ValuES

ValuES – Integrating Ecosystem Services into Policy, Planning and Practice

ValuES Project Report:

Analysis of 19 ecosystem service assessments for different purposes

Insights from practical experience

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ValuES promotes the integration of ecosystem services into policy, planning and practice, by providing materials, developing trainings, advising and supporting assessment processes, and by doing research.

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Executive summary

As part of the project 'ValuES – Integrating Ecosystem Services into Policy, Planning and Practice' 19 processes of ecosystem service assessment used in diverse socio-economic contexts and policy settings were identified and analysed.

This case study analysis describes experiences on the ground with ecosystem service assessments and the way they are used in decision making processes. The overall aim was to better understand the role of such assessments and to distil lessons in relation to their effectiveness in supporting policy change and environmental decision making. This document reports on these lessons learned.

Key lessons from the ValuES analysis of ecosystem service assessments

- **Assessment purpose:** Assessing ecosystem services can be done for different purposes. They range from raising general awareness to supporting specific planning or decision making. ValuES has identified 6 distinct types of applications for which different recommendations apply. It is necessary early on to achieve clarity about the issue at stake, the intended outcome of the assessment, and the audience being addressed. Only then can assessments be designed to effectively serve these purposes. In practice, there is no one-size-fits-all-approach to assessments.

- **Assessment context:** To assess ecosystem services meaningfully it is crucial to understand the context, i.e. the 'supply side' (the ecosystem) and the 'demand side' (the socio-economic, cultural and political system). This can require additional specialist knowledge, e.g. about cultural norms, legal issues and policy instruments. Understanding this context helps the analyst to ask the right assessment questions; and also the results need to be interpreted in context.

- **Choice of method:** Different methods generate different results because they represent different perspectives or focus on different factors. This being so, assessments always shape values, even if their main aim is to measure them. For relevant and credible results, it is necessary to choose an appropriate method. This means to select an approach (e.g. qualitative, quantitative, or monetary valuation) and to strike a balance in assessment design between costs, quickness, robustness and detail of findings. More demanding methods do not per se produce more useful results.

- **Connection with policy process:** An assessment can produce much-needed information, but doing an assessment is unlikely on its own to change policy processes or decisions. Engaging key stakeholders early on and strategically gearing the assessment to a political entry point enhances its potential policy impact. This can require significant efforts. However, in some cases, the (participatory) assessment process itself has been just as important for leveraging policy change as the assessment results.

1. Introduction

Ecosystem service assessments are often thought to provide effective guidance for policy and management if they build on sound standards of science. In GIZ's training courses on ecosystem services and in TEEB related workshops, participants have frequently suggested: 'Let us first have an ecosystem service assessment done, and then we can identify the problem and see what needs to be done'. In the ValuES project we found that this approach is rarely effective.

A general assessment or valuation of ecosystem services may in some instances be useful for a situation analysis. But beyond that it becomes difficult to follow a blueprint. There are dozens of methods, models and metrics available for studying ecosystem services in different ways (for an overview see the ValuES Methods Navigator). Hence, two assessment designs can – technically speaking – be equally plausible and robust and yet deliver hugely divergent results. So, which one to take?

Besides controversies about the virtue or appropriateness of monetary valuation, there are difficult questions to be asked about all kinds of assessment approaches: How should an ecosystem service be described? What kind of value do I want to articulate? Should my assessment speak of environmental change in terms of number of persons affected, number of hectares, number of jobs, amount of public costs, changes in public opinion, or changes in a composite vulnerability index?

Such questions cannot be decided upon by methodological convention. They should depend on the case in question. The task of deciding which questions to focus on, which methods to use and how to use them is a trans-disciplinary one. It should be assumed jointly by both the providers and users of ecosystem service information.

Our intention for this analysis of 19 ecosystem service assessments is to raise awareness about the diversity of issues relating to design and process of ecosystem service assessments. Instead of standardized assessment approaches, what merits attention is case-specific planning and a management of assessments that is responsive to the political situation within which they are being conducted.

Section 2 describes the methodology. After an overview of the case studies analysed by ValuES and of six different categories of practical purposes for which assessments have been conducted (Sections 3 and 4). For each of the six purposes, we then provide examples and recommendations regarding assessment design and assessment process (Section 5). Finally, four key issues are discussed which seem to play a crucial role across diverse settings in terms of the policy impact of ecosystem service assessments (Section 6). The Annex provides a more detailed overview of the cases, a full description of which can be found here.

2. Methodology

The cases we looked at were selected from the TEEB case collection, from personal contacts with people involved in conducting ecosystem service assessments, from partners of the ValuES project, and from the authors' own involvement in assessments. The principal criteria for shortlisting 'candidate cases' were:

- Evidence of a 'practical' (i.e. not primarily academic) interest in using results for policy or public management.
- Broad range of geographical, socio-economic and political contexts.
- Local, regional and national policy levels covered.
- Broad range of applications or practical purposes for which the assessment had been conducted.
- Access to first-hand information about the assessment processes, so as to obtain insights beyond their formal presentations.
- Case studies not older than 10 years.

Applying a qualitative approach, we reviewed project documents and conducted semi-structured interviews with those involved in the different assessment processes, or developed the case descriptions from our own experience. For some cases, we asked the practitioners involved to provide in-depth descriptions according to a template. Draft case descriptions were then submitted to the interviewees and sometimes to other stakeholders involved for comments and corrections.

This qualitative research design enables us to explore and present a broad range of different contexts, purposes and applications; this does not, however, constitute a representative description of different assessment types.

3. Case studies analysed by ValuES

The following table indicates the policy areas and assessment approaches for each case analysed. The full case study descriptions can be found here.

Table: Overview of 19 ecosystem service assessment processes analysed by ValuES

Case study of ES Assessment	Policy Area(s)	Assessment Approach/ Methodological Focus
Cost-benefit-analysis of the Bala dam proposal, Bolivia: Using economics to better show the overall expected impacts of a large infrastructure project.	Infrastructure	CBA with monetary value estimates of various ecosystem services
Investing in Cape Town's green spaces, South Africa: A strong `business case' for maintaining the city's natural environment	Nature conservation and protected areas	Return on investment with monetary value estimates of various ecosystem services
Rewarding farmers for reducing sedimentation, Indonesia: Farmers adapt and diversify land use, based on PES scheme with hydropower company in Sumberjaya	Water resources/ agriculture, forestry	Biophysical assessment of changes in sediment load
Budget motivations for NRM programmes, South Africa: Annual reports with diverse data & arguments about ecosystem services justify budget for Natural Resource Management (NRM)	Nature, conservation / Water	Multiple methods and metrics for describing various ecosystem services
Protecting mangroves for local benefit, Philippines: Workshop with stakeholders and scientists on mangrove loss (aquaculture) convinces local policy makers	Climate change and disaster risk reduction	Participatory valuation workshop with emphasis on economic metrics
Assessing climate benefits of peatland rewetting, Germany: Estimates of greenhouse gas emission reductions for issuing carbon certificates	Nature conservation, climate change	Biophysical assessment of GHG emission reductions from soils

Economic assessment of Namibia's protected areas: Showing their contribution to the country's socio-economic development	Nature conservation and protected areas	Monetary value estimates of various ecosystem services
Combining flood protection and habitat restoration, USA: Using cost-benefit analysis, including ecosystem services, to identify best management option	Infrastructure/ Climate change and DRR	CBA with monetary value estimates of various ecosystem services
Optimizing entrance fees for Tanzania's national parks: Analysis of the elasticity of tourism demand to improve income streams to parks	Nature conservation	Economic analysis based on visitor survey and other data
Local ranking of importance of watershed services, Colombia: Consulting land users on different ecosystem services for watershed management planning	Water resources/ Nature conservation	Participatory valuation workshops with emphasis on local appreciation and dependence of livelihoods on ecosystem services
Participatory feasibility assessment leads to water- PES, Colombia: Stakeholders engage in multiple workshops to finally agree on catchment protection	Water resources, agriculture, forestry	A series of consultations and workshops for joint analysis of the issue, of diverse data and of possible solutions
Integrated assessment of land-use options in Malawi: Weighing up the costs and benefits of ecosystem-based adaptation to climate change	Agriculture, forestry or fisheries/ Climate change and DRR	Economic analysis, including CBA, with emphasis on livelihoods
Intact ecosystems constitute robust water infrastructure, Mongolia: Study justifies improved investment in conserving watersheds for capital city.	Water resources / Economic dev. and planning	Comparison of land-useand conservation options in watershed and their economic impacts
Communicating the value of Montenegro's National Parks: Raising policy makers' awareness with a fresh view on protected areas	Nature conservation	Monetary value estimates of various ecosystem services
Enhancing regional tourism demand, Bolivia: Modelling tourists' choices in Pilón Lajas Reserve and Indigenous Territory	Nature conservation/ Economic dev. and planning	Economic modelling
Aral Sea Wetland Restoration Strategy, Uzbekistan: A participatory process, with a focus on ecosystem services included	Economic development/ Water	Multi-criteria analysis with multiple data

West Nile Delta Irrigation Rehabilitation Project, Egypt: Considering ecosystem services in a Strategic Environmental Assessment (SEA)	Infrastructure/ Economic dev. and planning/ Water	Biophysical data of ecosystem services and potential changes
Multi-Criteria-Analysis in regional planning, Mexico: Understanding competing environmental needs and related conflicts in Baja California	Economic dev. and planning	Stakeholder workshops for multi-criteria analysis with multiple data
The value of insect pollinators in Himachal Pradesh, India: Describing the role of insect pollinators to improve apple farming practices	Agriculture, forestry	Economic and biophysical data in a combined 'bio-economic' approach

4. Assessment purposes identified by ValuES

What are typical reasons for conducting an assessment and/or what are typical uses of assessment results? Better informed decision making and increased awareness about Nature's importance for human well-being are generic objectives for assessing ecosystem services.

More specific applications include e.g. making the case for a policy option (e.g. questioning the size of a projected new dam by examining its environmental consequences, as in the case of Bala Dam, Bolivia); supporting planning processes (as e.g. in the Aral Sea wetland restoration strategy, Uzbekistan); refining policy instruments (e.g. reforming the PA entrance fee system, as in the Tanzanian case), determining compensation payments, e.g. for litigation in court cases or for PES schemes (as e.g. in the Ranchería river basin, Colombia).

Other applications are conceivable as well. These include providing guidance for development assistance: the ES perspective can offer key insights for development efforts, forging a link between concerns for environment, climate, land use and poverty alleviation (as e.g. in the integrated assessment for climate smart agriculture in Malawi). An ES assessment may also assist in tackling conflict and environmental justice: the ES concept can identify whether and where projects and programmes have side effects and negative social impacts. In the Mexican case, an obligatory planning process was used to examine where there are competing needs for ecosystem services, so as to anticipate future conflict and develop sustainable arrangements with stakeholders.

The following table gives an overview of 6 broad categories of purposes or policy applications; most ecosystem service assessments fit within one (or sometimes more) of these categories.[1] They are presented with example research questions which illustrate the diverse emphases and directions an assessment can take:

Table: Overview of 6 assessment purposes identified by ValuES

Purpose of assessment	Example assessment question for this purpose	Case study
1. Undertaking scoping and situation analysis	What is the state of ecosystem services, what values and stakeholders are associated with them?	Participatory feasibility assessment leads to water PES, Colombia: Stakeholders engage in multiple workshops to finally agree on catchment protection
2. Enhancing environmental awareness or advocating for a policy option	How can information on ecosystem service provision and impacts be used to "make the case" for a specific policy option?	Protecting mangroves for local benefits, Philippines: Workshop with stakeholders and scientists on mangrove loss (aquaculture) convinces local policy makers to restrict shrimp farming
3. Comparing alternative policies, programmes and projects	How do alternatives differ in terms of the ecosystem service gains and losses they give rise to?	Combining flood protection and habitat restoration, USA: Using cost-benefit analysis, including ecosystem services, to identify best management option
4. Identifying livelihood, development and investment opportunities	What new or improved economic opportunities can be developed based on the conservation and sustainable use of ecosystem services?	The value of insect pollinators in Himachal Pradesh, India: Describing the role of insect pollinators to improve apple farming practices
5. Designing environmental policy instruments, including incentives, regulations and monitoring	Which information about ecosystem services allows us to design more effective, equitable and sustainable environmental policy instruments?	Assessing climate benefits of peatland rewetting, Germany: Estimates of greenhouse gas emission reductions for issuing carbon certificates
6. Tackling environmental conflicts	How can a focus on ecosystem services provide credible information about environmental change to assist in resolving conflicts?	Multi-criteria analysis in regional planning, Mexico: Understanding competing environmental needs and related conflicts in Baja California

[1] For another categorisation see for example: Billé et al. 2012

5. Findings and recommendations for each purpose

Given the broad spectrum of different purposes or practical applications for which ecosystem service assessments can be conducted, what does this imply for doing an assessment? It seems plausible that different purposes imply different requirements in terms of assessment design and assessment process.

In this section we present the findings and recommendations from our analysis of cases for each purpose. To do so, we also draw from our experience with conducting ES assessments and from our exchange with (potential) users of such assessments in workshops and training events (cf. Section 2 on Methodology). The full list of recommendations for each purpose can be found in the 'Top Tips' section, Step 3 of the ValuES Methods Navigator.

5.1 Purpose 1: Undertaking scoping and situation analysis

Conducting a scoping exercise or situation analysis is helpful for establishing an initial overview of ecosystem services, their current status, relative importance and the way they are likely to develop in the future. Scoping refers to starting off with a wide view and then narrowing down, initially including all ecosystem services – biophysical aspects of ecosystem services as well as linkages between ecosystem services and the socio-economy – and stakeholders in order to get an idea of the "bigger picture" conditions before honing in on the more critical issues.

Scoping can provide vital direction, e.g. for the questions to be addressed in a planning process and/or for identifying the focus and the methods to be used in a scheduled assessment. Scoping helps to integrate assessments into their policy context.

Scoping helps target scarce assessment resources. In some cases, the scoping itself has provided sufficient insights for informing policy and decision making – for that reason it is mentioned here as an application on its own (rather than as a first step in other types of assessments, which it can of course also be).

The scoping exercise or situation analysis provides an opportunity to consider not just "technical" issues and topics, but also to develop reliable stakeholder engagement for the subsequent assessment.

Study design issues:

- Screening the situation with regard to key actors, their relations and relative positions (e.g. in terms of resources, knowledge, influence, dependence) is often a suitable starting point for any further analysis.
- For screening ecosystem services it is useful to start off by going through the full list of services, checking for each their probable relevance based on available knowledge, data, and experience.

- Expert interviews, stakeholder consultations and focus groups are tools for gaining a rapid insight into critical issues and their relative importance – they also help determine what data to look for and where to find it.
- Rather than quantifications of current status, it is the analysis of linkages between ecosystem services and the socio-economic and cultural system which are useful for understanding the dynamics that shape the situation. This can be further examined using a trade-off analysis.
- Use of locally meaningful terms facilitates consultation with (local) experts who have the relevant insights and judgement capabilities but are rarely familiar with the ecosystem service concept and terminology.
- Early consultation with experts from outside the environmental domain provides important additional insights and can thereby prevent an overly narrow approach to the study.

Study process issues:

- A flexible approach and an 'open mind' during the early phase make it possible to identify the critical issues, which can then be explored in more detail in the analysis.
- Discussion with peers and colleagues is a good start, to be followed by involving other experts and key stakeholders, especially those affected by ES changes.
- If stakeholders are consulted bilaterally first, their inputs will typically be less strategic than in group settings; also, their interests will be clearer to those conducting the study, which is critical when it comes to managing expectations.

Example:

In Tunisia, an analysis was conducted of the various ecosystem services provided by the country's forests to the local population. The study focused generally on the forests' benefits and their distribution. This information was then reviewed in the light of national and sector development plans and programmes. The analysis indicated a need to reform rural policies and forest management. It revealed that the non-marketed services provided by forests, such as erosion control and stable access to water, which are important to local livelihoods, are not considered adequately in the government's plans.

5.2 Purpose 2: Enhancing environmental awareness or advocating for/against a policy option

In a situation of planned infrastructure development or when the need arises to source new conservation funding, information on ecosystem services provision and impacts may be the basis for raising awareness about or for "making a case" for the environment.

As in any situation that requires advocacy, it is essential to devise an advocacy strategy carefully, i.e. to

clarify what type of arguments to present, to whom, in which format, and when. Once the strategy is clear, it is highly advisable to engage with communications professionals wherever possible. Scientists and technical experts are not always the best people to deliver environmental messages and arguments. However, in order to target the right audience with the appropriate messages, communications experts need to be guided by strategic decisions regarding advocacy.

High credibility of the study results is essential for making a case. This can be done by means of e.g. explaining assumptions, documenting the study process, referring to widely accepted frameworks, making conservative claims/estimates in cases of doubt, and conducting a sensitivity-analysis for uncertain input variables, Further options include pointing to the study's shortcomings, drawing only conclusions which can actually be substantiated by the study, and having other scientists review or crosscheck results. Strong arguments become very weak if an assessment's credibility can be called into question.

Study design issues:

- The assessment serves to substantiate and back up arguments. Message, argument and evidence should be considered together. The message draws on the argument(s) which in turn build on the evidence produced by the assessment. The assessment design should follow this logic.
- Often, a case needs to be made more than once and to different stakeholders. Thus a broad and flexible study approach is advisable, which can respond to advocacy needs.
- When diverse output metrics are considered from the start, Nature's benefits can be expressed in a way that strikes a chord with decision makers, rather than merely using dollar estimates or biophysical units. Sometimes, other arguments may be more effective for advocacy purposes than those relating to ecosystem services: if, for example, you can use hard data to show that the return on investment in an ill-conceived public infrastructure project will be very low even if the significant environmental harm is not considered, then use this argument by itself.
- Using disaggregated results (e.g. how different ecosystem services provide benefits for different groups) rather than aggregate values (e.g. total economic value) reveals what lies behind the numbers and can help to make a transparent and more convincing case.

Study process issues:

- To frame and communicate a study's results so that selected key people are motivated to pay attention to them is a strategic decision. Alternatively, a study can be communicated widely from the start in order to build public pressure on decision makers.
- Teaming up with partners and forming alliances usually strengthens a case.
- In some cases it is desirable to get a "champion" on board to present arguments – someone who has credibility and authority with the target audience to be influenced.
- A challenge is to strike the right balance of being cautious yet convincing. Organising a peer-review process of the assessment can help find that balance.

- Timing the release of key results to maximise the chances of success can pay dividends. For example, when making the case for increased budget allocations for conservation, it helps to understand the budget allocation cycle and release results when decision makers are most likely to be receptive.

Examples:

In Bolivia, a cost-benefit analysis was conducted to assess the planned Bala Dam, which was mainly to be used for hydroelectric power generation. Cost-benefit analysis was chosen to make the case because it is a widely accepted framework. Despite time pressure and relatively poor data availability, conservative estimates of investment costs, likely returns and environmental harm (along with an associated loss of natural assets and livelihoods) were sufficient to raise questions about the project's validity. The study team opted for a public campaign and channelled the study results into the country's national media, which served to raise awareness among representatives of the government. Subsequent bilateral talks with policy makers led to the proposal being revised.

In Cape Town, South Africa, the Environmental Management department of the City of Cape Town decided to conduct an assessment for the purpose of developing a business case for increased investments in conservation of the city's natural assets. The aim was to influence municipal budget allocations to conservation activities. The assessment process included broad initial consultations with other city departments as a means of scoping the study.

The assessment results were communicated professionally at a later stage. Even though the study did not achieve the hoped-for impact – the budget was not immediately increased – the initial consultations and the joint development of the business case increased the finance department's recognition of 'natural capital' as an important city asset. This recognition now facilitates the ongoing search for new funding sources by an interdepartmental working group.

5.3 Purpose 3: Comparing options for planning and development

When planning for development, energy, agricultural extension, large infrastructure projects, etc., information on how the options depend or impact on ecosystem services can substantially enhance the knowledge base for a decision. The focus on ecosystem services is particularly suitable here, because it considers environmental change explicitly in terms of 'impact on society', highlighting a range of possible benefits or losses and pinpointing side-effects which may have been hitherto side-lined.

There are several well-established procedures for comparing options for planning and development, such as cost-benefit analysis or multi-criteria analysis (MCA). Strategic environmental assessments or environmental impact assessments are often required to identify and mitigate the impacts of planned investment programmes or projects. As information about ecosystem services combines a biophysical perspective (service provision) with a socio-economic perspective (service demand or appreciation), it requires careful reflection and stakeholder agreement about where and how to include these (additional) variables in a planning or MCA exercise.

Study design issues:

- Small-scale and specific analyses may be of more use than complete assessments that mainly reiterate what is already known – this is always valid but particularly relevant for this purpose.
- A comparison of alternative options is best served by assessing marginal changes and not average changes or values.
- This purpose often involves comparing scenarios about possible future developments. Developing and agreeing on the scenarios to consider is a critical exercise, because assessment results can only be as good as the scenarios they build on.
- Availability and distribution are both important. Two different options may provide the same quantity of an ecosystem service, but they may differ in the way this is distributed among the beneficiaries. This is especially critical with regard to (poorer) population groups who depend directly on ecosystem services for their subsistence.
- The use of frameworks, methods and units that are widely recognised and with which decision makers feel comfortable is helpful when considering ecosystem services information, i.e. methods that cannot be argued against on technical grounds. However, results obtained using sophisticated methods may also be rejected by stakeholders as coming out of a 'black box'.

Study process issues:

- Care should be taken to ensure that feasible alternatives and realistic scenarios are acceptable to all key stakeholders prior to undertaking the assessment.
- Assessments need to take account of the formal procedures applied in many planning and public project approval procedures, so as to be (formally) considered in the decision making process.

Examples:

In Egypt the World Bank took the initiative to instigate a strategic environmental assessment (SEA) at the earliest phase of planning in order to compare different investment options. The aim was to discover the potential consequences of this large investment programme before any major decision was taken on technical design, magnitude of measures or institutional setup. The SEA was based on an ecosystem services assessment to identify the direct and remote stakeholders potentially affected by changes in the water system. Through this approach environmental and social issues beyond the boundaries of the project area were incorporated into the design process, resulting in a significant limitation of the size and scale of the initial pilot activities.

In Seattle, USA the area surrounding the confluence of the northern and southern tributaries of Thornton Creek experiences storm water-related flooding more often than other areas. Seattle Public Utilities, the agency responsible for the area, decided to look into various options to decrease disturbances such as road closures due to flooding. A cost-benefit analysis that incorporated ecosystem service values proposed that an option which balances the economic, environmental and social benefits gained from the project should be pursued. The option selected focuses on reducing peak flows and providing habitat and floodplain restoration.

5.4 Purpose 4: Identifying livelihood, development and investment opportunities

An ecosystem services perspective may help to identify new or improved livelihood, development or investment opportunities. However, the value added from adopting an "ecosystem services" approach or focus in livelihood, development and investment activities needs to be considered carefully.

High ecosystem values cannot always be captured and turned into income streams. While ecosystem assessments can help in identifying or describing potential opportunities, typically only a small proportion of these can actually be operationalised.

People's current livelihood, development and investment activities should be the starting point for devising any new strategies. This includes investigating both the barriers and constraints that prevent or discourage them from taking up new economic activities, as well as the incentives and opportunities that exist for development. Many of these incentives are also related to cultural and social values which remain hidden in many assessments.

Study design issues:

- The study design should include a range of biophysical and socio-economic data, combined with expert judgment to adequately describe potential opportunities.
- The assessment should include requirements of implementation concerning time, resources and expertise from both the intended beneficiaries as well as from external supporters and investors.
- There are almost always distributive issues involved in taking up new livelihood, development or investment opportunities; for this reason it is important to include additional checks in the assessment: are the proposed activities viable and attractive to the intended beneficiaries?

Study process issues:

- If stakeholders are consulted bilaterally first, their inputs will typically be less strategic than in group settings; also, their interests will be clearer to those conducting the study, which is critical when it comes to managing expectations.
- "Non-environmental" experts and agencies may be important sources of information. They can help explore the potential and requirements to be considered at the start of designing an ecosystem services assessment.
- The following widely shared assumptions may be wrong: introducing new economic opportunities will automatically (i) replace or be a substitute for environmentally unsustainable activities, (ii) reduce pressure on natural ecosystems, or (iii) serve as incentives for conservation. Considerable efforts are therefore needed in relation to transition management and implementation, along with a clear understanding of incentive structures.

Examples:

In Malawi, the government's Department of Forestry and Department of Land Resources Conservation commissioned an integrated assessment of land use investment options for climate change adaptation and mitigation (IALUO). Of necessity, the assessment was a multidisciplinary process involving various thematic components. The ecosystem services valuation component provided overwhelming evidence that a failure to invest in sustainable land management would result in significant costs to the Malawian economy and population. Appropriate investments were shown to have the potential to counterbalance these costs and generate significant gains for smallholder farmers, downstream water users and other ecosystem service beneficiaries.

In India, apple farming plays a major role in the regional economy, which is highly dependent on insect pollination. The application of a bio-economic approach, focused on the production dependence ratio on pollinators, increased awareness among farmers. A regional study estimated that the annual economic value of insect pollinators to agricultural productivity for the major crops cultivated in the state of Himachal Pradesh was USD 365 million. When stakeholders realized how important pollination is to the regional economy, this led to the development of (private) pollination enterprises and (public) extension services, and ultimately enhanced apple farming practices.

5.5 Purpose 5: Designing environmental policy instruments, including incentives, regulations, and monitoring

Ecosystem services assessments can play a role in identifying and designing policy instruments and incentives. Taking account of information on ecosystem service flows, their distribution and their costs may enable us to design more effective, equitable and sustainable environmental policy instruments. This also includes developing meaningful and cost-effective monitoring and evaluation systems. By illustrating how changes in ecosystem service provision affect the well-being or even economic values (damage, benefits, etc.) for relevant stakeholder groups, ecosystem service assessments can demonstrate the need for new policy instruments or evaluate proposals for different instruments. Determining opportunity costs is frequently useful when the economic instrument (e.g., a PES scheme) involves motivating providers of ecosystem services to forego economically more beneficial activities (e.g., monoculture land use, pesticide use, exploitation of forest resources, over-fishing, etc.). Knowing opportunity costs can help understand the barriers to participation in the economic instrument and how to motivate actors to participate. In some cases, this motivation may involve economic payments, in which case the opportunity costs can provide a basis for the decision on appropriate amounts to be paid.

Policy instruments can change rights. Rules on ecosystem services can be geared toward those whose activities impact upon them ('polluters'), those who deliver them ('providers') or those who benefit from them ('beneficiaries').

Thus, many aspects matter when designing a new policy instrument (e.g. a new PES scheme) for ecosystem services. One may need to know: who has which rights to them? How are they currently

being used, and why? How will the instrument function in the current governance structure? What are the changes which the instrument will probably bring about? What are the impacts and side-effects of these changes?

Study design issues:

- Before focussing on a single instrument, it is worthwhile considering a range of possible solutions (e.g. a new regulation, a voluntary contract (PES), a new programme) to see which one generates the most desirable results in terms of ecosystem service flows, their distribution, their costs, etc.
- In view of the policy instruments that can potentially be applied (e.g. new regulation, revised assistance programme, new PES, etc.) the respective information needs should be clarified in detail, e.g. those relating to the target group, the behaviour pattern to be changed, the incentive structures supporting current behaviour.
- Information can be very specific to meet policy instrument design needs: e.g. ecological carrying capacity, price elasticity, socio-cultural feasibility related to single or various ecosystem services.
- Expertise from various backgrounds: e.g. legal/administrative, statistical, land use will be necessary to design a new policy instrument.

Study process issues:

- From the beginning the implementation should be considered: How can the instrument(s) identified be put in place, given the existing governance structure, communications, capacity building, costs and timing.
- De-facto interplay between instruments is what counts (policy mixes) rather than the isolated performance of a single instrument. For this it is helpful to build on the existing suite of instruments and regulations, and to 'field test' innovations.
- Monitoring: It is often very difficult to attribute ecosystem service change to the programme, policy or activity that you are monitoring.

Example:

In Colombia, a Payment for Ecosystem Services (PES) scheme had been one recommendation to implement a watershed management plan. The setting was characterized by high social inequality and ethnic fragmentation combined with competing needs over scarce water resources. In a series of stakeholder workshops and meetings with different combinations of participants, the advantages and disadvantages of a PES scheme for the different stakeholders were explored and a solution negotiated. The ecosystem services perspective served as a common framework, while the process was critical for promoting a shared understanding and a common interest in finding a solution.

5.6 Purpose 6: Tackling environmental conflicts

Choosing the right assessment approach for this purpose is a difficult task. Information on ecosystem services can be used as 'ammunition' in conflicts, or it can provide new space for finding compromises. In other words, assessments can support conflict resolution – or they may backfire. Their design needs to be crosschecked for any possible impacts the expected results may have on the conflict.

It is therefore essential to clarify the respective role/mandate of an assessment team within the conflict resolution process and to identify appropriate entry points for to initiating an assessment.

Throughout the process it is advisable to maintain sensitivity toward the dynamics of a conflict. Participatory methods for assessing ecosystem services can be useful for enhancing a shared understanding of the issues and of each other's positions. But they may also fuel conflicts by creating an additional public arena for the struggle. Depending on the situation, participatory assessments should be subordinated to the social process of conflict mediation – not vice versa.

Study design issues:

- The way an assessment is designed will determine the extent to which misinterpretations can occur; the more explicit and precise the mode of assessment, the less it lends itself to misinterpretations. In addition to the conclusions drawn, it may be helpful to state explicitly what other conclusions cannot be drawn from the assessment results.
- The focus on distributive effects requires precise assessment at the right level of detail, so as to capture (sub-) groups and to distinguish between them at a level appropriate for tackling the conflict.

Study process issues:

- Agreeing with the contesting parties on assessment design can significantly enhance acceptability of the results. In other situations, e.g. in cases of litigation, maintaining a distance from the conflicting parties and resorting to formal procedures and formally recognized methods are appropriate means of securing acceptability and credibility.
- The aim of a study process should not be to replace conflict resolution mechanisms but rather to be compatible with them (e.g. with regard to timing or the documentation of opposing views).
- If assessments are done to determine compensation payments in cases of judicial litigation, compliance with formal procedures is indispensable.
- Potentially underlying value conflicts may hamper attempts to resolve issue-based environmental conflicts. Recognizing and identifying the difference between positions and underlying interests, needs and values is critical.

Example:

In Mexico, the legal requirement to develop and implement regulations to ensure the sustainable use of land and resources was the starting point for an intensive participatory environmental regulation process. The Federal Ministry of Environment and Natural Resources involved all the relevant stakeholders at regional level where several sectors were competing with each other.

The application of the ecosystem services concept and a dynamic modelling approach revealed the existing environmental conflicts and trade-offs through different scenarios. The results of the process were used to propose regulations that would minimize the environmental conflicts and promote the sustainable use of natural resources within the region.

6. Analysis of key issues for policy impact

In the following, four aspects, which emerged from the case study analysis, will be further discussed. They appear as key issues across the various purposes for assessments to unfold policy impact or support decision making.

6.1 Alignment with assessment purpose

Successful assessments aimed at supporting policy change or decision making are designed in alignment with the intended use of the study's results. No one would want to do a study which does not meet its aims. The reason why we emphasize alignment with purpose is the following: The purposes described above are highly diverse; scientific standards of assessment or methodological conventions for putting a monetary value on ecosystem services may not reflect such diversity.

If assessment purposes differ significantly, then 'one-size-fits-all' assessments are not the best answer, even if they are of high scientific quality. This is because sophisticated studies require time, good data and a high level of expertise – scarce resources in many assessment settings; focussing on what is most useful in each situation is therefore crucial. This is not to say that if there isn't time, data and expertise, the quality is necessarily poor; assessments conducted in these conditions may also be very good, for example, if well-applied consultation techniques deliver new insights which are then processed wisely and carefully. The point is that 'high quality' should mean 'being appropriate to the context and needs' rather than 'fulfilling criteria for scientific studies irrespective of their relevance to the actual situation'.

Furthermore, from training workshops and involvement in some of these (and other) assessments we can conclude: Those commissioning an assessment are rarely aware of the considerable room for manoeuvre when it comes to specifying its terms of reference; consequently, they remain unaware of their options and of their responsibility for making the assessment meet their needs.

Following guidance on methods or on assessing ecosystem services more generally (e.g. the UK government's guidance for administrators or the ecosystem-based management tools network) can ensure the overall quality and acceptability of assessment results. However, such valuable guidance cannot replace careful planning and reflection on what would be an appropriate study design in a specific situation. For example, should we examine 2-3 ecosystem services thoroughly to produce precise and detailed estimates regarding their possible future changes or should we instead use the same amount of funding and time to examine 10 or more services in less depth?

Or, again, can we apply data sets from other contexts to achieve a convincing result, or does the practical need for this assessment require field measurements, stakeholder interviews and the like in order to learn what actually needs to be known? The purpose and context of an assessment should shape the answer to such questions – as well as available time, resources and capacity.

Therefore, standards and guidance for the proper use of a method give insufficient orientation for assessment design. And relying solely on technical experts to draft e.g. the terms of reference implies potentially foregoing the chance of devising a well-targeted assessment.

Aligning the assessment with its purpose is essentially a strategic exercise. It is necessary to gain clarity early on about the issue and the audience that is being addressed and about the intended outcome. For example, when the issue is clear, as e.g. in the case of a funding shortage for conserving Cape Town's urban biodiversity, the study team can work backwards by asking: what kind of change do we want to see happen? How can a study contribute? What information does this require? Who needs to be involved? What do we already know, and which knowledge gaps should be addressed by the assessment? Which study questions are suitable to do so?

Once (initial) answers to these questions have been found, the assessment can be designed (including the choice of methods) and the study process can be planned. In more open situations, i.e. where the intended policy change is still to be determined, iterative screening and scoping sessions (Purpose 1) are helpful, with sufficient flexibility to adapt the next steps of an assessment to new insights gained along the way. This requires important efforts **prior** to finalizing any terms of reference for an assessment. Such terms of reference may therefore become clear in the middle of the overall assessment process, rather than at its beginning.

For guidance on clarifying such questions, see e.g. the stepwise approach we recommend and use in ValuES.

6.2 Consideration of assessment context

Assessments need to be based on a thorough understanding of the situation. In order to meaningfully assess ecosystem services it is crucial to understand the context. Being aware of this context helps the case study analyst to ask the right questions and interpret the results more easily. Often, such contextual knowledge is also required to apply the assessment methods correctly.

At times, eco-systemic processes and biophysical cause-effect relations can be assessed by experts without measurements or field visits. But this is only part of the story. Assessing ecosystem services is about jointly considering the 'supply side' (the ecosystem) and the 'demand side' (the socio-economic and cultural system). For this, the perspectives and insights from stakeholders are often indispensable.

In the case of the Curubital sub-basin in Colombia, previous watershed management had sought to secure water supplies to the city of Bogotá, but protection measures had also caused conflicts with the resident rural population. Among the reasons was the growing need for arable land due to population increases and market opportunities. In order to bring the management plan up to date, land users were asked to describe (and later rank) the various benefits gained from different landscape types in the sub-basin according to the importance they attribute to them.

This made it possible to consider local demand for and appreciation of a range of benefits as part of proposals for new restoration areas in the watershed. What had previously been considered 'contextual aspects' by watershed planners became a central part of the assessment process.

The limits of 'context' may be subject to debate: there are no clear lines where 'context' starts or ends.

By emphasizing 'context', we do not call for a huge research effort to precede an assessment. In many cases, substantial (experience-based) knowledge is available about context which can help find more in-depth answers about the How and the Why of ecosystem services and the values given to them. Examining ecosystem service supply and demand often requires an understanding of the specific human-environment relationships that characterize a setting: Which human activities turn an ecosystemic function or process into a service or benefit for people? Or: Why would certain environmental attributes or conditions by more highly appreciated than others? If analysts cannot draw on first answers to such questions, they may miss main points when developing the assessment design.

For many assessments, the task is to capture the socio-economic drivers and political-administrative conditions which shape human-environment relations at the appropriate level of detail – i.e. sufficiently clearly so as to be understandable yet without going into unnecessary detail. One way to ensure this is to draw on (elements of) heuristic instruments, such as UNDP's Institutional and Context Analysis (ICA), prior to the assessment itself. ICA offers practical guidance for examining issues such as power and incentives, the legal system, political and social structures and outside forces at work.

Beyond that, if assessments are intended to inform policy advice, actual information needs and entry points for such advice should also be identified prior to doing the assessment. This refers to the political and strategic background of the assessment as well as to legal procedures and the administrative situation. Here again, the potential users of the assessment results play a key role. Whether this is a project-funded consortium (as in the Nile Delta irrigation case), an NGO-led coalition pursuing advocacy (as in the case of Bala Dam, Bolivia), or an environmental department initiating an inter-departmental collaboration (as e.g. in the Cape Town case), analysing the policy context requires their experience and inside views. This underlines the usefulness of forming a multi-stakeholder study team or advisory board when doing an assessment.

6.3 Choice of method

There is a huge diversity of methods suitable for examining ecosystem services (cf. ValuES data base of methods). Different methods generate different results, because they represent different perspectives or choose different foci. Not all methods are suited to examine all ecosystem services, and not all are suitable for every assessment purpose. As a crude characterization, however, we can say that:

- bio-physical methods focus on ecological, hydrological and atmospheric processes, among others;
- economic methods consider aspects of scarcity and/or efficiency, and many are used to calculate economic benefits, mostly in monetary terms;
- social valuation and anthropological methods examine stakeholder perspectives, in particular with regard to social and cultural meaning
- integrated methods seek to combine supply and demand data (e.g. by means of modelling)
- (other) decision support instruments process diverse data into scores, ratios or qualitative conclusions (e.g. CBA, MCA)

Furthermore, methods differ in the way they generate knowledge or data. This ranges from conducting field measurements, processing available data and modelling to consulting the literature and applying diverse forms of participatory research methods. In many cases, assessing ecosystem services requires the use of different methods at different stages of the assessment. For example, in the case of many economic assessments, biophysical methods would be applied to generate quantitative data which can then be further processed by means of social or economic valuation methods. A fully fledged study could first systematize and/or generate data on ecological processes, then consider aspects of scarcity and efficiency, to finally apply a focus on stakeholder dependence and appreciation.

Ecological change and its associated societal impacts are often at the centre of interest, and the choice of methods defines which parts of the equation are being looked at more closely. However, the more the perspectives and insights from the different methods are considered by an interdisciplinary research team, the better they can (correct and) complement one another, delivering robust and/or innovative study results.

In Himachal Pradesh, India, the dependence of apple farming on severely endangered insect pollinators was examined as part of an ecological study on pollination. The key finding: loss of insect pollinators, especially honeybees, would have a major impact on apple harvest levels. By itself, this information was not enough to prompt policy action to improve the situation. While biophysical linkages were clear, important questions remained unanswered, such as: What economic loss can be expected from the failure to pollinate? A bio-economic study combining productivity dependence ratios with market data and an analysis of alternative farming practices (in the case of pollinator loss) revealed that the economic risk is indeed huge and acute. Furthermore, alternative practices would come at a prohibitively high cost. Here, the economic focus reframed the situation as a serious problem to the entire cash crop producing sector – which prompted various policy responses.

This example seems to confirm the hopes underlying many monetary valuation exercises – that dollar estimates will reach more ears and be taken more seriously than biophysical metrics. While this may be true, it is not necessarily the best of all available assessment options. If, for example, a Total Economic Value gets unpacked and presented as 4-8 distinct but complementary arguments, these will command more attention than a single 'zillion-€-figure'.

Such an aggregate figure actually hides the diverse issues involved in environmental change. It suggests that x amount in water security equals z amount in, say, non-timber forest products, because both services are being included with their respective dollar value in the aggregate final figure. The capacity of such a total value estimate to adequately capture the importance of the different benefits provided by Nature to different people has been called into question. In many cases in remains important to distinguish between apples and pears. Also, Nature's social and cultural meaning is poorly reflected in monetary metrics. Awareness is needed that assessments always also shape values, although their aim is to measure them.

Another example indicates that, beyond monetary estimates (which over time can 'lose their gloss'), a combination of various visuals and stories (appropriately backed with quantitative data) do generate the hoped-for impact. In the case of the Working for Water Programme in South Africa, programme

managers compete with other government activities for public funding and have to annually explain and justify their planned budget. They do so by showing separately each of the various ecosystem service benefits of their ecological restoration work as well as the jobs created by it, relating them to relevant government objectives and strategies.

For salient and credible results, it is necessary to strike a balance in assessment design between costs, quickness, detail and robustness of findings. This requires sound judgement regarding what is appropriate for a given aim and context. In particular, if the study team closely scrutinizes which methods can deliver outputs that offer new insights and added value to the already established knowledge, this effort seems extremely worthwhile.

6.4 Connection with policy process

An assessment can produce much-needed information, but on its own, doing an assessment is unlikely to change policy processes or decisions. Here we emphasize the need to dedicate attention and resources to pro-actively connecting the assessment with the decision-making process to which it is supposed to contribute.

A well-managed collaboration between potential users and providers of ecosystem service information can be appreciated at three levels:

(i) **It can improve the quality of the study**: it enhances the initial knowledge base, help in defining a shared specification of the problem or issue to be addressed, contribute to delineating the knowledge gap and formulating relevant study questions for the assessment. Specialist know-how for identifying suitable entry points, stimulating change and managing transitions is indispensable. Failure to understand stakeholder perspectives can result in many kinds of inappropriate assessment design. We have raised some of these issues in the section on understanding context (see above).

(ii) **It is crucial in terms of exerting influence**: The assessment process can be understood and managed as part of the policy process. There are formal processes, e.g. in planning, where specific information is required at a pre-determined moment (and a study commissioned), and where subsequent consideration of results is part of the formal procedure. But in many other settings, it is necessary to actively ensure the relevance and legitimacy of a study, e.g. by seeking a formal mandate or by stimulating the interest of stakeholders in the study and their buy-in into its results.

This is also where **strategic communication** comes into play. An assessment can deliver the evidence and the plausible arguments from which clear and well thought-through messages can be crafted (which then also need to be delivered at the right moment by a suitable person or institution, using the proper channels). These messages can be developed ex-post, i.e. once the study is on the table. But it is far more effective to think of communication issues at the beginning of the study, when its scope, design and research questions are being determined.

Beyond communications, the interactive assessment process can be as important for leveraging policy change as the assessment results. In the Ranchería watershed, Colombia, the numerous workshops conducted for the assessment not only helped determine the feasibility of a water-related PES scheme, by eliciting information about users and providers and about their respective practices and conditions, they actually made the scheme feasible: They raised awareness about the acute need for

improved watershed management, they promoted a mutual understanding among the different stakeholder groups, and they built trust in the process and the PES scheme as a sensible management response.

Obviously, broad stakeholder engagement is not suitable for all assessment purposes. For an advocacy strategy on a contested issue it may be more appropriate to conduct the assessment confidentially and then use the results in the context of an advocacy strategy or to focus on key allies (as e.g. in the cases of Bala Dam, Bolivia and, to some extent, in the Aral Sea wetland restoration strategy).

(iii) **It promotes learning**: Once stakeholders become familiar with the ecosystem services concept, they adopt a paradigm which recognizes that Nature provides bundles of multiple, interdependent benefits to diverse users at all scales. They also adopt a common language which allows them to put very diverse issues on the same table – from natural wastewater purification to sacred forests. An assessment process that is managed and facilitated as an interactive process provides valuable opportunities to mainstream this ecosystem service perspective and to build the necessary capacity to benefit from this concept. Why is this useful? It is a perspective which integrates concern for Nature in all kinds of planning and decision-making processes outside the environmental sector.

The ecosystem services concept has potential to support policy change by pinpointing the societal relevance of environmental change. If stakeholders adopt the concept as a new perspective for their own work, this can have a lasting impact. In the Cape Town case, for example, municipal managers began to value green spaces not only for their recreational benefits but also for improved air quality and reduced street flooding after strong rain. And administrators in the city's finance department realized that protected area funding means investing in an important asset of the regional economy. These are experiences which seem to be evident in many variations across continents and policy areas.

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ANNEX: Overview of case studies analysed by ValuES

For the full version of the case study descriptions, see the case study section of the ValuES Methods Navigator.

Case study of ES assessment	Description
1. Cost-benefit analysis of the Bala dam proposal, Bolivia: Using economics to better show the overall expected impacts of a large infrastructure project.	There were plans for a huge dam for hydro-electric energy production, mainly for export. A cost-benefit analysis (CBA) was used because it is a widely accepted framework. CBA can combine diverse secondary data about the expected consequences of a proposed dam. Despite time pressure and poor data availability, conservative estimates about the environmental damage (and associated loss of natural assets and livelihoods) were sufficient to challenge plans.
2. Investing in Cape Town's green spaces, South Africa: A strong `business case' for maintaining the city's natural environment	Cape Town's Environmental Management Department commissioned an economic valuation study in order to estimate the return on investment in environmental protection and management. The study followed extensive consultations with other departments about the relevance and status of services from (near-)urban ecosystems. It was aimed at raising public awareness and increasing budget allocations for conservation.
3. Rewarding farmers for reducing sedimentation, Indonesia: Farmers adapt and diversify land use, based on PES scheme with hydropower company in Sumberjaya	Removing sediment from reservoirs is an important part of the costs of hydropower generation. Under the Rewarding Upland Poor for Environmental Services programme (RUPES), upstream farmers changed land-use practices in order to reduce soil erosion and sedimentation load in streams. Sedimentation rate was used as an indicator to measure the effectiveness of the programme.
4. Budget motivations for NRM programmes, South Africa: Annual reports with diverse data, arguments and illustrations related to ecosystem services motivates budget for NRM programmes	In South Africa, various public works programmes, such as the 'Working for Water' programme, focus on natural resource management and ecosystem restoration. For motivating annual budget allocations, these NRM programmes refer to social arguments (i.e. pro-poor job creation) and also use an ecosystem services perspective. The main task is to provide evidence of how programme activities improve ecosystem services. Maps and visual ecosystem service comparisons are important.

5. **Protecting mangroves for local benefit, Philippines:** Workshop with stakeholders and scientists on mangrove loss (aquaculture) convinces local policy makers	Despite legal protection, mangroves were being cleared for shrimp farming by non-local investors. The effects of mangrove loss, e.g. on coastal storm protection and abundance of fish, were well known to local scientists and NGOs. A workshop with foreign experts and local stakeholders helped legitimize and communicate this view. The loss of ecosystem services to the local community was being examined in order to convince the local government to stop mangrove conversion.
6. **Assessing climate benefits of peatland rewetting, Germany:** Estimates of greenhouse gas emission reductions for issuing carbon certificates	Wet peatlands store carbon in high concentration. Peatland drainage causes the continuous emission of carbon dioxide into the atmosphere. In Germany, as in many other countries, huge peatland areas have been drained for decades to facilitate agricultural activities. Collaboration between the regional government and a research team enabled the development of a standard for estimating emission reductions achieved by rewetting drained peatlands. This enabled the issuance of 'MoorFutures' carbon certificates.
7. **Economic assessment of Namibia's protected areas:** Showing their contribution to the country's socio-economic development	The aim of this ecosystem service valuation study was to raise additional funding and policy support for Namibia's protected areas. It was part of a larger GEF-funded project for consolidating the country's protected area system and management. The valuation process showed that making the case often needs to be done more than once - so it is worth ensuring that assessments are designed in such a way that they can be repeated and easily enhanced over time. In essence, the study stimulated debate and a search for policy reforms capable of achieving conservation and financing goals.
8. **Combining flood protection and habitat restoration, USA:** Using cost-benefit analysis, including ecosystem services, to identify the best management option	The area surrounding the confluence of the northern and southern tributaries of Thornton Creek experiences storm water-related flooding more often than other areas. A cost-benefit analysis, which incorporated ecosystem services values, proposed that an option which balances the economic, environmental and social benefits gained from the project should be pursued, with a focus on reducing peak flows and providing habitat restoration.
9. **Optimizing entrance fees for Tanzania's national parks:** Analysis of the elasticity of tourism demand to improve income streams to parks	The study analysed elasticity of tourist demand to recommend an optimal fee structure to generate revenue and distribute visitors more evenly between the parks. This was the first economic study conducted in the park system, and the first time a survey was conducted in all 12 parks. The study provided a structured, analytical approach to support management intuition and inform key park policies. Fees have been raised and are higher in the more frequently visited parks.

10. Local ranking of importance of watershed services, Colombia: Consulting land users on different ecosystem services for watershed management planning	The study served to inform updates of water management plans near Bogotá. In order to consider local needs and perceptions in Curubital, one of the sub-basins, 60 residents were consulted on their uses and appreciation of different ecosystem services. For this a 'social valuation protocol' was used: general ecosystem service descriptions were translated into typical uses and/or locally meaningful descriptions. The main emphasis was on provisioning and on cultural services. Results were aggregated and presented in maps for their further use in watershed planning.
11. Participatory feasibility assessment leads to water PES, Colombia: Stakeholders engage in multiple workshops to finally agree on catchment protection	The Ranchería river basin had already seen two failed attempts at agreeing on a watershed management plan. High social inequality and ethnic fragmentation combined with competing needs over scarce water resources. In a series of stakeholder workshops and meetings in different combinations of participants, the advantages and disadvantages of a PES scheme for the different stakeholders were explored and a solution negotiated. The ecosystem services perspective served as a common framework, while the process was critical in promoting a shared understanding and interest in finding a solution.
12. Integrated assessment of land use options in Malawi: Weighing up the costs and benefits of ecosystem-based adaptation to climate change	This case study describes how a public sector investment programme was designed on the basis of a detailed assessment of ecosystem service linkages, opportunities and values. These aspects are not conventionally factored into the appraisal, design and planning of public investment programmes.
13. Intact ecosystems provide robust water infrastructure, Mongolia: Study justifies improved investment in conserving watersheds for capital city	This case illustrates how ecosystem service assessments can help to catalyze changes in conservation and development policy and in management practices – but are rarely the sole factor. The evidence generated by the assessment study played a key role in "making the case" for improved investment in ecosystem conservation, and has been followed by a number of changes in the government's stated policies and plans for watershed conservation and financing.
14. Communicating the value of Montenegro's National Parks: Raising policy makers' awareness with a fresh view on protected areas	This study of the economic value of protected areas in Montenegro introduced a way of looking at protected areas that was new to conservation and development decision makers in Montenegro. The "novelty value" and perceived relevance of monetary estimates of protected areas' ecosystem values meant that the findings attracted a lot of interest among many decision makers.

15. Enhancing regional tourism demand, Bolivia: Modelling tourists' choices in Pilón Lajas Reserve and Indigenous Territory	A market study of regional tourism demand aimed at providing recommendations to communities who currently derive little benefit from tourist activities. The recommendations were incorporated into the regional tourism development plan. The methodology applied (a choice experiment) helped in understanding the factors considered to be most important by tourists when choosing their destination; it also helped promote tourism in a protected area.
16. Aral Sea Wetland Restoration Strategy, Uzbekistan: A participatory process, with a focus on ecosystem services included	Recognition of ecosystem services was instrumental in changing the course of development from sectoral, technocratic and unsustainable interventions towards the restoration of natural processes. The strategy development process created a strong coalition of local stakeholders and authorities, resulting in necessary pressure to convince national government and the donor community to invest in a pilot project.
17. West Nile Delta Irrigation Rehabilitation Project, Egypt: Considering ecosystem services in a Strategic Environmental Assessment (SEA)	The World Bank took the initiative for a Strategic Environmental Assessment (SEA) in order to discover the potential consequences of a large proposed investment programme for irrigation infrastructure. The strategy process was based on an ecosystem services assessment, as a means of identifying both direct and remote stakeholders in the project area. This helped in understanding the broader economic, social and environmental consequences of the planned investment programme.
18. Multi-criteria analysis in regional planning, Mexico: Understanding competing environmental needs and related conflicts in Baja California	The environmental regional planning process in the states of Baja California and Baja California Sur sought to minimize natural resource-related conflicts between different sectors. It also contributed toward the formulation of concrete proposals for regulations by way of input into the legislative process. The ecosystem services perspective helped to make trade-offs visible and to reveal the consequences of continued unsustainable management.
19. The value of insect pollinators in Himachal Pradesh, India: Describing their role in apple farming	Apple farming plays a major role in the regional economy and is highly dependent on insect pollination. Scientists applied a bioeconomic approach which considers the production dependence ratio on pollinators. This led to the development of pollination enterprises and extension services, and it ultimately enhanced apple farming practices.

About the ValuES Methods Navigator

Assessing ecosystem services has been widely recommended for showing the many ways how humans depend on intact nature. It has also been criticized for paving the way for further commodification of nature. Whether ecosystem service assessments can live up to their promise depends on how they are being done. How are they designed? And how are assessment processes connected to decision making processes?

At www.aboutvalues.net users find assistance for developing their own case-specific responses to whether an assessment makes sense, and if yes, in which form.

The site hosts a database with more than 60 method profiles with practical information on how a method works, and what its requirements are with regard to e.g. time and data. To make best use of these method profiles, a navigator guides users through various steps. The site also hosts a hands-on introduction to ecosystem services for those new to the topic.

About the ValuES Project

ValuES (2013-2018) is a global project that aids decision-makers in partner countries in recognizing and integrating ecosystem services into policy making, planning and implementation of specific projects. We do this by developing instruments and training courses, providing technical advice and facilitating planning and decision-making processes. We also promote knowledge-sharing via regional workshops and participation in global discussion forums.

On behalf of the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) as part of the International Climate Initiative (ICI), the ValuES project is implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) in close collaboration with the Helmholtz Centre for Environmental Research (UFZ) and the Conservation Strategy Fund (CSF).

About GIZ

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH GIZ is a German federal enterprise that operates in more than 130 countries worldwide to support the German Government and other donors in achieving their objectives in the field of international cooperation for sustainable development. The conservation and sustainable use of biodiversity for human well-being is one of the priority areas of German development policy. GIZ implements projects around the globe that support partners in implementing the CBD Strategic Plan for Biodiversity.

About UFZ

Scientists at the Helmholtz Centre for Environmental Research (UFZ) in Leipzig, Germany, study the complex interactions between humans and the environment in all its facets. They develop concepts and processes to help secure the natural foundations of human life for future generations. The UFZ assumes the scientific coordination of the ValuES project. For details, see here.

About CSF

The Conservation Strategy Fund (CSF) sustains natural ecosystems and human communities through strategies powered by conservation economics. Our trainings, analyses and timely expertise make development smarter, quantify the benefits of nature, and create enduring incentives for conservation. CSF has offices in the US, Bolivia, Peru and Brazil and additional staff in Costa Rica, Colombia and Uganda. Our training faculty includes instructors from Harvard, Duke, University of Brasilia, University of the Andes (Colombia), University of Concepción (Chile), Oregon State University, University of Cape Town and Makerere University (Uganda), among others.