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Which window leads to the best policy option? Successful strategies take into account different rights to nature's benefits, they consider local knowledge, and they involve stakeholders.

10 MAKING YOUR NATURAL CAPITAL WORK FOR LOCAL DEVELOPMENT

Lead authors:	Augustin Berghöfer, Heidi Wittmer (Helmholtz Centre for Environmental Research)
Contributing authors:	Alice Ruhweza, Lucy Natarajan
Reviewers:	Regina Birner, Jetske Bouma, Lucy Emerton, Natalia Hernandez, Martin von Hildebrand, Tilman Jaeger, Wairimu Mwangi, Jennifer Nixon, György Pataki, Isabel Renner, Dominique Richard, Nik Sekhran, Susan Young, an anonymous reviewer from CEPAL
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Language editor:	Jessica Hiemstra-van der Horst

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Key Messages

- **We need to change the way we think.** Environmentally oriented policies and public investments are often considered a luxury, rather than life insurance. Other needs and objectives may seem more pressing and desirable. This is a lost opportunity. Natural systems can save on future municipal costs, boost local economies, enhance quality of life and help secure livelihoods.
- **It's easier to see with the lights on.** Understanding the full range of ecosystem services makes trade-offs visible and helps local policy makers make informed choices about different policy options. Examining which services will be enhanced and which ones degraded, can illuminate the various costs and benefits of each policy option – as well as their distribution between different community groups.
- **We can all speak the same language.** The set of ecosystem services provides a common language for stakeholders from different backgrounds. Diverse interests and views can be recognized. This facilitates dialogue and negotiation.
- **You have the tools you need.** TEEB's stepwise approach to considering ecosystem services in local policy can help you identify which analytical procedure and methodology is most appropriate for your situation.
- **Making it happen.** Three issues, beyond the analysis itself, need your attention to make natural capital work for local development: the de facto distribution of rights to nature's benefits; the optimal use of available scientific and experience-based knowledge; and well-informed facilitation of the participatory processes.

“What one needs is not a common future but the future as a commons. A commons is the plurality of life worlds to which all citizens have access. It is not merely the availability of nature as being but of alternative imaginations, skills that survival in the future might require.”

Shiv Visvanathan 1991: 383

In the preceding chapters we explored reasons and options for taking an ecosystem services perspective to a range of local policy areas: municipal service provision, spatial planning and impact assessments, natural resource management and extension for rural development, protected area management and market-based instruments for conservation.

This chapter first synthesizes the key lessons (section

10.1) and then presents typical local policy scenarios where the consideration of ecosystem services would be useful, for example by applying TEEB's stepwise approach (10.2). This leads us to pinpoint three common challenges to many local policy and decision-making processes (10.3). Finally, we provide answers to a series of very practical questions related to making use of the concept of ecosystem services in local policy (10.4).

10.1 ECOSYSTEM SERVICES IN LOCAL POLICY: SOME KEY LESSONS

As illustrated throughout this report, explicitly accounting for nature's potential to provide →*benefits* for →*human well-being* through the appraisal of →*ecosystem services* has significant benefits. It allows us to assess →*trade-offs* involved when building infrastructure or other large-scale projects that affect nature and its services. It also allows us to identify cost-saving options where →*ecosystems* can replace or complement infrastructure, for example, in water management or disaster prevention. With these services nature provides important co-benefits such as habitat, recreation, or biological control. Further, appraising ecosystem services allows us to secure and develop natural →*assets* for the local economy, for example, to support tourism or agriculture. Finally, it helps identify who is affected by environmental changes and how they are affected – bringing local livelihoods to the center of policy attention.

LESSONS: ECONOMIC AND SOCIAL POLICY

- **Sound environmental policy is sensible long-term economic policy.** The ecosystem services perspective helps identify important natural assets. Mindful management helps ensure the long-term functioning of the natural system from which these services flow. Some services (like carbon sequestration) are global in nature while many (indeed most) affect local and regional ecosystems and thus livelihoods.
- Local development efforts often focus on the production of goods and services with a high market price. Intensifying production often results in degrading less visible, equally important, local ecosystem services. From an ecosystem services perspective, large-scale intensive monocultures are often a less attractive land-use option, despite their short term revenue stream. They have side effects. They often decrease water catchment capacity, pollute soils and rivers and degrade the functioning and habitat quality of the wider ecosystem. Even when prioritizing the pressing needs of

those living in →*poverty*, this kind of short-sightedness causes problems in the medium term. Instead, **a balanced land-use policy** that maintains a diverse mosaic in the landscape can sustain a healthy natural system, **providing a broad range of ecosystem services.**

- **Official statistics** and national accounting data **rarely capture the →values that nature provides** for human well-being and the local economy. If a local fish is sold on a distant market, the value enters the national accounts (measured as 'GDP' or National Income). If it is eaten by the fisher's family or sold or traded locally, this is rarely accounted for in statistics. Local policy can better decide on issues affecting the environment if official numbers and economic →*indicators* are complemented with insights into non-traded parts of the local economy. An ecosystem services perspective is an excellent way to capture such insights. (see TEEB in National Policy, Chapter 3)
- **Sound environmental policy is also good social policy:** in many instances, poor people are most dependent on intact ecosystems. Poverty alleviation is not just about meeting subsistence needs – the issue for local policy makers is to ensure that policies and projects do not unintentionally degrade those ecosystem services upon which the livelihoods of the less well-off depend. The ecosystem services framework makes clear who is most affected by environmental degradation and who benefits most from its protection. This information is essential for choosing the right policy measures.
- **Local government plays a critical role in securing** not only availability of ecosystem services, but also **access** to them. The extent to which the costs and benefits derived from ecosystem services are spread equitably amongst →*stakeholders* is strongly influenced by the quality of local governance. Inadequate or poorly implemented policy or legal systems are likely to result in corruption and rent-seeking by a few powerful people.
- **Costs and benefits** from conserving ecosystems



and their services are unevenly shared between local, national and global policy levels and this has negative consequences for →*ecosystem management*. If benefits occur mainly beyond municipal boundaries, pointing this out can help local governments secure support from higher levels.

LESSONS: ENVIRONMENTAL POLICY AND MANAGEMENT

- The **ecosystem services perspective** facilitates collaboration among diverse actors and agencies. It translates different interests and visions into a common ‘language’ of ‘provisioning’, ‘regulating’, ‘supporting’ and ‘cultural’ services. Considering the full set of ecosystem services **makes visible the trade-offs** between different land-use options – and helps to identify options where interests can be made compatible without jeopardizing nature itself.
- Some ecosystem services are more tangible and seemingly ‘useful’. Their direct link to local well-being is apparent – examples include freshwater quantity and quality. But other regulating and →*supporting services*, such as maintaining the diversity of microbes in soils, sustain these benefits. We need to be **cautious not to exceed recovery thresholds** of less visible services. Many ecological connections are still poorly understood. Future costs of damage to ecosystems may be enormous.
- There are a **variety of ways to assess ecosystem services**, all with varying degrees of detail and different emphases. A stepwise approach for a first

appraisal has been described in Chapter 2 (and is summarized below). Other tools are available to support decision makers in more specific analyses (see end of chapter and annex).

- Participatory appraisal techniques, multi-criteria assessments (MCA), →*monetary valuation* and Cost-Benefit Analysis are different approaches to identify the importance and value of a service. **Monetary valuation is a powerful instrument** for communicating the importance of →*biodiversity* for human well-being. However, monetary valuation of eco-system services **needs to be carefully conducted and interpreted**. Although the outcome may seem ‘concrete’ (in that precise values are determined), precision may disguise the fact that valuation is often based on assumptions and prognoses that are difficult to validate and predict.
- **Approach is guided by purpose**. The purpose for considering ecosystem services determines which approach to take. Are you revising your municipality’s spatial plan? Do you require guidance on a public infrastructure project? Do you want to run a public campaign for securing and enlarging your city’s green spaces? Does your marine protected area need more political backing? Do you want your farmers’ association to raise funds for conservation from international carbon markets? These, and similar, entry points shape which services are being assessed and how. You choose the assessment instrument. This choice determines the degree of detail you aim for, the time horizon considered and the value of future benefits as opposed to present ones.

10.2 A STEPWISE APPROACH TO APPRAISING NATURE’S BENEFITS



Assessment and valuation of ecosystem services may be carried out in more or less explicit ways, with degrees of intervention in markets and regulation that reflect the problem, the opportunity and the circumstances. TEEB recognizes there are three tiers for taking nature’s value into account (see Preface and TEEB Synthesis Report).

- **Recognizing nature’s values** (spiritual, social and economic). Spiritual values are reflected in sacred places and in art inspired by nature, while social ones are visible in a person’s sense of belonging. Economic recognition includes ‘cashable’ services as well as often ignored services upon which we equally depend. Where there is consensus within

- society on the importance of nature's benefits, attempting monetary valuation is often unnecessary,
- Where there is little consensus and benefit visibility, **demonstrating value** is often required to reach balanced decisions that take into account the full implications on services. Valuation in these circumstances facilitates local policy trade-offs between short-term benefits and long-term cost, between financial gains and quality of life; but also between concrete alternative land-use options and the bundles of ecosystem services they provide. In these situations, economic analysis of ecosystem services provides important insights.
 - **Capturing value** involves local policy responses that promote desired use-practices by making

them (financially) attractive to individuals, business, or communities. The valuation of ecosystem services is often important to the design of effective regulations and incentives.

In Chapter 2 we outlined a flexible, stepwise approach to appraising the value of nature. According to the specifics of local policy situations, your own effort may focus on recognizing, demonstrating or capturing nature's benefits and the steps may carry different weights. You can adapt them according to your needs.

How can these steps be undertaken in various settings? The following hypothetical scenarios illustrate typical opportunities for applying the TEEB stepwise

Box 10.1 The TEEB stepwise approach to appraising nature's benefits

1. Specify and agree on the problem

This is often a worthwhile effort because views can differ substantially. If key stakeholders share a common understanding of the problem, serious misunderstandings during the decision-making process and implementation can be avoided.

2. Identify which ecosystem services are relevant

Ecosystem services are often interconnected. Identifying which ones are most important to your problem focuses the analysis. Going one by one through the list of services (Chapter 1) is a simple approach.

3. Define the information needs and select appropriate methods

The better you can define your information needs beforehand, the easier it is to select the right analytical method and interpret the findings (Chapter 3). Assessments differ in terms of which services are considered, the depth of detail required, timelines, spatial scope, monetization of the results and other factors. The study design determines what kind of information you get.

4. Assess expected changes in availability and distribution of ecosystem services

If possible, use experts. Also, draw on field work and documented experience from analyses in comparable settings. Use common sense and consult with colleagues on possible changes and their consequences, starting with the most obvious ecosystem services.

5. Identify and appraise policy options

Based on the analysis of expected changes in ecosystem services, identify potential responses. Appraise these in terms of their legal and political feasibility as well as their potential in reaching the targeted quality, quantity and combination of ecosystem services produced by your → *natural capital*.

6. Assess distributional impacts of policy options

Changes in availability or distribution of ecosystem services affects people differently. This should be considered in social impact assessment, either as part of the analysis or as part of appraising policy options.

The relative importance of each step is determined by your situation and objectives. Taken together, adapted to your needs, and incorporated into existing decision-making procedures, they offer guidance for considering natural capital in local policy. Other technical, legal, economic and social information also needs to be considered. The steps can also help you design a monitoring system and thereby track the condition of your natural capital (Chapter 4.3).

approach: decisions on infrastructure, construction, development proposals, agricultural extension and conservation management in protected areas. These cases demonstrate that we cannot apply a fix recipe for assessing and considering ecosystem services in local policy. TEEB's approach is flexible. There are instances where certain steps can and should be omitted, repeated or emphasized. Hopefully, the scenarios encourage developing your own version of the process.

**Scenario 1:
Wastewater treatment plant no longer
meets water quality standards.**



A change in national legislation has increased treatment requirements by lowering acceptable bacterial levels. The added designation of new residential areas will also increase volume to a level that can no longer be handled by your city's plant.

As director of the responsible department, you commission a pre-feasibility study for the construction of a modern plant that meets both quality and quantity requirements. The province-level development bank has an attractive credit scheme to help finance converting an agricultural site, but the costs are high and would require a considerable portion of the city's infrastructure budget. The city council agrees that an alternative solution is needed (Step 1).

At a workshop, you learn about the utility of wetlands for wastewater treatment. This helpful coincidence makes you realize what a preliminary ecosystem services appraisal would have shown (Step 2): There is a wetland in your city close to an abandoned railroad track which is neither accessible nor attractive.

You invite the workshop expert who tells you that the location and condition of your wetland are suitable. He recommends you to determine how much rainwater runoff can be redirected to the wetland for rehabilitation, to examine flood control needs for neighboring settlements and to establish whether redirected waters will reduce the volume flowing to the old plant (Step 3). A team of colleagues consults available data for assessing the ecosystem services involved (Step 4).

Subsequent calculations reveal that this plan is consi-

derably less costly than constructing a new treatment plant (Step 5). It has the added benefit of liberating funds for other infrastructure projects and will not increase citizens' water bills. The area is uninhabited and unused, so an impact analysis on current users is unnecessary (Step 6). A local NGO agrees to help plant the reconstructed wetland and you convince the earth-works company to remove the railroad tracks to make space for a cycling and walking path.

The need to replace or construct new infrastructure presents an opportunity to examine ways to invest in **more green**, instead of grey, **infrastructure** or at least redesign projects in order to minimize damages to ecosystem services and biodiversity. There are many such opportunities: in water provisioning (catchment management instead of water treatment plants), flood regulation (flood plains or mangroves rather than dykes) and landslide prevention (maintaining slopes covered with vegetation). Green infrastructure usually provides additional ecosystem services such as recreational value or → *habitat services*.

**Scenario 2:
Public consultations: a proposal to
develop the city's port area.**

An investor has been asked to develop two alternatives: rehabilitating an old port or constructing a new one. The new facility would be less costly and closer to the industrial area. It would, however, be in your city's protected dunes.

Your mayor has been criticized by conservationists, a neighborhood group and the local chamber of commerce. As a municipal planner, you have been entrusted with organizing a public consultation (Step 1). A colleague from the city's environmental office presents which ecosystem services may be affected (Step 2). The 'old-port alternative' would amount to increasing traffic in the city center. The 'beach alternative' would cut through the city's most attractive weekend destination. Participants remain undecided.

Following fierce press coverage, the mayor commissions an expert group from the university to assess each alternative's economic consequences. They propose to estimate the costs and benefits of the port

in terms of jobs and local taxes. Conservation NGOs insist on examining the less obvious impacts on tourism, coastal protection, the local fishing industry and real estate (Step 3).

The expert group estimates future changes in the involved ecosystem services (Step 4). In a second public consultation, you present the estimates. Participants say the fishery estimates are too high, as catches have continuously diminished. Conversely, the importance people attach to beaches has been underestimated.

City council reviews the two port options with a revised set of monetary and non-monetary estimates (Step 5). They decide in favor of the new port. Local NGOs and citizen groups in favor of protecting the original landscape communicate through the press that the dunes effectively protect against flood waves. This is confirmed by the national office for coastal protection and the project is shifted two miles to avoid affecting the core area of the dunes.

Considering **ecosystem services in large construction projects** such as dams, roads or ports, can provide a more complete picture of construction consequences. Because the stakes are high, you can expect controversy, particularly when monetary valuation of ecosystem services is involved (See also Chapters 4 and 6).

Scenario 3: An NGO proposes innovative agricultural production methods.

As a local authority or rural extension officer, you have an interest in working with an external NGO that wants to use a new plant variety in pilot sites to improve grazing land. This could substantially lower the risk of overgrazing. With the backing of the national agency for promoting rural development, the NGO requests your support.

You examine their proposal and realize that the new varieties need to be checked for drought resistance (Step 3). After a joint appraisal with the NGO and other colleagues (Step 4), it's determined that the new variety is unsuitable to sloped land because it has high water needs and limited water retention capacity.

You compare alternative sites (Step 5) and decide to relocate some to flat areas. You also learn that the new variety's resistance to a local plant disease is uncertain (Step 3). After consulting with the NGO, you decide to investigate the risk of spreading the disease. Two pilot sites will be surrounded by land known to have resistant plant cover.

You also wonder how the new variety will affect the area's small game populations which are important to the region's poor families (Step 6). The NGO agrees to careful monitoring and to keep you informed of interim results which will be useful to you for future decision making.

Investors and NGO proposals may overlook local particularities. An assessment of ecosystem services, expected project impacts and management measures can help make a project locally relevant (Chapter 5).

Scenario 4: A simmering conflict over protected area regulations.

As the manager of a newly protected wetland, you oversee conservation of an internationally renowned bird habitat. Strict protection rules have been approved in the central office of the national wildlife agency.

At an information session, several neighboring villagers voice opposition to the new restrictions (Step 1). They are no longer permitted to use the wetland's thatch grass, which they use for roofing and basket weaving (Step 2).

After discussing with colleagues, you conclude that a comparative study of tourism-related income and the costs of lost access is necessary (Step 3). After examination of local thatch prices and national park visitor records (Step 4), your impression is that people benefit more from increased tourism than lose from restricted grass harvest. You learn from consulting with villagers, however, that nature tourism income does not flow to them (Step 4). Young people from the city have been trained to guide foreign bird watchers. You also learn that farmers are complaining about lower yields because they can no longer collect wetland bird feces to fertilize their fields (Step 3).



A local biologist tells you that thatch harvesting rejuvenates bird habitat and is therefore to some extent beneficial to the wetland (Step 4). You discuss alternatives for changing the rules with colleagues and local authorities (Step 5). Issuing permits for thatch harvesting is the most promising solution. You propose it to a senior wildlife agency that agrees to annual harvesting permits for villagers.

This solves one problem but many villagers remain discontent. You propose an additional voluntary charge to birdwatchers to compensate the farmers for losses in yield. This works well after its purpose and history are outlined on a flyer distributed at the park entrance.

Taking a close look at winners and losers, and how potential losses can be compensated for, is a powerful strategy for conflict resolution and avoidance (Chapter 7).

The formulation of a new development plan, decline of traditional economic activities, increasing problems in service provisioning and structural change within the local economy all provide further interesting entry points to **identify** where natural capital can contribute more, where it is already overused or **where potentials lie** to redirect economic development to sustainable activities.

10.3 THREE KEY ISSUES FOR MAKING ECOSYSTEM SERVICES COUNT IN LOCAL POLICY

The above scenarios demonstrate that including ecosystem services works best when following a flexible recipe. There is room for improvisation and for adapting the analysis to your needs. But environmental issues are always cross-cutting. They rarely abide by the sector responsibilities of public administration. For that reason, local authorities and government agencies can almost always achieve better results if they collaborate – amongst themselves, with civil society organizations and with local communities.

Your insights on ecosystem services enter into local policy and management processes which may be marked by many problems: issues such as corruption, party politics in pre-election periods, pressures from the corporate sector, differences between state and customary law, frictions inside the government hierarchy, high staff turnover and associated loss of capacity, are well known around the world. Also, many environmental challenges are created by economic or political influence beyond local scope – consequently, the room for local policy to respond is often small.

Under such conditions, **how can you make your analysis of ecosystem services count in local policy?**

Three issues deserve your attention to effectively employ your insights and make your natural capital work

for local development: the de facto distribution of rights to nature's benefits; the optimal use of available scientific and experience-based knowledge; and well-informed facilitation of the participatory processes.

RIGHTS TO NATURE: ECOSYSTEM SERVICES AS PUBLIC, COLLECTIVE AND PRIVATE GOODS

In every location, there is a bundle of ecosystem services. It is not always easy to determine ownership. Timber grown on a private patch of land usually belongs to the land owner – yet many countries require permits for cutting trees, even on private land. Do wild bees pollinating neighboring fields belong to the landowner? In some countries, water flowing from a forest spring is considered private, but what of the enjoyment hikers experience when they stop for a rest by the river? What about the ground water recharge capacity further down in the valley? What about regional climate regulation due to the forest's evapotranspiration? These questions are difficult to answer. They depend on the characteristics of the service itself (Can you delimit its borders? Is it quantifiable?). They also depend on those who benefit from the services and the rules which regulate access to them.

We can characterize rights to ecosystem services by classifying them:

- **private goods**, from which others can be excluded (the fruits in my garden).
- **→public goods**, where all enjoy more or less similar benefits (micro climate regulation by a city's green-belt).
- **common property**, where a group of people collectively enjoy and manage a limited service (water through a communal irrigation channel system).

Ecosystem services are interconnected. One ecosystem can provide private, public and collective benefits. Intensifying agriculture may enhance private benefits (such as crop production) that may be connected to fertilizer accumulation in surface waters, resulting in a public loss of water quality. Clearing the forest may improve private yields of shade grown coffee, but it may do so at the cost of public services (maintaining genetic diversity, protecting against erosion and regulating water flows). Inversely, the collective benefits of a pristine tourist destination (such as a beach resort) can lead local government to impose restrictions on private land use near the sea.

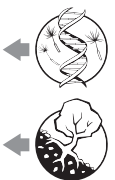
Local policy makers need to be aware of the mix of public, private and collective benefits from nature. Focusing on ecosystem services presents an opportunity for **clarifying who has what rights to nature**. This framework facilitates giving equal attention to less visible cultural and regulating services, often public goods. It also illuminates who is dependent on which ecosystem services irrespective of whether formal rights to them have been acknowledged. Recognizing customary rights and considering a community's poor citizens is critical here. Loss or privatization of public/collective services can result in the loss of poor people's crucially needed share. Poor people are rarely in a position to claim or successfully defend their rights.

Local policy decisions often influence which services are accessible for whom – both in legal terms – who is allowed to use the well? and in very practical terms – the well dries out if the forest responsible for ground water recharge has been cut. Therefore, rights and dependence on nature's benefits need to be considered during decision making.

Policy decisions also shape the overall availability of

ecosystem services. **Where connections between the services are understood, rules for private, public and collective goods can be mutually supportive in enhancing your natural capital.** National laws that regulate good agricultural practice, such as the use of pesticides, can complement spatial planning at watershed level, a municipal payment scheme for watershed services, or voluntary rules for certified organic farming. Likewise, the development of sustainable nature tourism requires public rules – for example regulating access to an attractive coral reef – to be considerate of public interest and of the needs of private users of ecosystem services, such as tourism operators and fisherfolk.

Policy makers can examine rules and policies through the lens of their impact on availability of ecosystem services and on access to them. This reveals not only the social impact of rules, but also where regulations are counterproductive. Harmonizing regulations on ecosystem services in the public and private sphere has enormous economic and environmental potential.



Modifying rights to nature is a key option for local policy makers. Most economic activity is based on private ecosystem services. For this reason, they are often our main focus. Public and collective goods, however, are also indispensable. They contribute to human well-being and society's welfare. Trees in cities improve temperature regulation and reduce air pollution. This benefits everyone. If an ecosystem service is not recognized as a public benefit ('greenbelts', for example), there is a risk that it will deteriorate. In many cases, it depends on local policy makers whether regulations and incentives can tackle pressures and ensure sustained ecosystem services.

Your setting determines whether state-managed or privatized services fare better than collectively managed ones. In Mexico, large parts of the country are under a unique regime of collective ownership and stewardship called 'ejido'. In 1992 a national law was adopted to promote their conversion to private lands. Despite the law, less than 10% of ejido lands have been privatized since then (Registro Agrario Nacional 2007), partly because community forestry enterprises had developed within the ejido structure. These successfully generated high, yet sustainable, flows of income (Antinori and Bray 2005; Barsimantov et al. 2010).

Protected areas have been managed with varying success either privately, publicly and collectively or in combinations of these (Barrett et al. 2001; Borrini-Feyerabend et al. 2006). Collectively owned and managed forest areas seem at least as effective in conserving biodiversity as state-run protected areas because they tend to develop and maintain site specific rules (Hayes and Ostrom 2005).

Internal and external factors determine which combination of rights, rules and management structures appear most appropriate. This can include connection to external markets or higher level policies. It can also include the ways in which communities depend on local natural →resources and services. Factors differ in weight according to context. They have been identified for common property regimes, (Agrawal 2001; Ostrom 1990) and, more generally, for the sustainability of local human-environment systems (Ostrom 2007).

KNOWLEDGE ABOUT NATURE: WHAT SCIENTISTS SEE AND WHAT OTHERS SEE

Handling knowledge effectively is another key issue for making ecosystem services count in local policy. Different kinds of knowledge must be brought together. Our approach to what we know should also account for uncertainty – our knowledge is not exhaustive.

We can understand ‘knowledge’ as a combination of observations and ideas about how things are connected. A forest means different things to different people. To a local inhabitant, it can be a cherished childhood place. To a professional from a city’s water company, it is a catchment. A landowner may see it as a source of timber revenue while a biologist recognizes it as habitat for a rare woodpecker.

The framework of ecosystem services captures all of these views. But for stakeholders it may be a difficult exercise. Appreciating other people’s knowledge requires recognizing other worldviews. It also involves understanding that different ideas are expressed in different ‘languages’. Biologists do not always grasp the meaning of childhood narratives. Foresters may have trouble interpreting hydrology jargon.

Sometimes, people use the same words but mean different things. For instance, what exactly is ‘nature’? Plants and animals? Wild landscapes? With humans, or without them? ‘Nature’ has inspired poets, politicians, engineers and ecologists in very different ways (Hinchliffe 2007; Ingold 2000). In local policy, disregarding such difficulties can lead to great misunderstanding.

We have to make decisions when we are not certain. While science generally knows how ecosystems develop under different circumstances, it is often impossible for researchers to precisely anticipate tipping points. Here site-specific knowledge can be crucial: From experience and local observation insights can be drawn which are key to informing ecological science. Experience-based knowledge can specify assumptions and prognoses from research. Ecosystem science and concepts such as ‘critical natural capital’ (Farley 2008) can alert decision makers, but to avoid irreversible environmental damage decision makers also need to recur to local observation. Nevertheless we cannot put our finger on the exact moment from which a natural system will not recover but turn into a different state. Precaution is therefore essential.

When knowledge is rather limited, focusing on ecosystem services can provide strong guidance for policy. Determining who depends on which services and in which ways, quickly and effectively identifies critical environmental assets and helps prioritize policy attention.

The lens of ecosystem services invites insight from different knowledge backgrounds. The Millennium Ecosystem Assessment (MA 2003) provides a means to classify different benefits from nature – from ‘provisioning’ to ‘regulating’ services and from ‘supporting’ to ‘cultural’ services. Such classification may conflict with the experience and worldviews of people who feel these things cannot be separated. However, the framework does important work. It structures debate and draws attention to a broad range of benefits. The framework is also not static. There are options for adapting it to other knowledge systems. Stakeholders can agree on locally appropriate ways to classify services in their

Box 10.2 What role for scientists in local environmental policy?

Scientists can support stakeholders to identify and agree on the problem. They can develop a study design together with stakeholders and conduct an ecosystem services assessment. They also help policy makers in interpreting the results.

Often, scientists are privileged knowledge holders and make use of their expertise to formulate concrete policy recommendations: “This is what you should do!”. However, such recommendations imply value judgments or policy trade-offs beyond the scientific realm. Values and trade-offs should be subject to local policy debate. Thus, instead of recommending one best decision, scientists describe the consequences of various alternative options and to leave it to policy makers and stakeholders to discuss and decide about values and trade-offs, based on this information (Pielke 2007).

own way based on how much they depend on them. The framework is also open in terms of how relations between services are described and how their values are expressed.

Bringing scientific and experience-based knowledge together is a particular challenge. Experience-based ecological knowledge from local, traditional or indigenous knowledge-holders often fails to be fully recognized as valuable. This knowledge is rarely expressed in the vocabulary of formal science. In many cases, it reflects the best available site-specific understanding of an ecosystem. Apart from the different languages and worldviews upon which knowledge builds, knowledge ownership is a frequent challenge for bringing together local and external experts. In India, for example, a system to record eco-

logical knowledge in people’s biodiversity registers was fiercely opposed, as the rights to the local knowledge (for medical uses, for example) could not be protected.

From a policy perspective, **site-specific environmental knowledge is an important asset**. Local resource-use patterns and cultural practices reflect local expertise (Maffi 2001). Rather than seeking to extract secrets, policy makers should seek to engage with local experts in an open and respectful manner. This can bring an enormous diversity of views and expertise to inform the decision-making process (Berghöfer et al. 2010). But such diversity also requires us to take care when appreciating the quality of diverse local knowledge (Atran et al. 2002). One strategy to verify local knowledge claims is to ask peers

Box 10.3 Recognizing different worldviews

The coastline of Lebanon has been massively developed over the past decades. As a result, the coast is under severe pressure. A UNEP taskforce was set up in the 1990’s to support conservation efforts. They identified one bright green spot along Lebanon’s coast: the forest of Harissa.

The forest landowner, the Maronite Church of Lebanon, was sent a 48-page scientific, economic and legal document demanding that the Church abide by national and international laws to ensure the future protection of the forest, due to its enormous ecological importance. The Church, which had owned the land for centuries, did not reply. It had guarded the forest because it harbored one of its most important cathedrals. The document had made no mention of the forest’s spiritual, cultural and historical significance.

In a follow-up attempt, representatives from a local NGO met the head of the Maronite Church. They made the case for protecting the forest and within half an hour, the church committed to protect the forest in perpetuity. This happened because it made sense in Maronite theology, culture and tradition to protect nature, and in particular this forest – irrespective of scientific arguments.

Source: Adapted from: Palmer and Finlay 2003

Box 10.4 Religion in local environmental policy

Most religions promote taking good care of the earth (www.arcworld.org). This can translate into local environmental action when religious leaders assume responsibility for the environment. Religious leaders may lead by example or seek to directly influence policy. The role of religion in influencing environmental policy cannot be underestimated.

Caring for the earth: Views from religious leaders

- “Islam says that human beings should not use what they don’t need. And that they should plan their resources for a future use.” Sheikh Mohammad Hossein Fadlallah, Beirut
- “An awareness of the relationship between God and humankind brings a fuller sense of the importance of the relationship between human beings and the natural environment, which is God’s creation and which God entrusted to us to guard with wisdom and love.” Common Declaration by Pope John Paul II and the Ecumenical Patriarch Bartholomew I
- “We have a responsibility to life, to defend it everywhere, not only against our own sins but also against those of others. We are all passengers together in this same fragile and glorious world.” Rabbi Arthur Hertzberg, World Jewish Congress
- “Nature is the closest thing to religion, and religion is the closest thing to God.” Sheikh Ali Zein Eddine, Druze Foundation, Lebanon
- “Do not use anything belonging to nature such as oil, coal or forest, at a greater rate than you can replenish it. For example, do not destroy birds, fish, earthworms and even bacteria which play vital ecological roles – once they are annihilated you cannot recreate them.” Swami Vibudhesha Teertha, hereditary leader of Vedic teaching, India

For guidance on how to connect religious convictions to environmental action, consult ARC/UNDP (www.windsor2009.org/Guidelines-Long-Term-Commitment-09-11-24.pdf)

Source: www.unep.org/ourplanet/imgversn/142/finlay.html

to comment on them or to have local group discussions about them. Local knowledge cannot be judged by the same criteria as academic science. Each type of knowledge builds on its own equally valid worldview.

PARTICIPATION IN DECISION MAKING: WHO SHOULD BE INVOLVED?

How can acknowledging rights to nature and knowledge about nature support mainstreaming ecosystem services in local policy? Participatory decision making is where knowledge and rights converge.

Stakeholder participation in local policy goes beyond people’s right to be part of processes that affect them. Participation is an important element of effective local policy. The credibility and legitimacy of policy efforts is enhanced when there are opportunities for stakeholders to become involved. Also, local perspectives often surface through reflection and

dialogue. If well done, participation brings stakeholder concerns to the fore. It can bring different knowledge backgrounds into fruitful exchange, preventing conflicts and strengthening the knowledge base out of which decisions are made. Participation can strengthen local environmental awareness and create a sense of ownership regarding decisions. In sum, **participation can improve both the quality of decisions and their chances of being successfully implemented** (NRC 2008).

Participation means different things to different people. To some, participation is about empowering the poor, to others it is about improving the effectiveness of projects. One way to clarify is to distinguish the degree to which participants share power with those convening the process. Are participants merely being informed? Are they being asked their opinion regarding certain measures? Are they part of the planning processes, and if so, how? Are they consulted

on the objectives of the policy/project? Do they have a formal influence on the final decision? Which degree of power sharing is most appropriate depends on your situation, but **transparency on what participants can expect is key** to a successful process.

In policy settings with divergent worldviews, conflicts can be anticipated by elucidating different knowledge and opinions in participatory processes. This is particularly important in situations of high uncertainty (Renn 2008). Step 1 of the TEEB approach (10.2) emphasizes the need for consensus regarding the problem and its parameters. This can involve exchanges of opinion and negotiation.

Well-conducted participatory processes can also play a key role in bringing to light de facto rights to resources and services – important for dealing with conflicting interests.

Several principles have proved useful for organizing participation (Box 10.5):

There is a direct correlation between the accessibility of information and the utility of the participatory process. A focus on ecosystem services provides information in a format that is very relevant to stakeholders. It **helps identify stakeholder-specific dependencies** on certain services. This helps to outline the implications of policy change on the stakeholders and their activities. The first step to recognizing the social im-

pacts of policy change is agreeing on which stakeholders are dependent on which ecosystem services.

Where people are at risk of losing certain services, their rights need to be taken seriously. This may be a basis for rethinking the original decision, or it may help define adequate compensation. Public consultation on ecosystem services means that conflicting interests and disputes over alternative options are grounded in broadly acceptable information. This helps the debate. And it helps the project or policy proponents who can expect concrete feedback.

A focus on ecosystem services also **makes trade-offs between services visible**. This focus can make plain the implications of each choice. Debate is better informed, based on a clear picture of the social and economic implications of different options. It illuminates what people stand to lose and what people stand to gain. Another virtue of discussing environmental implications in this way is that ecosystem services provide a common language. This builds bridges between distant positions. Through this lens, disparate concerns are made equally visible and valid.

Finally, a **note of caution**: when conducting ecosystem service assessments using participatory processes, the method and its underlying assumptions need to be understood by all. People cannot make informed choices or debate results if they do not understand what is being assessed and how.

Box 10.5 Design principles for facilitating participatory processes

How can participation help people peacefully relate to each other and act together in their own best interest? A challenge! Facilitating participation requires caution in both word and deed. The following principles are helpful guides:

- For each participatory process, organizers should specify: Who participates? On which terms? For what purpose? Stakeholders need to have a clear idea of what they can expect from the process.
- Organizers should analyze (politically and in economic terms), interactions and power relations within the local context as well as between a locality and its wider structural setting. Examining the distribution of ecosystem services provides important insights. If power relations are neglected, the process may be used by those with the most power to capture additional benefits.
- Participation should include everyone directly affected by the decision, as well as those relevant to implementation. Different actors will have different concerns. Bilateral meetings, or ‘shuttle diplomacy’, can support process facilitation.
- The success of a participatory process largely depends on the trust stakeholders place in it. For this reason, the reliability and transparency of the facilitator are key.

Source: adapted from: Berghöfer and Berghöfer 2006

10.4 TEEB'S ANSWERS TO PRACTICAL QUESTIONS

Why and how should an ecosystem service assessment be conducted? How can I make use of an ecosystem service assessment in local development policy? What follows are answers from a TEEB perspective to practical questions about considering ecosystem services in your own regions, districts, or municipalities.

Question 1:

What do I need to know when commissioning an assessment?

- **What do I need it for?** The typical situations described above give you an idea of the different ways an ecosystem services assessment can support local and regional policy. For precise decision-making support, the assessment needs to incorporate the future impact of several decision options. For an initial analysis for example, a snapshot of your city's green infrastructure may be sufficient.
- **What information and expertise do I already have at my disposal?** If you already know, through experience or common sense, what the assessment will investigate, the assessment is of little added value. If water provisioning is a key service in your region because it is arid, the assessment should focus on different scenarios or policy options, rather than merely confirming what is already evident.
- **What are my resources and time constraints?** If data and capacity is limited, and time is tight, a stepwise approach makes sense. After a rough first appraisal, narrow down your scope and concentrate efforts on further examining those services or areas where more insight seems most helpful. Organize the assessment in such a way that preliminary results are repeatedly discussed and used to guide the next steps of examination. Insist that only the obviously necessary information is generated.

Question 2:

Do I need to clarify the design of the assessment study?

Yes. The TEEB Foundations report summarizes best practice for valuation, but most settings require specific adaptations to the study design. To a significant extent, the design of the assessment determines the kind of information you get out of it. You need to agree on the assumptions upon which the assessment is based (see Chapter 3). If you collaborate with the experts conducting the assessment by being involved in the study design, you can make sure that necessary information is actually produced. You will also know how to interpret results.

The following questions can **help you clarify and agree on the study design**:

- Where do I need monetary estimates? When do I want quantitative and when do I want qualitative results?
- Benefits or costs of changes in ecosystem services may occur beyond municipal borders, and sometimes into the future. Which area do I focus on? Can I have different degrees of detail in my analysis for different parts of the assessment area?
- Which services do I focus on? Are there potentially critical ones amongst those I intend to neglect? Where can analysis of one service give me a good proxy for another one? For which services do I have clear information already – even if it is not labelled as an 'ecosystem service'?
- What is the time horizon I want to consider? This may be a decisive design feature for monetary valuations. The value of a forest differs if you estimate the benefits that flow from it over a period of 10 years or 30 years. Here, the → 'discount rate' at which you calculate future gains in present terms, strongly affects the result. The higher the discount rate, the less important you consider future benefits compared with today. (see Chapter 3; also TEEB 2008 and TEEB Foundations, Chapter 6).

Question 3:**How can I assess ecosystem services without scientific resources and skills?**

An exact assessment of ecosystem services requires a sound understanding of the functioning of the ecosystem which provides the services. An ecosystem services perspective already provides valuable orientation where ecosystems have not been studied in depth. The list of services (Chapter 1) tells you what to look out for. It presents guiding questions that help with a first appraisal. Such questions include:

- Which ecosystem services are central to my local/regional society and economy?
- Who depends on which services?
- Which services are at risk?
- What impact will an action/decision/policy have on the services?

Discussing these questions among peers, using common sense, local expertise and available information can begin to generate a clear picture about the characteristics of the problem and the priorities for action. Likewise, participatory appraisal techniques (Chapter 3) and information from other places about linkages between ecosystem services, or between policy action and services, can give you valuable insights. The ecosystem services perspective orients your analysis and prevents you from neglecting key issues.

We do not present monetary reference values for different ecosystem services here because they vary across different settings. The value of a coral reef for tourism can differ from a few dollars to nearly one million dollars per hectare depending on what kind of infrastructure and connections to the tourism market you have. The TEEB Matrix available on www.teeb-web.org recompiles exemplary studies of values for ecosystem services in different socio-economic contexts and →*biomes*. Also, for your own appraisal, Chapter 3 gives you an overview of relevant guidelines and handbooks on valuation methods.

Question 4:**Do I need to calculate total economic value (TEV)?**

The →*total economic value* can give you an indication of what you risk losing. It points to value dimensions:

use, →*non-use*, option and →*existence values*. Identifying these value categories for different services helps to characterize what we are talking about (See Chapter 2 and 3). Existence and option values can never be calculated as precisely as provisioning services for products with a market.

It is often not necessary and sometimes not appropriate to calculate TEV. Sometimes a project impacts only one service. In order to be sure that other services are minimally affected, you should carry out at least Step 2 (10.2) and explicitly go through all ecosystem services to identify which are relevant to your situation. You might then consciously decide to focus on a few services or on one and choose the appropriate assessment approach (see next question). Further along in the process, it is helpful to mention the assumptions made regarding the other services.

Question 5:**When should I use qualitative assessment?**

The situation, and the intended use of assessment results determine what kind of assessment you need. You can choose between (i) a qualitative assessment describing why and how a service is important for local well-being, (ii) a quantitative assessment estimating for example how much a service has changed, and (iii) a monetary assessment expressing the value of a service in money terms. You can also combine different approaches for different services.

It is often useful to first conduct a ‘quick and dirty’ appraisal, mainly in qualitative terms, to prioritize and specify the need for further analysis. This is particularly useful where the relative importance of services and/or the potential impact of a project are still very unclear, or where there is little scientific expertise available.

When the expected impacts are drastic, it may not be necessary to quantify what is already known to be unacceptable. For example, when a certain pesticide is known to contaminate a water supply or where a species is in acute risk of extinction, the decision may not require more elaborate estimates. ‘Recognizing value’ is sufficient (compare TEEB Foundations, Chapter 4).

Qualitative assessment also is a better choice where it is considered unethical to value services or species in monetary terms. Assessing in qualitative terms ensures that their value is explicitly considered in the decision-making process.

Question 6:
How can I assess cultural services?

Some cultural services can be assessed and monetized quite easily, such as the value for tourism (see Chapter 3) while inspiration, religious importance or sense of place are better captured in a qualitative manner. Even if services are only identified and discussed, decision makers can be made aware of what these services mean for the population and future development potential. Often, the more urbanized and industrialized an area becomes, the higher the potential value of recreation, health, peace of mind, and inspiration. Good quality enquiry could include questions such as:

- Will our children be able to play in the forests as we did?
- Can I be buried where my ancestors lie?
- Will this still feel like home once large parts of the natural surrounding are transformed in order to allow for construction or industrial development?

Question 7:
What if my results are very different from studies in other places?

In this case the first important step is to analyze and understand why this is so:

- Were all pertinent ecosystem services included in the analysis?
- Is important data missing?
- Are only very few people affected?
- Is the income of this people and/or their purchasing power much lower than in comparable biomes?
- Was a very high or very low discount rate used?

Ecology is often very complex, so be aware that values may differ strongly from place to place. It is therefore important to identify crucial or critical areas (compare Box 2.3)

Question 8:
How long do my estimates remain valid?

There is no clear cut answer to this question. It depends on many factors, from ecosystem to beneficia-

ries. This is precisely why applying the precautionary principle when managing local nature, or at least identifying potential option values for future development, is so important.

It is useful to identify which variables will have a significant effect on the results if they are adjusted. If these (or proxies) can be monitored, it becomes easier to determine when and what type of updates might be required to ensure that the valuation remains valid.

Question 9:
Are there sound monitoring systems for ecosystem services?

As indicated in section 10.2, there are many different occasions where conducting an assessment of ecosystem services can be beneficial. In the medium and longer term it is beneficial to monitor and stay abreast of the state of important natural resources and the services that flow from them (the stock of natural capital). Again, your monitoring system should respond to your information needs and be adapted to your situation. *ecoBUDGET* (Chapter 4.4), is an example of a management system for local natural capital. It includes the agreement on needs-oriented indicators for monitoring.

In 2010 a City Biodiversity Index is being developed under CBD auspices, combining indicators on biodiversity, ecosystem services and environmental policy for urban management (www.cbd.int/authorities).

Question 10:
How do ecosystem service assessments relate to other assessments?

While ecosystem service assessments can inform other monitoring and assessment efforts, they should not duplicate or replace them. They can be incorporated into spatial contexts and their respective tools and management systems (maps, GIS). Several tools exist to incorporate ecosystem services explicitly into management systems and GIS databases. The most comprehensive is *InVEST* (see Box 6.7 and annex).

A focus on ecosystem services can be incorporated into strategic environmental assessments or environmental impact assessments (Chapter 6). Any social



impact assessment of projects or policies would also benefit from such a focus. Including ecosystem services in other assessments can be the most practical and cost-effective means to explicitly take ecosystems and their services into account. How can this be done? The key issue here is to revise and complement the design of these other assessments, checking which services are already covered and which ones would need to be included.

Often, impact assessments are fixed in a legally required format. When local authorities have to commission, comment on or endorse impact assessments this presents a good opportunity to request that assessment teams expand their focus to include ecosystem services.

Question 11:
How can I make the most of ecosystem service assessments?

Some typical opportunities for taking up an ecosystem services perspective have been described above. They include:

1. making visible the trade-offs among different decision alternatives (land use, infrastructure projects);
2. understanding the social impact of certain environmental changes;
3. making a strong case for wider consideration of your natural capital;
4. adopting a systematic approach for doing so (see the steps described above).

Assessments of ecosystem services can be very helpful when devising local and regional policy response. They can improve the design of incentives schemes and compensations, taxes and charges; rules and regulations; spatial planning and environmental monitoring (See Chapters 4-9).

In order to make the best use of assessments, their function and scope in the policy process needs to be clear to you and to others. For this, it is helpful to adapt your study design to the intended use of the assessment. It is also helpful to be transparent about the assumptions in your assessment when you communicate results. Combine the assessment or valuation of services with other information you draw from. It is important not to allow any debate to be narrowed down only to an estimate of the value of selected eco-

system services. A clear plan for how to insert results into a decision-making process is most important.

Question 12:
How do I involve stakeholders in using results of assessments?

Assessing the availability, future changes or the value of ecosystem services is insightful. This is especially true if services are viewed in the context of other available knowledge, such as business knowledge about the local economy, higher policy level experience concerning the political and legal context and your peers' professional experience in different local policy areas.

It is a good idea to use assessments as input in discussion with stakeholders. This may prompt different interpretations of the results and tease out implications. This is best done if there is sufficient time for it, if results are presented at disaggregated levels (for each service or for each area separately) and if assumptions and assessment methods are understood (though not necessarily agreed upon) by all involved.

Focusing on ecosystem services, and their importance for human well-being, can also provide a common language between different parties. This is the case even where there is no agreement on specific values, or on which services are to be prioritized, in your local setting.

In complex or conflict-prone settings, it is advisable to make use of formal decision-support systems such as multi-criteria assessments (MCA). This does not require additional steps in your process, but is a tool for bringing together insights from different realms in a transparent and recognizable way (see Chapter 3). MCA can be very helpful for structuring difficult decisions regarding trade-offs for your community.

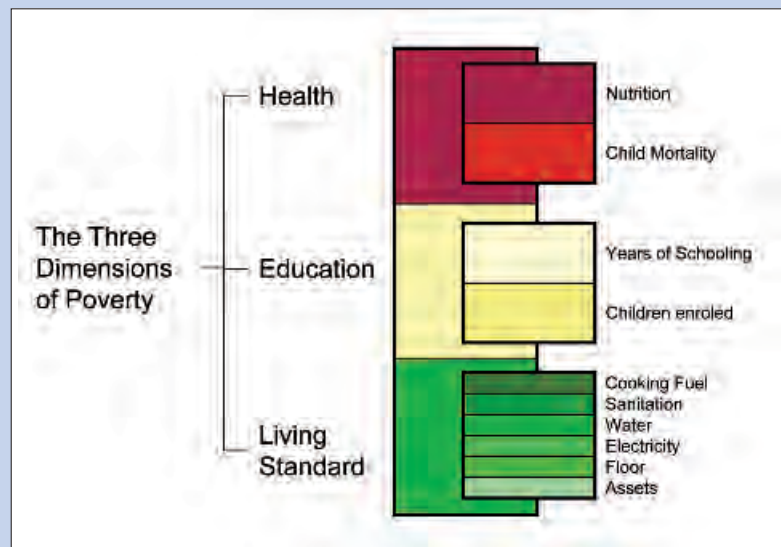
Question 13:
How can I ensure that monetary estimates do not backfire?

In Bulgaria, some years ago, a project estimated the economic value of medicinal plants. This information quickly spread. Eventually, the police had to protect the areas where these wild plants occurred. This shows

Box 10.6 Dimensions and Indicators of Multidimensional Poverty

The Multidimensional Poverty Index focuses on three facets of poverty: health, education and standard of living. The index works with 10 indicators relevant and feasible to study in more than 100 countries (Alkire and Santos 2010). At least 3 of the indicators are directly related to the sustained flow of ecosystem services: (i) malnutrition, (ii) the availability and quality of drinking water; (iii) electricity and other energy sources.

The multidimensional index goes beyond income measure. Policy makers can adapt it to their information needs in twelve steps procedure. They define what aspects of poverty are most relevant, which indicators would be feasible and meaningful to apply. For each indicator a threshold determines from when onwards someone is regarded deprived in regard to the indicator. For example, lack of education may be determined by less than 3, 4 or 5 years of school enrolment. Subsequently, for each indicator the situation of households is assessed and finally, if desired, weighting and aggregation can bring this information into a single score.



In rural subsistence economies, where dependence on ecosystem services is high, their availability and accessibility could function as meaningful indicators.

More details at www.ophi.org.uk/research/multi-dimensional-poverty/how-to-apply-alkire-foster

Source: adapted from Alkire and Santos 2010

there are concrete dangers involved in disclosing or attributing monetary values to ecosystem services.

While monetary estimates are a powerful means of communicating value, the way they are perceived and used in local communities and policy debates cannot be anticipated or controlled. They may take on a life of their own, and persist in the collective memory for a long time while the assumptions and conditions under which the estimates were made are not part of that memory. Numbers can also be used to argue for opposing causes. If calculating future costs of a loss of water catchment capacity and habitat for pollinators gives a very low monetary estimate, even small monetary gains from deforesting land may seem like an attractive choice. It is important to keep in mind that the benefits (from timber, for example) do not replace the losses of the other services if different people are affected or different time periods are considered.

Monetary estimates of ecosystem services can frame the debate about decisions affecting the environment in terms of costs and benefits. While a comprehensive cost-benefit analysis would include existence and option values of all ecosystem services, in most cases we have only partial estimates because only a selection of services have been used to produce the estimate. Omitted services, preferences and arguments need to enter the decision-making process in non-monetary formats. At local policy level, an estimate of a total economic value seems seldom the best choice in face of these difficulties.

Monetary estimates need to be embedded into a chain of arguments or into a multi-criteria analysis if you want to ensure that they do not backfire. Another safeguard is to keep estimates at disaggregate levels. Instead of claiming that green spaces in a town are worth X, you should state that their air quality value is equivalent

to Y and their leisure value is equal to Z. This makes communication more complicated but helps you and your audience in interpreting results.

Question 14:

Why should I examine *who* benefits from nature?

Ecosystem services benefit different people or groups in different ways. Making distribution visible is a good precondition for designing policies that contribute to →*equity* and poverty reduction. When designing an ecosystem service assessment, it is important to ask (for each service): ‘Who benefits from this service?’ and ‘Who uses or depends on this service?’ For services such as flood control, microclimate regulation or erosion control, a spatially disaggregated analysis can also help identify who are the main beneficiaries and who is at risk of losing a service.

The sustainable livelihoods approach and participatory appraisal techniques (Chapters 2 and 3) provide methods and tools for a more detailed analysis on who depends on ecosystem services. Implications of changes in ecosystem services, especially for the daily life of poorer populations, can often be captured in descriptive terms, such as the time required to access clean water, or the health risks of contaminated water.

To address environmental conflicts, local policy makers benefit from considering the full range of ecosystem services, from obvious to elusive ones. Two things need to be clarified. Firstly: Which services are actually affected? This includes services which are indirectly involved. Secondly: Who has which rights to these services? In combination, responses to these questions can help map conflict lines between different public and private interest holders. This is useful for any conflict resolution strategy.

Question 15:

How can a focus on ecosystem services strengthen the local economy?

Natural capital is an important asset for business. Managing it well can help reduce risks and secure business opportunities. The efficient use of natural resources, and the prevention or limiting of pollution, secures long-term economic growth. Local fisheries

are an example of this. There are several options for local policy to improve the use of natural capital – through taxation, specific credit programs and fees or charges. Local policy can also create incentives for citizens and businesses to invest in natural capital.

Local policy can also make rules to guard against very damaging and dangerous practices. A clear understanding of local natural capital provides a good basis for this. Local government, or related organizations such as municipal water companies, can directly invest in ecosystems by buying up land or setting up payment schemes for ecosystem services (Chapter 8).

When restoring nature, it can take a considerable amount of time for services to fully resume. Carefully identify when costs and benefits occur and who will benefit and who will lose. This will help with devising tailored approaches to overcome gaps. Communicating and explaining (to all parties involved) when and how benefits and costs will occur is an important first step. Knowing short-term loss will be compensated by medium-term gain can help mobilize resources and help you to plan accordingly. Many people and firms may not be able to finance the investment using their own resources. Credit lines or easements can help overcome the ‘dry spell’ before benefits cover costs. Grants or subsidies can cover parts of the initial investment. Other instruments can make an investment accessible to private parties. Make sure support is transitory and compatible with cost and benefit streams.

The same principles apply at the municipal level. Although conserving or restoring nature is often a good investment (TEEB in National Policy, Chapter 9), municipal budgets might not be able to cover costs on their own. State level or development banks might have adequate credit lines. Incentive programs may be set up at the national level. Some foundations set up projects or competitions that can help cover parts of the costs. Selling shares to citizens and involving them in the investment might also be an option.

Transition is not only a financial challenge. Changing how we manage natural resources requires a change in how we relate to nature. It requires a change in how we perceive it and what we value. Investing in wetlands

or degraded forests that have long been considered wastelands is a radical shift from the current ways of doing things. Such changes take time and effort, even when compensation for financial losses occurs. Education and capacity building, which make benefits tangible, can help ease transition. Changes might affect rights (to access or use), knowledge (the definition of nature) and values. Such changes are usually not easy and often involve conflict.



Question 16:
How can I address conflicts over ecosystem services?

Environmental conflicts exist amongst private interest holders and between public and private interests. Current and future interests also play a part. Environmental conflicts occur over resource use rights and the pollution of natural systems. Rights to harvest or pollute are currently being negotiated and renegotiated at an unprecedented speed across many policy levels. Apart from social or political changes at local and regional levels, central government policies and new demands from distant markets can rapidly transform relationships with the natural system. Carbon sequestration values did not exist 15 years ago. Climate change mitigation had not reached the policy sphere.

Addressing conflict takes more than an ecosystem service assessment – but an assessment can help map the conflict lines between different public and private interest holders. It specifies which services are actually affected (including services that are indirectly involved). It also specifies who has which rights to services. Such a map is useful for any conflict resolution strategy. It pinpoints who will be affected by the environmental change (See Further Information).



Question 17:
How does a focus on ecosystem services affect other motivations to protect nature?

A focus on ecosystem services raises awareness about our dependency on a functioning natural environment. Those already concerned about conserving nature because of scientific, aesthetic, cultural or spiritual experiences and rationales, may not need additional insights to convince them of the value of nature. They might even feel pressed when asked to justify their activities with reference to the services they help to secure. This should not be a hurdle if assessment includes cultural and supporting services.

Estimating the monetary value of an area's ecosystem services cannot substitute for other forms of knowledge and appreciation, such as the spiritual importance of a place, its political significance or the emotional attachment people have to it. Instead, a focus on ecosystem services provides arguments and insights which are complementary to other motivations for nature protection. If this is recognized by policy makers, arguments for enhancing and protecting ecosystem services become even more convincing.

In the long-term, we can imagine a rich landscape with diverse protection regimes in different places. Some measures will focus on securing immediately needed services such as water provision through the protection of watersheds (eg funded by water utilities), or climate regulation by protecting forests (eg funded by a REDD+ scheme). Other areas will focus on species conservation (eg funded by conservation organizations).

10.5 CONCLUSION: IT IS BETTER TO ERR ON THE SIDE OF CAUTION

Understanding where, how and why ecosystem services play a role in the local society, economy and culture is essential to prioritizing which services to enhance and how to enhance them. Understanding

also makes it possible to consider the implications of imminent local land-use change and of planned projects, programs and policy changes. This is the central claim of our report.

We have offered tools and frameworks for considering ecosystem services in Chapters 2 and 3. We have presented options and experiences with this approach in a range of local/regional policy areas and →*public management* tasks in Chapters 4-9. In this last chapter, we have outlined key governance issues and practical questions for shifting local policy on the basis of stronger environmental arguments.

A focus on ecosystem services makes it clear that a functioning natural system is an indispensable pre-requisite for our well-being. Some of the consequences of degraded services are difficult to quantify even though the connections are well understood. Losing green spaces in cities certainly affects the mental health of city-dwellers – even if calculating the impact of this loss is difficult – and some of the benefits of maintaining ecosystems accrue over many years. We do not know yet, except in a vague sense based on our hypotheses, how important it will be to maintain genetic diversity. Because we do not know what the future has in store, it is prudent for us to err

on the side of caution when-ever we are in doubt about the consequences of our actions. Without ecosystem services, life on earth could not be supported. They are essential to our survival. Safeguarding them, quite simply, is common sense.

We simply cannot risk taking nature for granted. Twenty years from now, we may see more clearly the implications of what we are already seeing signs of today. We might understand better how overexploitation affects people and natural systems directly and indirectly. We may also notice that governments, whose strategy is to balance needs with supply, have had a significant positive impact on the environment and quality of life.

Let us consider ‘quality of life’ as the beacon that orients local policy, recognizing that a healthy environment is our natural life support system. On these terms, visionary leaders of cities and rural communities, working to secure the future of our planet and its people, will ultimately be proven right.



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FOR FURTHER INFORMATION

Identifying Policy Responses

Millennium Ecosystem Assessment 2005. Response Assessment. This volume is a comprehensive collection and analysis of policy options. www.millenniumassessment.org/en/Responses.aspx

Rights to Nature

CAPRI – Collective Action and Property Rights. Online information portal with policy briefs, research papers and training announcements – all on the role of getting rights clarified. www.capri.cgiar.org

R Meinzen-Dick et al. 2010. The role of collective action and property rights in climate change strategies. Policy brief on response strategies to climate change and the importance of collective action and clear property rights in them. www.capri.cgiar.org/pdf/polbrief_07.pdf

P Dasgupta 2006. Common Land – Commercialisation versus Conservation. Policy Brief of SANDEE, examining effects of a shift from collective to private ownership of benefits from nature in rural India. <http://idl-bnc.idrc.ca/dspace/bitstream/10625/38935/1/128294.pdf>

Kalpavriksh Environment Action Group. Website with reports and analyses of implications of environmental laws on rural residents in India. www.kalpavriksh.org/laws-a-policies/tracking-forest-rights-act-

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Knowledge Management

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