserves is often threatened by illegal wood extraction, deforesta-tion, hunting and invading cattle farming.

State policies often - accidentally - increase the pressure on Zentralistan's biodiversity and ecosys-tems, for example, subsidies for cotton production which worsen the land degradation problem; and subsidies for irrigation which promote an excessive use of water, leading to soil salinization and wa-ter-logging.

STEP 5
PREPARING BETTER DECISION-MAKING

Exercise 5: Applying economic valuation in Egana

The initiatives of the development committee exploring the linkages between the development plan and ecosystem services have prompted interest by several groups.

The National University of Zentralistan 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 Zentralistan Nature Conservancy (ZNC) wants to undertake an economic valuation to raise awareness on the contribution of remaining forests and grasslands to agriculture productivity and security. They want the Development Committee of Egana to reevaluate their policy for granting permits of land use change to promote cotton plantations.

- The Provincial Environment Unit and the Water Company plan to make an economic valuation to show how the purification costs associated with removing sediments and pollution in the Siul river can offset if better agricultural and livestock management practices are implemented up-stream, and water discharges regulations are enforced.

- The Farmers Association of Egana wants to apply economic valuation in order to prove that, in comparison to cotton, sustainable rice production can actually contribute to improve the provision of ecosystem services and provide additional benefits to the stakeholders in Egana. They have asked the Province Agricultural Development Unit for support, but still have not gotten an answer.

Your task:

Please discuss the following questions:

1. Which decision do you intend to influence with the results? Which types of results would you need?

2. Which decision-maker are you trying to reach? What type of information do you need to approach or influence the decision-maker (biophysical information, monetary figures, etc.)?

3. Which ecosystem services would you value?

4. Which economic valuation methods would you suggest using and what information/inputs would you need? Why did you choose those methods? Describe their advantages and disadvantages.

5. Can you identify possible risks associated with conducting an economic valuation?

6. Which other methods do you think could provide inputs to complement the economic valuation?

7. Can you think of other ways to highlight the value of ecosystems and ecosystem services?

Refer to the table in the Annex II to identify suitable methods. You can also access the ValuES methods navigator on-line (www.aboutvalues.net/method_navigator) to find information on methods, as well as the advantages and disadvantages of their application.

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 with recommendations on how to revise the content of Egana'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 steps 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.

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.

1. What needs to change? What are the related drivers (and underlying causes) that should be tackled?

2. Describe different policy options that you would implement. How easy or difficult it would be to implement them? You can discuss this by looking at the following criteria: relative ease of implementation, costs of implementation, stakeholders' acceptance, political context, risk of losing an opportunity, available resources, etc. Keep in mind that a mix of complementary policy options might be required.

3. Identify entry points to key decision-making processes.

4. Identify key stakeholders to be involved in the activities and those with whom you would need to communicate to make change effective.

5. 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
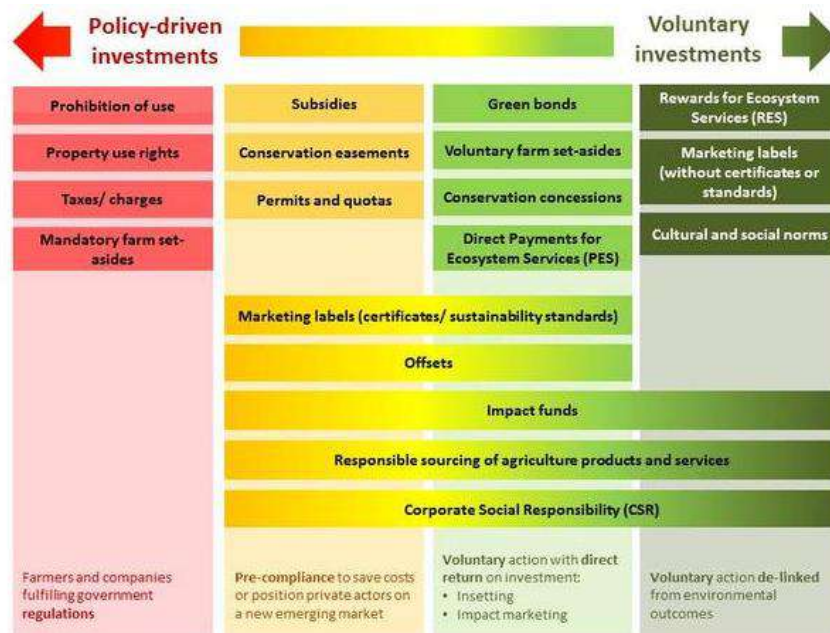
Source: taken from Garret et al. 2016

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

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 CO_2 equivalents (tCO_2e).

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

CATE-GORY	METHOD	ELEMENTS OF TEV	APPLICATION	STRENGTHS	LIMITATIONS
Market prices	Market prices	Direct & indirect use	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
Market prices	Substitute prices	Direct & indirect use	The market price of a close substitute for a naturally-occurring product (e.g. kerosene for fuelwood, roof tiles for thatching grass, purchased feed for pasture)	Market data readily available and robust	Limited to those ecosystem services for which a market substitute exists
Production function approach	Effect on Production	Indirect use	Value is inferred by considering the changes in quality and/or quantity of a marketed good that results from an ecosystem change (e.g. fisheries income resulting from improvements in water quality)	Market data readily available and robust	Data-intensive and data on changes in services and the impact on production often missing
Surrogate market approaches	Travel cost	Direct & indirect use	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 trips are made to multiple destinations or for multiple motivations.
Surrogate market approaches	Hedonic price	Direct & indirect use	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 approaches	Replacement costs	Direct & indirect use	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)		

CATE-GORY	METHOD	ELEMENTS OF TEV	APPLICATION	STRENGTHS	LIMITATIONS
	Damage costs avoided		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
	Mitigative & avertive expenditures		The costs of dealing with the effects of the loss of an ecosystem service, in terms of what has to be spent to remediate any negative impacts (e.g. costs of buying bottled water because of pollution, costss of food relief and resettlement of affected populations, costs of desilting a reservoir)		
Stated preference methods	Contingent valuation	Use & 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 experiments		People chose from a 'menu' of options with differing levels of ecosystem services and differing costs, e.g. policy decisions where a set of possible actions might result in different impacts on ecosystems.		
	Participatory economic valuation	All	Based on stakeholders' own participation, perceptions, preferences and categories of value. There is no fixed approach or method for participatory economic valuation, but PRA techniques often used.	Able to capture use and non-use values, not based on externally-imposed categories	May not be comparable between sites or contexts. Often cannot be monetised.
Benefit transfer methods	Benefits transfer	All	Transferring a value from studies already completed in another location and/or context (e.g. estimating the value of a forest using the calculated economic value of a different forest of a similar size and type)	Can reduce the need for primary valuation studies	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	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. Data collection spread over larger time frames allows for better capturing the entire spectrum of	May be time consuming and may require involving many people. Not representative of 'society' or 'culture' as a whole. Possible bias through misinterpretation of actions or missing information.
	Participant observation	Can be used to derive values by looking at people's behaviors 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. Analyzing these data sets will help to better understand the perspectives of community members.		
	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.		

APPROACH	METHOD	APPLICATION	ADVANTAGES	DISADVANTAGES
Ethnoecological Methods (Process of understanding how people conceptualize, value, and use their local environments.)			people's values and beliefs.	People may act or express themselves differently when being observed.
	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. Survey results can be compared and be used for statistical analysis. Values and preferences derived directly from (different) societal actors. Can capture different aspects of values, beliefs and preferences. Includes the perceptions of most relevant stakeholders if done thoroughly and ensuring representation of all involved parties.	Hypothetical situation, i.e. based on people's stories and perceptions. Several biases possible referring to the design of the questionnaire or interview (e.g. response bias, strategic bias, design bias). May require expert input. Getting a large and representative sample size may be time consuming. Can be "incomplete" or not representative of an entire culture or society.
	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.		
	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.		
	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.		
	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.		
	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.		
	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.		

APPROACH	METHOD	APPLICATION	ADVANTAGES	DISADVANTAGES
Geographic Methods (Identify and map ES relevant information spatially.)	GIS and Remote Sensing	Geo-Information Systems (GIS) analyze 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. Easy to understand due to visual output. Promotes ownership amongst a community or group of stakeholders. Visual output that can be used to influence decision-making processes. High flexibility, questions can be adapted to specific local conditions or information needs. Provides insights into the overall value of ecosystem services at a specific site.	Can be expensive and time consuming. 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. Can be "incomplete" or not representative of an entire society or culture. Difference in opinions can be difficult to reflect in a 'final output". May not capture complexity of the situation. Can require extensive knowledge and expertise. Difficult to assess all ecosystem services spatially.
	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.		
	Protected Area Benefits Assessment Tool – PABAT	The Protected Areas Benefits Assessment Tool (PA-BAT) 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.		
	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.		

APPROACH	METHOD	APPLICATION	ADVANTAGES	DISADVANTAGES
	Participatory Rural Appraisal	Participatory Rural Appraisal (PRA) offers various tools for practitioners, government officials and community members to jointly analyze 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.		
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. Allows exploring past and present tendencies and preferences.	Results may not be representative of 'society' or 'culture' as a whole, but rather of individual stakeholder groups or organizations. May be time consuming.
	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 regard 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.		
	Media Analysis	Media (newspaper, TV channels) and social media outputs are analyzed 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. Allows for weighing and judging different options. Can help in decision-making processes.	The way information is presented may cause a bias in responses. Difficult to present all information and capture complexity correctly. Can be time consuming. Results can be highly influenced by individuals with a stronger voice.
	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.		
	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 develop-		

APPROACH	METHOD	APPLICATION	ADVANTAGES	DISADVANTAGES
		ment. 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.	Ensures public acceptance and local / regional relevancy of results.

Allows exploring different scenarios and their implications.

Can help create awareness. | Due to complexity of ecosystems, it is difficult to create comprehensive and realistic scenarios for the future in terms of ES supply and demand. |
	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.		
	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'.		
	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.		

ValuES