6 SPATIAL PLANNING AND ENVIRONMENTAL ASSESSMENTS

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Content of this chapter

This chapter highlights **opportunities for policy makers** to consider ecosystem services and biodiversity **in both spatial planning and environmental assessments**. Section 6.1 outlines challenges to spatial planning and describes the trend towards its redefinition. 6.2 explores its relationship to ecosystem services and →*biodiversity*, advocating the importance of incorporating ecosystem services in spatial planning – as well as identifying the connection between spatial planning and climate change issues. The use of environmental assessments to account for ecosystem service values and biodiversity is presented in 6.5. **Action points** on spatial planning are in 6.4 and lessons from practice on environmental assessments in 6.7.

Key Messages

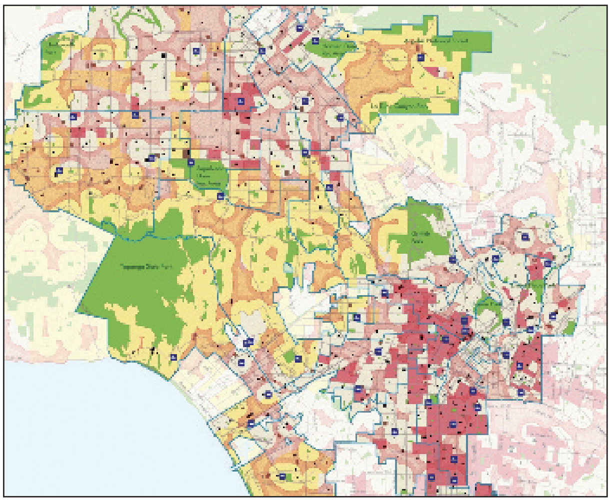
- **Seeing the forest for the trees.** The overriding benefit of spatial planning is that it can encompass the cumulative impacts of incremental decisions on ecosystems and their services. It examines the 'parts' to make decisions that affect the 'whole.'
- **Knowledge really is power.** An effective planning framework can make the policy and planning process transparent and inclusive, assessing who benefits from which ecosystem service, helping to avoid conflicts, especially if different stakeholder groups are part of the planning process.
- **Early thinking enables opportunities and management of changes.** Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA) can contribute to the integration of biodiversity issues and ecosystem services in local and regional planning. This safeguards livelihoods, illuminates impacts on ecosystem services and highlights the risks and opportunities associated with changes.
- **Start locally to think globally.** A good strategy considers both local and global systems and stakeholders. Spatial planning, supported by EIA and SEA, may form a basis for sustainable, economically and socially appropriate responses, for example, to climate change.
- **Getting more than you bargained for can be a good thing.** The proactive inclusion of ecosystem services allows environmental assessment to identify the economic potentials, rather than simply the constraints, associated with development that supports biodiversity.

6.1 CHALLENGES FOR SPATIAL PLANNING

A clear planning framework helps to create sustainable communities, and an →*ecosystem* perspective is increasingly recognized as key to effective spatial planning. Plan-led urbanization and rural development can contribute significantly to more sustainable economic growth and environmental justice. This means that planning authorities should create long-term spatial development plans for specific areas which are used to inform decision making. This can be achieved through a range of approaches to spatial planning (Box 6.1).

IDENTIFYING THE CHALLENGES

Current estimates project that by 2035, 2 billion additional people will be living in urban areas, of whom 1 billion will be slum dwellers. This scale of urbanization is overshadowed by risks associated with climate change and the threat of natural disasters which present extraordinary challenges for spatial planners. Projections for the impacts of climate change involve uncertainties in particular at the local and regional level. Therefore, decisions for long term planning need to be precautionary considering a range of possible scenarios. As ecosystems like forests and wetlands can deliver multiple services relevant for climate change mitigation and adaptation, they are an important component within regional planning. Essentially, the planner's job is to 'map the way' to future economic growth and ecological integrity by resolving conflicting development goals.



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Map displaying park access for children of color living in poverty with no access to a car in Los Angeles, USA. Parks in green, areas with more than half-mile-distance to next park in red.

Box 6.1 The nature of spatial planning

Spatial planning can be delivered through development policy or through legally binding plans. Development policy guides planning by formulating objectives and key areas of intervention while legally binding plans define rules of action. In both cases, effective plans are monitored, measured and re-assessed when necessary. Open and collaborative spatial planning helps to make agreement between diverse →*stakeholders* with a variety of agendas, backgrounds and landscapes possible. Spatial planning integrates three perspectives:

Sectoral Planning targets specific 'activities' such as transport, water resources, forestry and mineral extraction. Plans are often prepared by the government department or agency that manages these →*resources*.

Master Planning addresses areas requiring significant changes such as new communities or areas targeted for regeneration. Typically, these plans are prepared by lead agencies in either the public or private sector.

Nested Planning addresses different scales of governance – from local to regional to national. Nested planning increasingly encompasses mega-regions beyond state boundaries. Their shape is as variable as the mechanisms and bodies that implement them, reflecting both their scope and purpose. It can be influenced by broad and specific goals, geography and relevant legislation.

The Millennium Ecosystem Assessment (MA 2005c) recognized that when urban systems are managed more equitably and the loss of →*ecosystem services* is purposefully addressed, the benefits to →*human well-being* can be substantial. However, despite the fact that effective spatial planning can be instrumental in 'greener' urban development, the Global Report on Human Settlements (UN- HABITAT 2009) reports that although the sustainable urban development vision has been embraced by cities all over the world, none are yet able to simultaneously and comprehensively address the different facets of the sustainable urban development challenge: both where ecosystem services can help improve quality of life (green agenda) and where ecosystem services are affected by infrastructure (brown agenda, Table 6.1).

The European Environment Agency report on 'Ensuring quality of life in Europe's cities and towns' (EEA 2009) identifies four common challenges for spatial planners:

1. **The sectoral nature of policies:** The diverse number and range of local strategies (transport, housing, environmental, economic) are often in conflict and are not integrated.

Table 6.1 Green and brown agendas for urban planning

Green Agenda (ecological systems)	Brown Agenda (human systems)
Ecosystems that provide green/ recreation space and biodiversity protection.	Waste systems that recycle and remove (solid, liquid, air) wastes from cities.
Water systems that provide a natural flow for both water supply and waste disposal.	Energy systems that provide power, heating, cooling and lighting for city functions.
Climate and air systems that provide cities with a healthy environment.	Transport systems (including fuel) that enable mobility in the city.
Agricultural and forestry systems (and other ecological services) that provide food and fibre for cities.	Building and materials systems that provide the physical infrastructure of cities.

Source: Adapted from UN-HABITAT (2009).

2. **Poor delivery mechanisms:** Plan making and plan delivery are often managed by separate agencies which are not aligned. Implementation increasingly rests with private corporations, particularly in the case of major new infrastructure such as transit systems.
3. **Lack of professional resources:** A shortage of planners limits the promotion of sustainable development – especially those who have an understanding of the role of the ecosystem services approach in effective planning.
4. **Administrative boundaries:** Administrative boundaries rarely coincide with economic, social or ecological systems. These boundaries may create competition rather than collaboration between municipalities across an ecosystem (eg one municipality may extract headwaters from a river system, affecting downstream areas).

REDEFINING SPATIAL PLANNING

The above challenges require a redefinition of spatial planning, to make it more **value-driven and action-oriented** (The New Vision for Planning, RTPI 2000). This has set an agenda for planning that places greater importance on sustaining habitats that underpin ecosystems and biodiversity (Vancouver Declaration 2006).

Integrated, inclusive and sustainable plans have become the internationally accepted goal. For example, the European Council of Spatial Planning (ECTP) has set out a New Charter of Athens (ECTP 2003) which focuses on the need to recognize social, environmental and economic connectivity. The charter stresses the importance of both the **'Precautionary Principle'** and environmental considerations in all decision-making processes, not only when they are obligatory (see Box 6.10).

Aligning local and regional spatial planning with wider global challenges is also critical to the delivery of the eight **Millennium Development Goals** of the United Nations. Planning has been identified as a key tool for addressing wealth, health and educational challenges. This is because goals pertaining to welfare have a strong spatial dimension.

Local communities can use **benchmark planning** systems with a range of criteria such as those set out in the INTERMETREX Benchmarking System (METREX 2006). In designing or re-designing planning systems to make them effective, decision makers may consider the following: who holds development rights; delivery mechanisms; public participation processes in planning decisions; and how disputes are resolved. Planners can also rank the extent to which public benefits are extracted from private development initiatives.

6.2 THE RELATIONSHIP BETWEEN SPATIAL PLANNING AND AN ECOSYSTEMS SERVICES PERSPECTIVE

Integrating ecosystems into spatial planning positively affects quality of life and provides essential support for ecosystems and habitats (EEA 2009). Effective planning can be instrumental in reducing a city's ecological footprint by increasing housing density, no longer exporting waste to surrounding areas, decreasing flood risk (DCLG 2010) or by providing green space for exercise. The challenge for the planner is to determine how to incorporate an ecosystem perspective into city and resource management. Including →*values* of ecosystem services can significantly change the results of Cost-Benefit Analysis (Box 6.2).

When exploring opportunities for significant land use change or natural resource extraction, taking ecosystem services into account allows for the identification of alternative strategies that limit the impacts on the natural resources that sustain rural livelihoods (Box 6.3).

The overriding benefit of spatial planning is its ability to address and encompass the cumulative impacts of incremental decisions on ecosystems. Spatial planning can effectively assess incremental consequences because it considers the long-term outcomes of different options.

Box 6.2 A Cost-Benefit Analysis of ecosystem services in Brazilian Amazon

Road construction and paving in the Brazilian Amazon has been greatly debated in the last decades due to its 'positive' impact on regional development and 'negative' impact on forest ecosystems.

In 2005 the Brazilian government announced plans to reconstruct a road between the states of Amazonas and Rondônia as part of its Growth Acceleration Plan (PAC). This route, once connecting two capital cities (Porto Velho and Manaus), requires 406 km of extensive paving, bridges and reconstruction. The impact of improved infrastructure, however, is projected to cause extensive deforestation unless effective policy measures can restrain forest clearing.

A pre-feasibility study used a Cost-Benefit Analysis to evaluate the effect of including environmental externalities in both a 'conventional' and an 'integrated' scenario. Interestingly, both feasibility studies indicated that the project was not economically feasible. The 'conventional' scenario focused on local and regional benefits associated with cargo and passenger transportation savings as well as the costs of road construction and maintenance. This study indicated that the project would result in a net loss of about US$ 150 million. The 'integrated' scenario, which accounted for the costs of deforestation, projected a net loss of up to US$ 1.05 billion; this means the expected value of the lost ecosystem services amounts to US$ 855 million (NPV 25 years, 12% →*discount rate*).

The project is stopped at the moment because of several factors, the main one being the fact that the project still does not have an environmental license approved by IBAMA, Brazil's environmental agency, because they considered the environmental impact study to be deficient. The study referred above was used by the Brazilian Senate and the National Public Prosecutor's Office - MPF to question the feasibility of the road.

Source: Costs benefit analysis of road construction considering deforestation, Brazil. TEEBcase based on Fleck 2009 (see TEEBweb.org)

For example, cutting a few hectares of forest for a new road or shopping mall mainly has local effects, however, as a regional trend, urbanization affects the function of natural ecosystems at large and this has relevance for global climate change (DeFries et al. 2010). Equally, the first few farmers converting forests on hill slopes to agricultural production might not have serious implications; however, if the trend continues, cumulative consequences include soil erosion, siltation, reduction of water availability and landslides. **Integrating an ecosystem services perspective into spatial planning helps planners to identify and deal with →*trade-offs* and cumulative effects.**

Box 6.3 Low-impact mining in Chocó, Colombia

The Chocó eco-region is a biologically and culturally rich area. The region's soils contain gold and platinum, making it attractive for mining. Large-scale mining would destroy most of the area's ecosystems and their services. Local communities depend on these services for fishing, wood extraction and subsistence agriculture. For this reason, local communities decided not to rent out land to large-scale mining companies but rather to extract minerals with innovative and traditional low-impact mining practices that do not involve the use of toxic chemicals.

With this type of alternative land use plan, communities can generate income from mining while sustaining biodiversity and ecosystem services. The strategy was implemented with the help of national and local NGOs and foundations. This enabled the communities to get their minerals certified by FAIRMINED and sell it at a premium in the growing market for low-impact mined minerals.

Source: Hidrón 2009 and Alliance for Responsible Mining 2010

Decisions about climate-relevant ecosystem services cannot only be made on a project by project basis – which has often been the case to date. Those that are relevant to climate regulation are both global and local in their extent and are delivered by a wide range of ecosystems, which are at risk to varying degrees (MA 2005). Similarly, water services and regulation of extreme events are complex and vast. Ad hoc and small scale approaches to their management risk the total value of the resource being lost because of the **cumulative effect** of the individual decisions (DEFRA 2007). Without a larger strategic context there is a real danger of 'not seeing the forest for the trees.'

Sustaining ecosystems is therefore no longer just an environmental goal. It is necessary to ensure the conditions for sound economic and social development. Therefore two **key principles** need to be applied if we are to integrate an ecosystem services approach into spatial planning:

- Planning must be undertaken for the **functional spaces** within which people live and work rather than the administrative boundaries of a single municipality or region. Ecosystems and the scales on which they deliver services should therefore be understood as the key building blocks for spatial analysis.
- It is essential to integrate ecosystem services into socio-economic decision making, rather than addressing them separately. For this reason, planners can develop a **multi-scale approach** to decision making that accounts for both 'horizontal' and vertical' collaboration.

The potential of ecosystem services is increasingly taken into account in regional and national land use planning (Box 6.4). At the local scale, the Global Report on Human Settlements (UN-HABITAT 2009) has identified eight potential planning responses for urban zoning. These responses provide opportunities to incorporate the above principles into ecosystem services planning (Table 6.2). Furthermore, assumptions that are based on historical experience no longer hold under climate change. Therefore, new tools and guidance is needed that include sophisticated methods like climate models for local and regional planning, which integrate ecosystem services (Box 6.7).

In order for spatial planning to effectively use an ecosystem service approach, municipalities and other agencies are advised to establish:

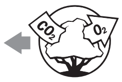
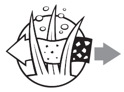
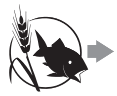
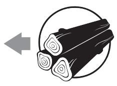
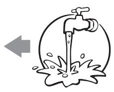
1) **Legal Framework:** This provides a statutory basis for local plans to guide both development and the powers that enforce it (UN-HABITAT 2009). Without a legal framework, the adverse impacts of proposals on ecosystem services cannot be fully controlled or remediated. Planning systems can be made more effective if local communities can design (and redesign) regulatory and legal systems to support effective development.
2) **Regional or national planning frameworks:** In most countries, spatial planning takes place only at the local level, making it difficult for municipalities to draw up strategies for entire ecosystems (such as water catchments). Developing a regional or national planning framework helps to implement plans that incorporate entire ecosystems (Box 6.4).
3) **Technical Resources:** Planners need data and tools to draw up effective plans. This is a particular challenge in developing countries, where there is often negligible information, for instance, about slum neighbourhoods and informal settlements.
4) **Processes for engaging local communities:** Participatory planning is at the core of spatial planning. Community support is essential for an effective plan. This depends on the political will and the resources of the community, particularly in areas where civic society does not have a democratic culture or institutions.

Ecosystem services approaches can be operationalized within planning systems using three different perspectives (Haines-Young and Potschin 2008):

1) **Habitat:** A focus on Habitat units is valuable because it has clear relevance to policy. It links the assessment of ecosystem services with biodiversity action plan processes.
2) **Services:** This approach focuses directly on the ecosystem services themselves (such as water supply or flood control) and is particularly effective in assessing regional and national-level services, such as water basin management.
3) **Place-based:** This approach identifies and evaluates the interrelationships between all services in a defined geographical area. This perspective may overcome problems in defining an ecosystem.

Table 6.2 Policy responses integrating ecosystem services

Policy directions	Examples of potential responses
Renewable energy to reduce dependence on non-renewable sources	• Community energy systems in Freiburg (Germany) and travel management in Calgary (Canada)
Carbon-neutral cities to cut and offset carbon emissions	• Zero-carbon housing in Denmark • Urban tree and woodlands in Sacramento (USA)
Small-scale, distributed power and water systems with more energy-efficient service provision	• Water sensitive design that uses the complete water cycle in Hanoi (Vietnam) • Waste water agro-systems in Kolkata (India) • Local power systems and cooperatives in Malmo (Sweden)
Increasing photosynthetic spaces (as part of green infrastructure development) to expand renewable sources of energy and local food	• Local food provision in Devon (UK) • Biomass in Vaxjö (Sweden) • Green roofs and materials in Shanghai (China)
Eco-efficiency to enable the use of waste products to satisfy urban energy and material resource needs	• Industries reduce waste and resource requirements by sharing waste and resources in Kalundborg (Denmark) • Ambitious recycling targets in Cairo (Egypt) • Maximising urban densities in Hammarby Sjöstad (Sweden)
Local strategies that increase 'pride in place' by enhancing the implementation and effectiveness of innovations	• Participatory systems that localize energy, food, materials and local production in Medellin (Columbia) • Planning systems that capture the value of ecosystem services and creating a 'local sustainability currency' in Curitiba (Brazil)
Sustainable transport that reduces the adverse impacts of dependence on fossil fuels	• Urban form and density in Vancouver (Canada) • Transit systems in London (UK) • Street planning and mobility management in Tokyo (Japan)
Development of 'cities without slums' to improve access to safe drinking water, sanitation and reduce environmental degradation	• Respecting community structure in slum resettlement in Kampung (Indonesia) • Planning for the informal economy in Somalia (UN-HABITAT initiative)


Source: Adapted from UN-HABITAT (2009).

Box 6.4 Ecosystem services in regional planning

China: Provincial and county planners in China now consider areas that are critical for the provision of ecosystem services and for biodiversity conservation in order to develop multi-objective and cross-sectoral land use plans. In Boaxing County, for example, InVEST was used to desing zones development zones that help to protect areas with high ecosystem services value for sediment and water retention for erosion control and flood protection as well as carbon storage. These are also key conservation areas for biodiversity.

Source: Mapping conservation areas for ecosystem services in land-use planning, China. TEEBcase by Wang et al. (see TEEBweb.org).

Indonesia: Sumatra's next ecosystem-based spatial plan will guide local and regional decision-making processes and assist planners to determine whether, and where, to award concessions for economic activities, such as oil palm and pulp and paper plantations. Using the InVEST tool, the location and quantity of high-quality habitat, carbon storage and sequestration potential, annual water yield, erosion control, and water purification were analyzed. This will help to locate and determine conservation activities such as payments for carbon or watershed services as well as best management practices for forestry and plantations.

Source: Integrating ecosystem services into spatial planning in Sumatra, Indonesia. TEEBcase by Barano et al. (see TEEBweb.org).

Although both the ‘habitat’ and ‘service’ perspectives are useful in assessing ecosystem services, political decision making typically focuses on a particular geographical area. For this reason, a place-based perspective is potentially the most effective. It encourages people to think about **cross-sectoral issues**, appropriate geographical scales for analysis, and the values and priorities of different stakeholder groups (Box 6.5).

A place-based approach to planning that incorporates ecosystem services addresses several key questions (adapted from Haines-Young and Potschin 2008):

- **Which** ecosystems services in the area are important to human well-being?
- **Where** do these ecosystems services emanate from? Are they local, or do they come from outside the area under consideration?
- **Who** relies on the services, and in what kind of capacity? How important are they to groups or individuals within and outside the area?
- **What** is the value and priority of each service? Can the services be replaced, substituted or acquired elsewhere?
- **How** can management and policy actions enhance services? In particular, how might actions that address the flow of one service negatively or positively affect the flow of another?

6.3 SYNERGIES BETWEEN SPATIAL PLANNING AND BIODIVERSITY

Policies with the aim of promoting biodiversity are generally reactive in their approach to biodiversity and implement SEA or EIA processes (see section 6.5) or separate policy frameworks (eg Local Biodiversity Action Plans, see Box 6.6).

The traditional hierarchical approach to natural resource protection seeks to protect the ‘best’, generally rural, resources. In doing so it fails to value ecosystems as a whole, especially in urbanized regions. Recent spatial planning approaches to biodiversity reflect a more pro-active approach to biodiversity through two linked

Box 6.5 Restoring ecosystem services to prevent flood damage: The Napa Living River Project, California

The Napa River Basin ranges from tidal marshes to mountainous terrain and is subject to severe winter storms and frequent flooding. The present value of damageable property within the floodplain is well over US$ 500 million. After a major flood in 1986, the federal government proposed digging levees and implementing a channel modification project. Local citizens, however, did not approve the plan. They were concerned by the risk of salinity intrusion due to channel-deepening, water quality degradation and problems associated with the disposal of contaminated dredge material.

In response to community concerns, the "Living River Initiative" was proposed – a comprehensive flood control plan to restore the river's original capacity to handle flood waters. Since 2000 it has converted over 700 acres around the city into marshes, wetlands and mudflats.

The project reduced or eliminated flood-related human and economic casualties: property damage; cleanup costs; community disruption; unemployment; lost business revenue and the need for flood insurance. By taking a cross-sectoral planning approach the project has also created an economic renaissance, instigating the development of several luxury hotels and housing along the river which, at one time, was viewed as a blighted area. Since approval, approximately US$ 400 million has been spent on private development investment in downtown Napa. Urban citizens' health has improved with access to trails and recreation areas.

At completion, the project will protect over 7,000 people and 3,000 residential/commercial units from flooding catastrophe. The project also has a positive benefit-to-cost ratio since over US$ 1.6 billion in damages is expected to be saved from flood protection expenditures.

Source: River restoration to avoid flood damage, USA. TEEBcase by Kaitlin Almack (see TEEBweb.org)

concepts – 'green networks' and green infrastructure:

a. **Green Networks** promote linked spaces and corridors of biodiversity resources, sustainable transport networks and formal and informal public open-spaces. This enables the identification of network 'gaps' and implementation of management priorities with a focus on linked networks rather than individual sites.

b. **Green Infrastructure** is a strategically planned and delivered network of ecosystems and green spaces including parks, rivers, wetlands and private gardens. It focuses on ecosystems that provide important services such as storm water protection, water and air quality improvement as

Box 6.6 Local biodiversity action plans

Local Biodiversity Strategy and Action Plans (LBSAPs) create a local framework that can concurrently address national and international conservation and biodiversity targets. LBSAPs functions are to:

- translate international and national policies and obligations into effective action at the local level.
- conserve important local and national biodiversity.
- provide a framework and process, coordinating new and existing initiatives, for biodiversity conservation at the local level.
- assist sustainable planning and development.
- raise public awareness and involvement in biodiversity conservation.
- collect and collate information on an area's biodiversity.
- provide a basis for monitoring biodiversity at a local level and make recommendations to regional and national levels of government.

Source: adapted from Local Action for Biodiversity (LAB) 2009 (www.iclei.org/lab) well as regulation of local climate. If well planned, green infrastructure can be part of the economic and social capital of a region and a multifunctional resource capable of delivering a wide range of ecosystem services with significant benefits to the well-being of local communities (Natural England 2010). Tools like CITYgreen allow for the systematic integration of green infrastructure into spatial planning.

At the **local scale** such approaches range from local volunteer programmes (eg the UK Groundwork Projects) to more formal institutions (eg the Urban Ecology Agency of Barcelona). Local planning has seen development in approaches to strategic urban design, public realm strategies and urban ecology. The American 'Great Places' initiative, for example, annually identifies places with exemplary character, quality, and planning – distinguishing places that demonstrate significant cultural and historical interest, community involvement and a 'vision for tomorrow'.

At the **sub-regional and regional scale**, green networks are increasingly seen as part of wider infrastructure. The Verband Region Stuttgart regional plan for the Stuttgart metropolitan region (Germany) includes landscape and ecological specifications for green belts and wedges in the form of parks and green spaces which act as a counterweight to the spread of commercial and residential areas (www.region-stuttgart.org/vrs/main.jsp?navid=19). Planning at this scale may also identify important areas for ecological protection, such as biotopes or water catchment areas. In Miami (USA), the city has used the CITYgreen tool for systematically including green infrastructure such as parks, urban forests and wetlands into urban planning. This is mainly for the purpose of storm water protection, enhancement of air and water quality and climate regulation (TEEBcase Multiple benefits of urban ecosystems: spatial planning in Miami City, USA).

This kind of integrated planning is also possible at a **national scale**. Sweden has developed national urban parks (Schantz 2006) and the Dutch ministry for spatial planning has promoted a coherent network of nature areas and connection zones (Ecologische Hoofdstructuur) as part of a larger European Natura 2000 network (www.groeneruimte.nl/dossiers/ehs/home.html).

Mega-regional inter-state spatial planning is also emerging. Eleven countries in the Baltic Sea Region are collaborating on spatial planning (VASAB) (www.vasab.org). This approach is reflected in the 'America 2050 Initiative' (www.america2050.org) which promotes the concept of 'Ecopolis', a network of wild and working landscapes in metropolitan systems consisting of Portland and Seattle (USA), and Vancouver (Canada) (www.america2050.org/pdf/cascadiaecopolis20.pdf).

6.4 POTENTIAL FOR PROGRESS – ACTION POINTS FOR LOCAL POLICY

The potential for proactively making use of the multiple benefits provided by ecosystems in spatial planning is seldom realized. Few countries have good tools or professional resources for effective spatial planning (French and Natarajan 2008). Equally, few countries are using National Biodiversity Strategies and Action Plans as tools for integrating biodiversity into planning (SCBD 2010).

Mainstreaming biodiversity and ecosystem services in decisions made across a wide range of sectors, departments and systems (land, freshwater, sea) can be promoted by taking action in the following areas:

1. **Benchmark** the planning system and administrative arrangements to establish how they can be better integrated, more inclusive and sustainable. This can be done based on functional regions that reflect local ecosystems.
2. Develop **Green Infrastructure** if necessary, collaborate with bordering municipalities or the regional level to develop planning policy for shared ecosystems services.

3. Set **priorities** according to resource limitations (professional and financial). These can address the level of urgency needed to tackle ecosystem challenges (eg focus on vulnerable drylands with high population pressure and →*poverty* rates). Act before the risks to ecosystem services become critical.
4. Create **new forms of engagement** that can deliver more integrated policy. This involves consultation at early stages, hands-on participation, shared outcome targets and joint programmes between municipalities and other agencies (EEA 2009).
5. Use the available **tool-boxes**. Strengthen the competences of planners and policy makers generally. This can include utilizing the potential of GIS tools to make visible the impacts on ecosystem services of alternative scenarios, plans, policies and projects (Box 6.7).

Box 6.7 Tools for integrating ecosystem services into policy and decision making

Specific application software, such as **CITYgreen**, can be used to analyze the ecological and economic benefits of tree canopy and other green features in cities. Planners can use it for scenario testing – for projections related to stormwater run-off, air pollution control, carbon storage and sequestration and landcover. (CITYgreen: www.americanforests.org/productsandpubs/citygreen).

Planners also have access to free software, such **Marxan**, a conservation planning toolset that can help planners analyze a range of conservation design dilemmas (Marxan: http://www.uq.edu.au/marxan). It can also be used to develop multi-use zoning plans for natural resource management and can be applied to a wide range of problems associated with the management of reserves (including terrestrial, marine and freshwater systems) and generate options that can encourage stakeholder participation. This has been used in a range of situations, Madre Dios, Peru, for example (Fleck et al. 2010).

InVEST is designed to help local, regional and national decision makers incorporate ecosystem services into a range of policy and planning contexts for terrestrial, freshwater and marine ecosystems. It includes spatial planning, SEAs and EIAs and maps where ecosystem services are provided and utilized. It can provide biophysical results (such as meters of shoreline retained) and economic values (avoided property damage cost). It also creates a relative index of habitat quality (although biodiversity is not given a direct economic value). It can help design models which account for both service supply (living habitats buffers for storm waves) and the location and activities of people who benefit from services.

Depending on data availability, InVEST includes relatively simple models (with few input requirements) and more complex, data intensive models that can inform policy that requires certainty and specificity.

The InVEST process begins by identifying stakeholders' critical management choices which can be analyzed for effects on →*ecosystem processes*, biodiversity and flow of ecosystem services.
Outputs can inform:

- **Spatial planning:** assessing current and potential ecosystem services status under alternative, spatially-explicit future scenarios.
- **SEA and EIA:** identifying how policies, plans and programs can affect multiple ecosystem services, thus guiding selection of best alternatives.
- **Payments for ecosystem services (PES):** identifying how payments can be effectively and efficiently disbursed.
- **Permits and mitigation:** assessing impacts of proposed activities and providing guidance for where mitigation will provide the greatest benefits.
- **Climate adaptation strategies:** demonstrating how changes in climate patterns will influence services delivery.

Source: http://invest.ecoinformatics.org Background information on InVEST and the Natural Capital Project is available at www.naturalcapitalproject.org

6.5 INTEGRATING ECOSYSTEMS AND BIODIVERSITY IN ENVIRONMENTAL ASSESSMENT

For those concerned with promoting local and regional development, this section explains how assessment instruments such as Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA) can help maintain and enhance ecosystems and biodiversity values. It follows several key assumptions (Slootweg et al. 2009):

1. Biodiversity is about people, as people depend on biodiversity for their livelihoods and quality of life;
2. Safeguarding livelihoods is a major →*driver* in the application of impact assessment;
3. SEA and EIA have a major role in bridging economic, social and biophysical planning dimensions to assess future development opportunities;
4. Future opportunities for development are often unknown, but potentially hidden in ecosystems, species and genetic diversity;
5. Ecosystems services make economic sense as they provide direct or strategic support of all human activities;
6. SEA and EIA can highlight development opportunities provided by ecosystem services and assess the negative impacts on ecosystem services before they are affected;
7. SEA and EIA can promote and enable stakeholders' views on the importance of ecosystem services.

THE ROLE OF EIA AND SEA

Environmental impact assessment (EIA) was one of the first instruments to proactively identify and assess the consequences of human actions on the environment and to avoid irremediable consequences. Today, EIA is the process of identifying, predicting, evaluating and mitigating the biophysical and other relevant effects of development proposals prior to major decisions being taken and commitments made (IAIA/IEA 1999). It is generally conducted as a mandatory step to obtain planning approval for development projects such as dams, airports, highways, transmission lines, power plants, large industries, urban infrastructure developments and irrigation projects.

Legal requirements were established to enforce the application of EIA, and currently most countries around the world have enacted EIA legislation (see Box 6.8). However, the treatment of biodiversity within EIA has not been consistent. With the adoption of impact assessment guidelines by the Convention on Biological Diversity (SCBD and NCEA 2006; Slootweg et al. 2009), a framework has been provided which is consistent with the objectives and instruments of the CBD.

Box 6.8 EIA and SEA around the world

The United States is credited with first institutionalizing EIA in 1969, and was followed by other predominantly western countries. During the eighties, the EU instituted EIA legislation and the World Bank adopted EIA as part of its operations. Since then, over 100 countries have followed suit. In comparison, SEA is less widespread. Its application, however, is rapidly catching up. Approximately 35 countries have (as of 2009) adopted regulations for SEA, largely due to the 'Kiev Protocol' which entered into force in July 2010.

Interest in SEA also sparked the call for more holistic, integrated and balanced strategic decision making made in influential initiatives such as the 2002 Millennium Development Goals (MDGs). International financing institutions and co-operation organisations such as the World Bank and CIDA have played an important role in introducing SEA to developing countries, funding many SEA studies. Principle 17 of the Rio Declaration (1992) highlights the role of EIA in environmental policy for sustainable development.

Source: adapted from Kolhoff et al. 2009

A suite of impact assessment approaches with different foci have emerged over time, but most are based on the EIA principles of pro-active information provision before decision making, ensuring transparency and stakeholder involvement. Examples include social impact assessment, health impact assessment, cumulative impact assessment and biodiversity impact assessment.

Strategic Environmental Assessment (SEA) was developed to address development choices at a strategic level before projects begin. In order to be more effective, SEA considers alternative options, weighing and discussing the risks and opportunities they present (Partidário 2007; 2007a).

ECOSYSTEMS AND BIODIVERSITY IN ENVIRONMENTAL ASSESSMENTS

Biodiversity is commonly described in terms of ecosystem and species diversity, numbers of individuals per species and a number of other ecological terms. For planners required to deliver services and quality of life to people, this language may be difficult to relate to. Conservationists and planners frequently clash on biodiversity issues, particularly if SEA and EIA are perceived as legal requirements that can hinder development, driven by environmental authorities.

The CBD in its guidelines on biodiversity in impact assessment (SCBD and NCEA 2006), tries to **reconcile biodiversity conservation with development** by highlighting the role of ecosystem services as the basis for human well-being and livelihoods. By describing an ecosystem in terms of the services it provides to people (including future generations), it is possible to identify groups of people having an interest, or stake, in these services. Each ecosystem provides multiple services. A forest provides both timber and non-timber forest products, anti-erosion services and carbon storage. Coastal dunes provide protection against storm surges, protect the hinterland against underground seawater intrusion, conserve biodiversity and provide recreational facilities.

Stakeholders do not necessarily share the same interests. For example, seasonal floods in Bangladesh are accommodated by floodplains. This ecosystem service is highly appreciated by fishers, while farmers prefer to have embankments and regulated water supply to be able to produce two crops per year (Abdel-Dayem et al. 2004). EIA and SEA can help identify different interests, creating an important baseline for conflict resolution.

USING IMPACT ASSESSMENT TO RECOGNIZE ECOSYSTEM SERVICES

From a spatial planning perspective, three situations can be envisaged for impact assessment to effectively integrate ecosystem services into the planning process:

1. **Sustainability-oriented spatial planning with pro-active SEA:** SEA facilitates the planning process in a pro-active and strategic way. It identifies ecosystem services and their respective stakeholders in a defined geographic area and maps sensitivities. Both the status of biodiversity as well as direct and indirect drivers of change are assessed. Some ecosystem services may be overexploited and remediation or rehabilitation is needed, while others may identify an unexploited development potential (case studies 1, 2 and 3, Box 6.9).
2. **Spatial planning with reactive SEA:** SEA can be used to assess consequences of proposed plans and developments in a defined spatial area. Proposed activities and the planning area are known, and an inventory of ecosystems and their sensitivity to identified drivers of change can be made (for example, making a sensitivity map). In consultation with stakeholders, potential impacts on ecosystems can be translated into impacts on ecosystem services, expressed as opportunities or risks to social and economic well-being (case study 4, Box 6.9).
3. **Detailed project planning and EIA:** if a spatial plan already subjected to an SEA has been established, and development is prioritized, alternatives may only need fine-tuning. EIA applied to these projects can make a detailed analysis of their potential consequences. Local biodiversity, related ecosystem services and the stakeholders can be determined. The assessment predominantly focuses on (i) avoiding or mitigating impacts (through adjusting location, changing magnitude or timing of the activity or applying alternative

technologies), and (ii) the creation of an environmental monitoring and management plan .

The efficacy of each of these approaches will depend on intended outcomes and on the nature of the planning system in each local setting.

Box 6.9 SEA to recognize ecosystem services

Case Study 1: Catchment Planning in South Africa

In uMhlathuze municipality, an area identified as a biodiversity hotspot, a classic case of 'development' versus 'conservation' led to conflict in a rapidly industrializing municipality in favor of development, in large part due to poverty and lack of local opportunity. The municipality undertook a Strategic Catchment Assessment. The study highlighted the 'free' ecosystem services provided by the area (nutrient cycling, waste management, water supply, water regulation, flood and drought management). The annual value of these environmental services was estimated at R1.7 billion (nearly US$ 200 million). Politicians reacted positively once they realized the economic value of these ecosystem services. The municipality embarked upon a negotiating process to identify (1) sensitive ecosystems that should be conserved, (2) linkages between ecosystems, and (3) zones that could be developed without impacting on the area's ability to provide environmental services. More importantly (4), it identified management actions that would ensure not only the survival of key biodiversity assets, but also sustainable development opportunities using biodiversity resources.

Source: Catchment planning incorporates ecosystem service values, South Africa. TEEBcase by Roel Slootweg based on Van der Wateren et al. (see TEEBweb.org).

Case Study 2: SEA for Integrated Coastal Management, Portugal

Although not legally mandatory in Portugal, an SEA was used to assist with the preparation of the Portuguese Strategy for Integrated Coastal Zone Management (PS-ICZM). SEA and PS-ICZM teams collaborated closely to achieve a well-integrated outcome. The SEA proved to be key in placing ecosystem services on the agenda, facilitating the integration of environmental and sustainability issues into both strategy and design. An assessment of key strategic options for the coast assisted with fine-tuning the strategy, highlighting strategy-related risks and opportunities.

Source: SEA for including ecosystem services in coastal managment, Portugal. TEEBcase by Maria Partidário et al. (see TEEBweb.org).

Case Study 3: Restoration of wetlands for local livelihoods and health, Central Asia

Intensification and expansion of irrigation activities in Central Asia led to shrinking of the Aral Sea and degradation of the Amu Darya delta in Uzbekistan, leaving only 10% of the original wetlands.

The Interstate Committee on the Aral Sea, in consultation with the World Bank, requested the development of a coherent strategy for the restoration of the Amu Darya delta. An SEA approach was used to structure the decision-making process. Valuation of the ecosystem services was instrumental in changing the course of development from technocratic and unsustainable interventions, towards the restoration of natural processes, better capable of creating added value to inhabitants under the dynamic conditions of a water-stressed delta.

The 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, the restoration of the Sudoche wetlands. The project resulted in an increase in productivity of the region; the best →*indicator* of success is the return of young people to the villages.

Source: Wetland restoration incorporates ecosystem service values, Aral Sea, Central Asia. TEEBcase by Roel Slootweg et al (see TEEBweb.org).

Case Study 4: Irrigation rehabilitation through water transfer, Egypt

In the desert area west of the Nile Delta, groundwater based export-orientated agriculture has an annual turnover of about US$ 750 million. Groundwater is rapidly depleting and becoming saline. To reverse this situation, the Egyptian government has proposed pumping 1.6 billion cubic meters of fresh Nile water from the Rosetta Nile branch into an area of about 40,000 ha.

The use of SEA at the earliest stages of planning has guaranteed that environmental and social issues beyond the boundaries of the project area were incorporated into the design process. Valuation of ecosystem services focused on those services affected by the transfer of water from the Nile to the desert area. Simple quantitative techniques provided strong arguments for decision makers in the government ministry and the World Bank to significantly reduce the scale of the initial phase.

The diversion of water from relatively poor smallholder farmers in the delta to large investors west of the delta posed →*equity* problems, so a phased implementation was agreed. This provided time for the National Water Resources Management Plan, which includes a water savings program, to be implemented.

Source: Water transfer project influenced by ecosystem service evaluation, Egypt. TEEBcase by Roel Slootweg (see TEEBweb.org).

SEA AND EIA TO CREATE OPPORTUNITIES FOR LOCAL AND REGIONAL PLANNING

Both SEA and EIA provide a means to highlight the interests of biodiversity and its stakeholders. By proactive work in the early stages, SEA and EIA can explore the opportunities and risks from proposed development, identify the impacts of human actions on ecosystems and biodiversity, and advance the necessary planning guidelines or project mitigation measures in order to avoid or reduce negative consequences. SEA and EIA can help spatial planning in four ways:

1. **Prevent** changes that create **increased pressures on biodiversity** by influencing spatial planning strategies and territorial models (case examples 1 and 2);
2. Help **identify opportunities created by existing ecosystems** to improve the quality of both urban and rural life, through identification and quantification of ecosystem services (case example 1);
3. Influence project design in order to **avoid or mitigate irreversible negative impacts** on ecosystems and biodiversity and enhance the positive impacts (case examples 3 and 4);
4. **Implement legal and international obligations** concerning biodiversity such as nationally protected areas or species, internationally recognized areas (Ramsar, UNESCO, World Heritage) protected ecosystem services (water supplies, coastal defences) and indigenous protected areas (case examples 2 and 3).

PRINCIPLES TO GUIDE THE PLANNING AND ASSESSMENT PROCESS

By ensuring the long term viability of ecosystem services, SEA and EIA also contribute to ensuring that →*natural capital* is not ‘traded in’ to meet short term needs in a manner which limits the freedom of future generations to choose their own development paths (SCBD and NCEA, 2006). Meeting these general requirements in concrete decision-making settings constitutes a challenge for which some guiding principles provide direction (see Box 6.10).

The Millennium Ecosystem Assessment states that understanding the factors that cause changes in ecosystems and ecosystem services is essential. Drivers of change can be natural (earthquakes, volcanic eruptions) or human-induced. Impact assessment is primarily concerned with human-induced drivers as they can be influenced by planning and decision making.

Box 6.10 Principles to secure the long-term development potential of biodiversity

No net loss: Loss of irreplaceable biodiversity must be avoided. Other biodiversity loss has to be compensated for (in quality and quantity). Where possible, identify and support opportunities for biodiversity enhancement through 'positive planning'.

The precautionary principle: Where impacts cannot be predicted with confidence, and/or where there is uncertainty about effectiveness of mitigation measures, be cautious and risk adverse. Employ an adaptive approach (several small steps instead of one big step) with safety margins and continuous monitoring (see also The Precautionary Principle Project, www.pprinciple.net/).

Participation: Different groups or individuals in society have a stake in the maintenance and/or use of biodiversity. Consequently, valuation of biodiversity and ecosystem services can only be done in negotiation with these stakeholders. Stakeholders thus have a role in the impact assessment process.

Local, traditional and indigenous knowledge is used in impact assessment to provide a complete and reliable overview of issues pertaining to biodiversity. Views are exchanged with stakeholders and experts. While physical drivers of change (such as hydrological changes) can be modeled by experts, impacts are 'felt' by people and are location specific (for an example see Sallenave 1994).

Source: SCBD and NCEA 2006

SEA and EIA need to distinguish between drivers that can be influenced by a decision maker and others which may be beyond their control. The temporal, spatial and organizational scales at which a driver of change can be addressed are crucial (SCBD and NCEA 2006). For example, overexploitation of groundwater cannot be dealt with at the level of one individual groundwater well, but is better addressed at the level of regional groundwater extraction policy. At higher and strategic levels of planning, the indirect drivers of change may become relevant, making them particularly relevant in SEA. Changes in production and consumption processes, for example, through international trade agreements, will act as indirect drivers. This in turn leads to direct drivers of change (Slootweg et al. 2009).

6.6 WHEN AND HOW TO INTEGRATE ECOSYSTEM SERVICES IN EIA AND SEA

EIA and SEA perform differently in their capacity to integrate ecosystem services: EIA follows a process characterized by an internationally accepted sequence of steps:

- **screening:** used to determine which proposals be subject to EIA (usually legally embedded).
- **scoping:** to identify which potential impacts are relevant to be assessed in EIA, resulting in a TOR for the assessment (usually with public involvement).
- **assessment study** and reporting: the actual study phase should result in an environmental impact statement (an EIS or EIA Report) and environmental management plan (EMP).
- **review: quality check** of the EIS, based on the TOR (usually with public involvement).
- **decision making**
- **follow up:** monitoring during project implementation and implementation of the EMP.

When looking at the inclusion of ecosystem services in EIA, special emphasis should be given to the screening and scoping stages. The need for an impact assessment study is defined by good screening criteria and procedures; it is beyond the scope

Table 6.3 Checklist of how to address ecosystem services in SEA

Ecosystem service triggers	Key questions to ask	Actions to address ecosystem services
Trigger 1 – Spatial Policy is affecting a known area that provides ecosystem services.	*Does the policy, plan or programme influence:* • important ecosystem services? • important biodiversity? • areas with legal and/or international conservation status?	*Focus on area* • Map ecosystem services. • Link ecosystem services to stakeholders and beneficiaries. • Invite stakeholders for consultation. • Systematic integration of ecosystem services and biodiversity in conservation planning.
Trigger 2 – Sectoral direct Policy is affecting direct drivers of change with immediate biophysical consequences (area not defined).	*Does the policy, plan or programme lead to:* • biophysical changes such as land conversion, fragmentation, extraction? • other changes such as human relocation and migration, change in land-use practices?	*Focus on direct drivers of change and potentially affected ecosystem* • Identify drivers of change. • Identify which ecosystems are sensitive to expected biophysical changes. • Identify expected impacts on ecosystem services.
Trigger - Combination of 1 and 2 Policy is affecting known direct drivers and area.	*Combination of 1 and 2 above*	*Focus on area and direct drivers of change* *Knowledge of intervention and area of influence allows prediction of impacts on ecosystem services and biodiversity.* *Actions include a combination of 1 and 2.*
Trigger 3 – neither area nor sector are defined Interventions affecting indirect drivers of change, without direct biophysical consequences.	*Are indirect drivers of change affecting the way in which a society:* • produces or consumes goods? • occupies land and water? • exploits ecosystem services?	*Focus on understanding* the complex linkages between indirect and direct drivers of change. • *Review existing cases and methodology (like the MA).* • *Undertake original research.*

Source: adapted from SCBD and NCEA (2006)

of this document to discuss biodiversity-inclusive screening criteria.

In the scoping phase, experts, stakeholders and competent authorities play a role in defining the issues that need further study. The CBD Guidelines provide an extensive 13 step approach to do good scoping for biodiversity and ecosystem services (see SCBD and NCEA (2006) below).

Unlike EIA, the SEA process is not structured according to a given procedure. The principal reason is that best practice SEA should be fully integrated into a planning (or policy development) process, and these differ between eg national sectoral or regional spatial plans, or policy development processes. Different approaches and guidance documents are available in 'for further information' below.

There are, however, some procedures to verify the need to include ecosystem services in the SEA process. Table 6.3 identifies ecosystem services triggers in a policy, plan or program (Full detail is provided in SCBD and NCEA 2006 and Slootweg et al. 2009).

6.7 LESSONS LEARNED FROM PRACTICE

From a study of 20 cases where valuation of ecosystem services actually influenced planning and decision making, Slootweg and Van Beukering (2008) derive the following lessons for practical policy:
Recognizing ecosystem services enhances transparent and engaged planning. The quality of planning processes and SEA is greatly enhanced if stakeholders are at least informed of, or preferably invited into, the planning process. Linking ecosystem services to stakeholders provides a good approach to involve relevant actors.

Poverty and equity issues are highlighted by looking at the distribution of ecosystem service benefits. In early planning stages, recognition of ecosystem services and identification of stakeholders can provide important clues to the winners and losers resulting from certain changes and thus provides better understanding of poverty and equity issues. Benefits and costs can occur in geographically separate areas and affect social differentiation (see case study 4, Box 6.9).

Valuing ecosystem services facilitates the **financial sustainability** of environmental and resource management, highlights **social equity** issues and provides a better insight into the **long- and short-term trade-offs** of planning decisions.

Valuation of ecosystem services is influential with decision makers. Monetization of ecosystem services puts biodiversity considerations on many decision makers' agenda. Politicians may react more positively once they realize that environmental services have an economic value.

SEA provides a platform to include valuation results in decision making. SEA also guarantees the inclusion of stakeholders in the process and leads decision makers to take valuation results into account.

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Urban managers are faced with reconciling competing needs for land by a growing population - as here in Addis Ababa, Ethiopia

FOR FURTHER INFORMATION

Guidelines on sustainability oriented Urban Planning
Global Report on Human Settlements (2009) Planning Sustainable Cities. United Nations Human Settlements Programme (UN HABITAT). This comprehensive report reviews recent urban planning practices and approaches, discusses constraints and conflicts, and identifies innovative approaches to current challenges of urbanization. www.unhabitat.org/downloads/docs/GRHS2009/ GRHS.2009.pdf

Practical guidance on effective spatial planning as well as on metropolitan mitigation measures is available on the website of the Network of European Metropolitan Regions and Areas METREX www.eurometrex.org

The Revised Metrex Practice Benchmark of effective metropolitan spatial planning. www.eurometrex.org/Docs/InterMETREX/Benchmark/EN_Benchmark_v4.pdf

The Biodiversity Planning Toolkit uses interactive maps to incorporate biodiversity in spatial planning. www.biodiversity planningtoolkit.com

Metropolitan Mitigation Measures Sourcebook www.eurometrex.org/Docs/EUCO2/Metropolitan_Mitigation_Measures_Sourcebook.pdf

Guidelines on Good Environmental Governance
WRI (2003), World Resources 2002-2004: Decisions for the Earth: Balance, voice, and power, 2003 This easily accessible report with several maps and figures points out the importance of good environmental governance by exploring how citizens, government managers, and business owners can foster better environmental decisions www.wri.org/publication/world-resources-2002-2004-decisions-earth-balance-voice-and-power.

The Precautionary Principle
Guidelines, workshop report and several case studies are available on the Precautionary Principle Project http://www.pprinciple.net/publications___outputs.html including Cooney, R. (2004) The Precautionary Principle in Biodiversity Conservation and Natural Resource Management: www.pprinciple.net/publications/PrecautionaryPrincipleissuespaper.pdf

Guidelines on Biodiversity-inclusive impact assessment
SCBD and NCEA (2006). Biodiversity in Impact Assessment: Voluntary Guidelines on Biodiversity-Inclusive Impact Assessment (www.cbd.int/doc/publications/cbd-ts-26-en.pdf). Using case studies (www.cbd.int/impact/case-studies) the approach of ecosystem services has been applied to develop guidelines for a better integration of biodiversity in impact assessments.

Slootweg et al. (2006) Biodiversity in EIA and SEA. Further information on the CBD guidelines is presented in this multilingual CBD technical series. www.cbd.int/doc/publications/cbd-ts-26-en.pdf

Ramsar Convention on Wetlands (2008) Resolution X.17 Environmental Impact Assessment and Strategic Environmental Assessment: updated scientific and technical guidance. www.ramsar.org/pdf/res/key_res_x_17_e.pdf

Slootweg, et al. (2010) Biodiversity in Environmental Assessment - Enhancing Ecosystem Services for Human Well-Being. This elaborate academic work provides in-depth conceptual as well as extensive case evidence on the CBD guidelines.

Environmental Impact Assessment
Petts, J. (1999) Handbook on Environmental Impact Assessment. This handbook on EIA provides an international perspective on practices, requirements and challenges.

UNEP (2002) Environmental Impact Assessment Training Resources Manual. This guidance forms the centrepiece of a package of EIA training materials and assist trainers in preparing and delivering courses on the application of EIA. http://www.unep.ch/etb/publications/envilmpAsse.php

Glasson et al. (2005) Introduction to Environmental Impact Assessment. The introduction to EIA addresses concepts and practice in EIA, including process and legislation. Furthermore, different EIA systems are compared and a wealth of reference material and case-studies is provided.

Abaza, H. et al. (2004) Environmental Impact Assessment and Strategic Environmental Assessment: towards an Integrated Approach. This manual contains guidance on good practice, with particular application to developing countries. http://www.unep.ch/etu/publications/textONUBr.pdf

Strategic Environmental Assessment
IAIA (2001) SEA Performance Criteria. This 1-pager presents a set of criteria for good SEA performance which is an accepted benchmark for SEA. http://www.iaia.org/publicdocuments/special-publications/sp1.pdf

OECD-DAC (2006) Applying SEA: Good Practice Guidance for Development Cooperation. The report explains the benefits of using SEA in development co-operation and provide guidance using check-lists and more than 30 case examples. http://www.oecd.org/dataoecd/4/21/37353858.pdf

OECD (2008) Strategic Environmental Assessment and Ecosystem Services. DAC Network on Environment and Development Cooperation (ENVIRONET). 26p. URL: http://www.oecd.org/dataoecd/24/54/41882953.pdf Advisory Note that supplements (OECD DAC 2006) with a focus on how to integrate ecosystem services in SEA.

Various training manuals and best practice examples on SEA are available on the SEA Network website http://www.seataskteam. net/library.php, e.g. Partidário, M. R. (2007a) Strategic Environmental Assessment, Good practices Guide.

UNEP (2009) Integrated Assessment for Mainstreaming Sustainability into Policymaking: A Guidance Manual. This handbook draws on international experiences and highlights the connections between proposed policies and desired results such as job creation and poverty reduction. Its "building-block" approach provides a powerful tool flexibly adapt assessment to different contexts and policy processes. http://www.unep.ch/etb/publications/AI%20guidance%202009/UNEP%20IA%20final.pdf.