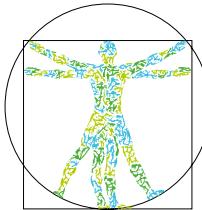


# Making the value of ecosystem services visible

*Proposals to enhance well-being through biodiversity and ecosystem services*



## Cover illustration

The illustration is inspired by a drawing that Leonardo da Vinci made over five hundred years ago. It depicts a human with the body in two positions superimposed. Along with accompanying notes, the artwork is considered to be da Vinci's way of describing how humans relate to nature and its proportions. The artwork is also seen as an example of the union of art and science. In the Inquiry's version of da Vinci's classic image, the human body is shaped by an interacting network of plants and animals. This illustrates how human existence is rooted in biological diversity and how our societies and economies develop in interaction with nature. Image: Jerker Lokrantz/Azote

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# Main messages

Biological diversity is a prerequisite for the long-term capacity of ecosystems to provide ecosystem services, which are essential to our well-being. Both public and private actors are directly or indirectly dependent on ecosystem services. The inclusion of ecosystem services in social planning and business development

is becoming increasingly urgent with the on-going loss of biodiversity, but the question is how this can be done effectively.

## Our task

The Inquiry was assigned to analyse actions and suggest methods and measures to better evaluate ecosystem services and to improve the knowledge base of the societal value of ecosystem services, as well as to propose measures that will mainstream the importance of biodiversity and the value of ecosystem services so that they can become better integrated in economic positions and other decisions in society where this is relevant and reasonable.

Our proposals focus on two different time frames:

- Direct action proposals for raising awareness and promoting the integration of the value of ecosystem services into decision-making processes in the short term.
- Measures for more long-term promotion of the further development of the knowledge base as a foundation for more comprehensive analyses of policy options for achieving the generational goal and environmental quality objectives.

The existing knowledge is not enough to make a final decision on what measures are relevant and reasonable, or to assess cost-effectiveness. Therefore, our task can be seen as a step towards improved impact analysis as a basis for decisions on ecosystem use.

ecosystems to generate human well-being (e.g. soil formation, water regulation, or pollination). Uncertainty about ecological relationships and potential threshold effects needs to be described and communicated in a comprehensible manner. The “insurance value” refers to the ability of ecosystems and biodiversity to provide ecosystem services in times of change. This value can be very high for ecosystem services that are difficult to replace, and many assumptions are required to make a valuation.

The Inquiry analyses strategies for valuing ecosystem services in qualitative, quantitative, and monetary terms. The valuation of ecosystem services can be done by identifying important ecosystem services and users, and by mapping the ecosystem services. This work may in itself provide an important basis for decisions. Measuring the value of ecosystem services in monetary terms can sometimes help make them visible and ensure that the benefits of biodiversity and ecosystem services are effectively taken into account in decision making.

However, monetary valuation is less reliable or even inappropriate in complex situations that involve a variety of ecosystem services, or where there are different ethical convictions regarding what values are possible or appropriate to express monetarily. This applies especially to the supporting and regulating ecosystem services that determine the long-term capacity of

Care for the environment is not a special interest. Integration of ecosystem services needs to take place in many policy areas and social sectors. In this way, the capacity of ecosystems to generate important ecosystem services can be secured, and society's chances to achieve sustainable development can be improved. There are already a number of municipalities, county administrative boards, authorities, and businesses that incorporate ecosystem services into, for example risk assessment, business intelligence and development. Planning for ecosystem services can generate positive synergies between, for example, climate adaptation and attractive living environments. However, there are, of course, also potential conflicting goals between the use of different ecosystem services or between ecosystem services and other types of services.

In the report, we present a number of contexts and consultation processes where a dialogue on ecosystem services can be a useful tool to identify and resolve perceived conflicts of interest. Knowledge and awareness of the value of ecosystem services should, whenever possible, be created with the participation of those who use and affect ecosystem services in the formulation of problems and the identification, mapping, or valuation of ecosystem services. It is important to take different perspectives and experiences into account in order to take advantage of existing knowledge, but also for democratic and ethical reasons, especially if the effects of the decisions possibly are irreversible.

The Inquiry proposes 25 measures, divided into three main areas: (A) integration into decision-making processes (Ch. 3); (B) a better knowledge base (Ch. 4); and (C) learning about ecosystem services (Ch. 5). A central theme of many of the proposed measures is to make the value of ecosystem services visible through ecosystem service assessments (i.e. through identifying important ecosystem services and estimating their state and benefits, as well as factors affecting their maintenance). In urban areas, this involves improving physical planning by reviewing laws and developing guidance and competence support. When it comes to agriculture and forestry, the Inquiry proposes that current payments for ecosystem services and other support systems be evaluated. Current economic policy instruments should be evaluated, and new ones proposed, with the aim of reducing environmentally harmful subsidies and achieving the environmental quality objectives. In addition, we propose that the possibilities and consequences of ecological compensation in the everyday landscape should be investigated in order to implement the "polluter pays principle".



The Inquiry suggest dialogue as a method to work with ecosystem services. Identification, mapping and valuation of ecosystem services should be done with beneficiaries and other relevant actors. Photo: A Emmelin

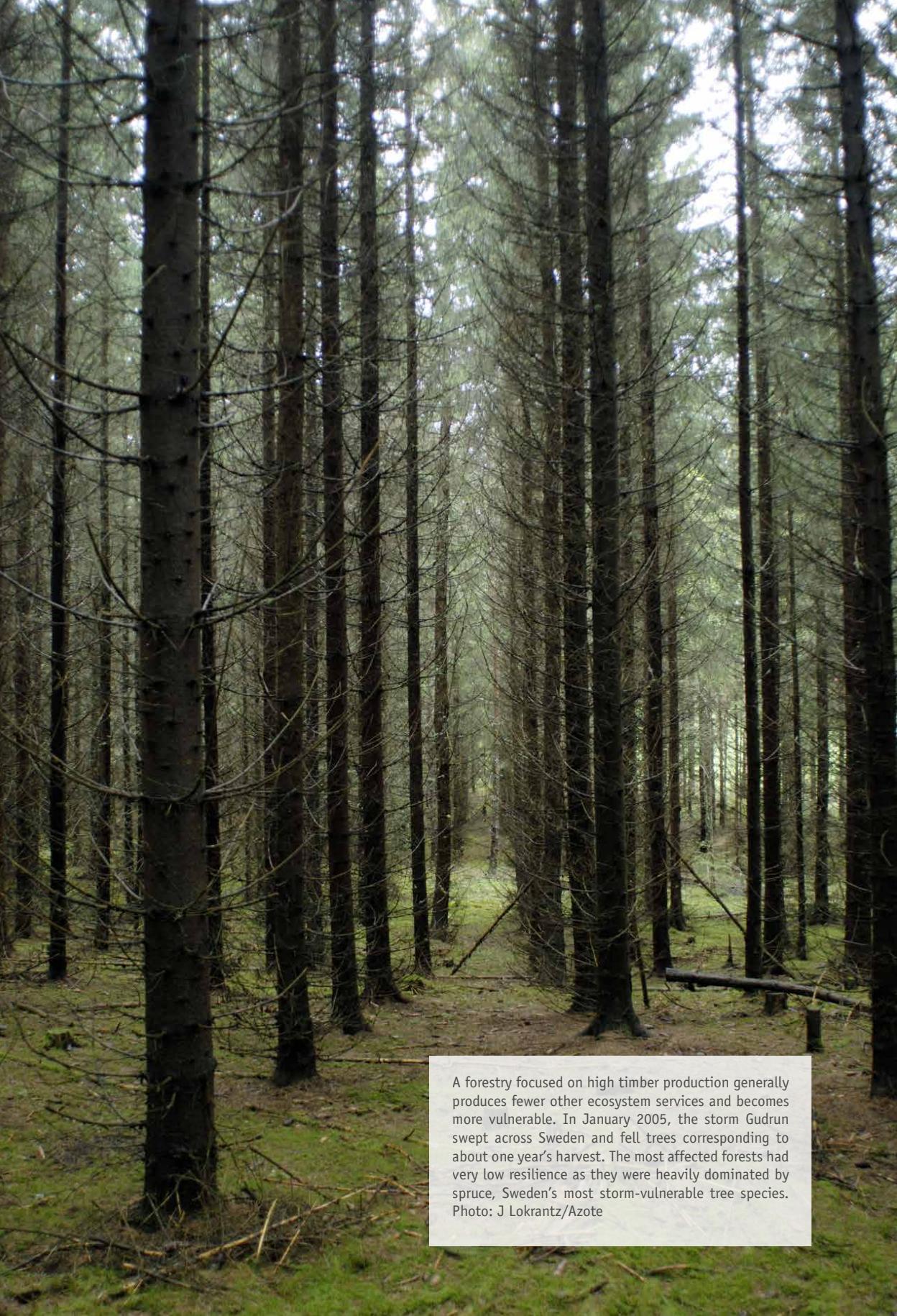


Economic instruments in agriculture should be reviewed to take better account of ecosystem services.  
Photo: M Pennbrant/Azote

The Inquiry further proposes that sustainability indicators be reported together with information on the economic development and that the official statistics need to be developed with better data for ecosystem services.

Many proposed measures involve building the institutional capacity to make ecosystem service and impact assessments, and achieving better coordination and division of responsibilities between sectors and authorities. The extent of knowledge needed to make informed decisions is difficult to estimate in advance. The value of ecosystem services is thus best integrated through gradual learning. The Inquiry proposes that a temporary committee for ecosystem services be commissioned to serve as a knowledge hub to support both public and private actors and ensure that knowledge and experiences are utilised and disseminated. The Inquiry also makes proposals regarding research, public procurement, corporate governance, support for business development and innovation, information for investors, and participation in international forums.

We depend on ecosystem services from local ecosystems both in Sweden and abroad. Authorities responsible for trade, aid, and international investments play an important role to highlight our impact and dependence on ecosystem services outside the country's borders; a task which is in line with the parliament's generational goal for the environmental policy and Sweden's policy for global development.



A forestry focused on high timber production generally produces fewer other ecosystem services and becomes more vulnerable. In January 2005, the storm Gudrun swept across Sweden and fell trees corresponding to about one year's harvest. The most affected forests had very low resilience as they were heavily dominated by spruce, Sweden's most storm-vulnerable tree species.  
Photo: J Lokrantz/Azote

# Starting points

The term ecosystem services describe the ecosystems' direct and indirect contributions to human well-being. The more visible ecosystem services, such as the production of food and fibres (goods), affect and depend on other services, such as soil formation and nutrient and water regulation.

Ecosystem services is a new concept to many people, even though it has been used in research since the 1980s. The term highlights humanity's dependence on nature, and the fact that the multitude of plant and animal species in the Earth's forests, oceans, lakes, wetlands, and other ecosystems provides humanity with a wide selection of goods. Great diversity in terms of landscapes with many different ecosystems and types of nature, different species, and genetic variation within species create robust ecosystems that are also resilient, i.e. they are able to adapt and develop in spite of various disturbances. Thus, there is a connection between biodiversity and the long-term ability of ecosystems to provide us with a number of important ecosystem services.

## Ecosystem Services

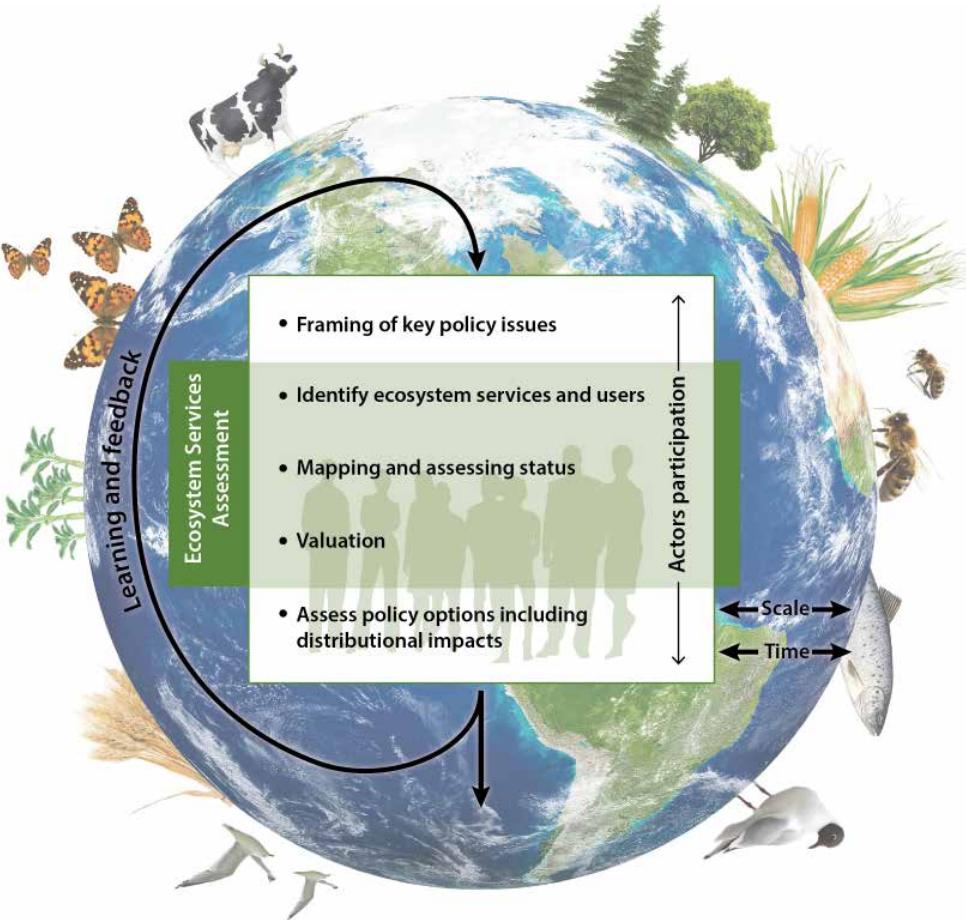
Ecosystem services are "the ecosystems' direct and indirect contributions to human well-being" (EPA, 2012). Ecosystem functions can also contribute directly and indirectly to society. The more visible ecosystem services, such as food and wood production (goods), depend on other services, such as soil formation, nutrient and water regulation.

The following four categories are based on an international classification system for ecosystem services:

- **Provisioning** ecosystem services are the goods produced, such as food, water, wood and fiber.
- **Regulating** ecosystem services are the benefits people gain from ecosystem processes that regulate environmental factors such as climate, floods, waste degradation and control of diseases and the pollination of our crops.
- **Cultural** ecosystem services include beauty, inspiration, recreation and spiritual values that contribute to our well-being.
- **Supporting** ecosystem services are the basic functions of ecosystems that are a prerequisite for all other ecosystem services, such as soil formation, photosynthesis and biochemical cycles.

In 2000, then UN Secretary General Kofi Annan initiated the Millennium Ecosystem Assessment (MA), which was a comprehensive study of the ecosystems' importance for human well-being. The project involved a large number of researchers and other experts, and resulted in several highly publicised reports that introduced the term "ecosystem services" to policy makers and the UN. The focus was on human welfare and well-being in a broader sense, and not primarily the importance of ecosystems in monetary terms.

In 2007, the G8 countries initiated the study The Economics of Ecosystems and Biodiversity (TEEB), which had a larger focus on economics than the MA and proposed ways to further concretise and apply the term ecosystem services.



Making the value of ecosystem services visible in decision-making with the help of ecosystem service assessments. As ecosystem services are produced in interaction between humans and nature, actors that use and affect (and often have knowledge of) the ecosystem services should participate.

Illustration: J Lokrantz/Azote

The TEEB reports have gained much recognition in, for example, the EU. They have been identified as an important source of knowledge by the parties to the Convention on Biological Diversity and have received financial support from Sweden.

## Ecosystem service assessments

Both MA and TEEB have introduced concepts and methods for making the values of ecosystem services visible. TEEB has developed guidance for how to analyse ecosystem services as a basis for socio-economic consequences of decisions. In this report, we will use the term ecosystem service assessment to describe this. This term does not refer to a definite method, but to efforts to identify, map, or evaluate ecosystem services that are made in order to make ecosystem services visible in various decision-making processes (see the illustration above). As mentioned above, ecosystem service assessments are already being carried out to a growing extent in Swedish authorities, municipalities, and businesses.

## The vale of nature and the nature of value

Some ecosystem services have obvious price tags. This is of course especially true for the provisioning ecosystem services, the goods. But is the price tag at the store (the market price) on the potatoes, meatballs and carrots the same as the value? Even though the price of food or water increases by several hundred percent we are still willing to pay it if we can afford - we must have food to survive. In other words, we value these ecosystem services very highly in a shortage situation. Agriculture together with forestry and fishing account for only about 2% of GDP in Sweden today, and we are led to believe that their contribution to our welfare therefore is that small. The market price covers only human labor plus capital spent, and not related ecosystem services. The globalized market sets the price mechanism out of order; for example if we deplete all fish in one place, this does not raise the price for fish, we merely import it from another place in the world. Thus the dwindling supply is not mirrored in the market price. The above example shows that the market price and the GDP do not capture the value of ecosystem services in a fair way.

## Current goals for ecosystem services

At the Conference of the Parties to the Convention on Biological Diversity in Nagoya in 2010, a global target was adopted to include the value of biodiversity in decision-making processes and accounts. The same year, the Swedish parliament adopted a generational goal for the environmental policy. The goal includes a long-term safeguarding of ecosystem services. The generational goal also specifies that environmental problems should not be solved by moving the effects abroad, which is in line with Sweden's policy for global development.



In Sweden we eat seafood from around the world which means that we depend on and affect ecosystem services and livelihoods abroad. To make these relationships visible is in line with the Parliament's generational goal for the environmental policy and Sweden's policy for global development. Foto: N Desagher/Azote

In 2012, the government adopted a milestone target for the environmental objectives system which entailed that by 2018, the importance of biodiversity and the value of ecosystem services are to be generally known and integrated into economic positions, political considerations and other decisions in society where it is relevant and reasonable to do so.

As part of these efforts, the Swedish Environmental Protection Agency has produced the report *Sammanställd information om ekosystemtjänster* (Compiled information on ecosystem services). The government's aim of the milestone target is to create mechanisms that benefit the ecosystems' ability to provide services, and to provide incentives for sustainable management. In addition, it is stated that a better understanding of the ecosystem services' socio-economic and other values will contribute to increased awareness of the importance of conservation and sustainable use of biodiversity, which in turn help create favourable conditions for securing biodiversity for the future. The Swedish Environmental Protection Agency's report has also been used by the Commission on the Future of Sweden, which noted that the mapping of ecosystem services in Sweden has not yet been exhaustive, which means that it is currently difficult to evaluate the effectiveness of measures for ecosystem services.

## Ecosystem services clarify the landscape's multifunctionality

Ecosystems have the ability to produce multiple ecosystem services simultaneously, something that is referred to as multifunctionality. Efforts to maximize the production of single services (eg production of a crop) can have a negative impact on other services; see "flower diagrams" below where a filled petal represents the maximum production of a particular service. Flower diagrams may be helpful to illustrate both the synergies between different ecosystem services, as well as trade-offs. It is also important to have knowledge about what services are needed for other services to be produced; for example, water and often pollination are needed for agricultural crops. Modified from Björklund and Helmfrid (2010).

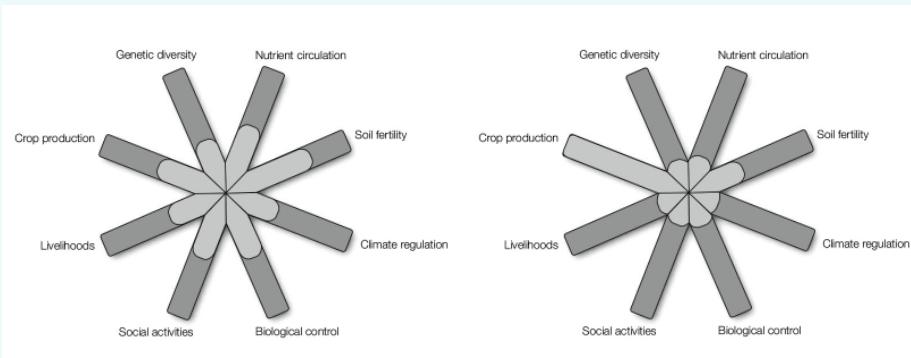


Photo next page: The trees in our cities are not only beautiful to look at, they also provide a range of other ecosystem services. From dampening of noise and providing shade to cleaning of air and water. The canopy will also benefit biodiversity in the city as the trees are important for many plants and animals such as birds, lichens and insects. Photo: J Lokrantz/Azote



# Proposed measures

We propose a coherent set of measures that strengthen existing initiatives and are based on the authorities' current working methods. Our 25 proposals are concerned with integration into decision-making processes (Chapter 3), a better knowledge base (Chapter 4), and learning about ecosystem services (Chapter 5). The distinction is not clear-cut, however, since also measures for integration are expected to generate knowledge that could support learning processes. The proposals are based on the analysis of barriers presented in Chapter 2 of the report, which deals with the provision of knowledge and education, institutional structures, public and private collaboration, and differences in world view between parties. The measures could contribute to learning about the value of ecosystem services at the local and national levels, as well as international collaboration.

Great emphasis is placed on the improvement of impact analyses through ecosystem service assessments of relevant extent. Of central importance are three proposed measures that give authorities with responsibilities in the environmental objectives system a clearer responsibility to take important steps towards a better understanding of socio-economic consequences by integrating the value of ecosystem services in decision-making processes (proposals 5, 19 and 20 below). This and other knowledge produced by the initial measures in Chapter 3 should provide a better basis for further action by the government and other authorities. Therefore, we propose that several of our measures be taken at a somewhat later stage, when we expect these efforts to have generated results in the form of, for example, identification and mapping or valuation of important ecosystem services. At the same time, it is important to implement the measures by 2018, which is the year when the milestone target regarding the importance of biodiversity and the value of ecosystem services is to be achieved.

The Inquiry believes that a knowledge hub is needed in the implementation of these measures and thus proposes that a temporary authority be created (in the form of a committee) to help in the effort to achieve the milestone target (proposal 11).

## A) Integration into decision-making processes

The Inquiry proposes 18 measures for integrating the importance of biodiversity and the value of ecosystem services in decision-making processes. We have analysed measures for integration of ecosystem services in the knowledge base for economic policy decisions, regulation of land and water use, economic policy instruments, ecological compensation, competence support, and information channels. The proposed measures vary in complexity and required work effort, but

all aim to make a number of actors in society understand how ecosystem services contribute to, and can be further developed in, their areas of responsibility, and what impact the operations in question have on ecosystem services. The measures are expected to lead to a better understanding as a basis for further considerations and measures by the governments of other authorities.

## ***Integration of ecosystem services in the basis for fiscal policy decisions***

The available data and tools for monetary evaluation are inadequate to satisfactorily make ecosystem services visible in the national accounts. As a complement to the gross domestic product, attempts have been made in Sweden and internationally to develop aggregate measurements of welfare that take social, economic, and ecological factors into account. However, it has proven difficult to obtain accurate measurements and to implement them in the basis for fiscal policy decisions. Sustainable development should thus for the present be demonstrated using a set of indicators that provide information on the capacity of society and the ecosystems to generate welfare, today and in the future.

### *Our proposal*

1. Starting in 2014, the government should increase the visibility of sustainability factors, including ecosystem services, in the basis for fiscal policy decisions, initially by annually presenting sustainability indicators along with data on economic development.

## ***Regulation of land and water use***

Laws and regulations need to be reviewed in order to ensure that available knowledge of the value of ecosystem services is taken into account when balancing different interests. In a first stage, what is required is guidance on how these rules can be used, as well as collection of insights from on-going work as a basis for evaluation of existing rules.

The County Administrative Boards play a key role as they guide and supervise local and regional planning.



The Inquiry proposes a review of better use of ecological compensation when ecosystem services are affected by the exploitation of land and water areas. Photo: D Karlsson/Azote

Agencies with responsibilities in the environmental objectives system have a particularly close relationship with ecosystem services and a special responsibility for achieving the environmental quality objectives. The value of ecosystem services should be gradually integrated into

these agencies' decision-making processes. The knowledge created through these efforts provides an important basis for the government's decisions and measures to achieve the milestone target. The agencies should review their own policy documents and exercise of authority in light of *inter alia* the ecosystem services described in the Swedish Environmental Protection Agency's report and then



Water treatment and water regulation are important ecosystem services highlighted in the Inquiry's proposal to conduct a review of laws and regulations governing the use of land and water. Photo: T Järnetun/Azote

report back to the government. For agencies with responsibilities for trade, aid, and international investments, this first stage may involve establishing policies for integrating ecosystem services in policy documents of importance to Sweden's environmental impact (positive and negative) on other countries.

### *Our proposals*

2. In connection with the review of laws regulating the use of land and water, the government should continuously make sure that it is made clear whether the current regulations facilitate a holistic perspective on ecosystem functions and a long-term sustainable use of important ecosystem services. Changes should be proposed to address any shortcomings.
3. The government should commission the Swedish Environmental Protection Agency and the Swedish Agency for Marine and Water Management to, in 2014-2015, develop guidelines for the County Administrative Boards on how to take ecosystem services into account, both in their work with municipalities and regional bodies when it comes to physical planning and development, and in connection with drawing up environmental impact assessments and strategic environmental assessment. Considerations and proposals developed in the action plan for green infrastructure should be given special attention.

4. The government should commission the Swedish National Board of Housing, Building and Planning to develop guidance and competence support for dealing with ecosystem services in the application of Chapter 2 of the Planning and Building Act and Chapters 3 and 4 of the Environmental Code in the physical planning. Opportunities for synergies with the task proposed by the Cross-Party Committee on Environmental Objectives, regarding social values in natural environments near urban areas, should be considered, and this task should be scheduled to coincide with such a task.
5. The government should, as soon as possible, request official reports from agencies with responsibilities in the environmental objectives system regarding how the agencies use ecosystem service assessments in their work. The initial focus should be on efforts to identify important ecosystem services and to clarify how each sector depends on and affects ecosystem services in Sweden and abroad. Continuous reporting regarding follow-up of ecosystem services and measures to integrate the value of ecosystem services in the agencies' work should be provided within the environmental objectives system and the environmental management system, respectively.
6. There is an urgent need to establish an Inquiry to obtain a more holistic approach to the use of land through strengthened coordination in the central government administration, as proposed by the Swedish Cross-Party Committee on Environmental Objectives. However, its scope should be broadened to include the business sector's need for consistent control signals to promote the development of products based on ecosystem services with positive effects for the environment.

## ***Economic policy instruments***

Economic policy instruments should be evaluated and investigated in order to strengthen the application of the internationally recognised "polluter pays principle". Potentially environmentally harmful subsidies should also be investigated in accordance with recommendations from the Convention on Biological Diversity. The cost-effectiveness of different types of environmental compensations or payments should also be evaluated, but the total extent of the support should not be decreased.

## ***Our proposals***

7. In 2016, the government should commission the National Institute of Economic Research and the Swedish Environmental Protection Agency to jointly review current economic policy instruments that affect biodiversity and ecosystem services, and propose new policy instruments and measures to decrease potentially environmentally harmful subsidies. The aim of the proposals should be to achieve the environmental quality objectives and implement the polluter pays principle. The task should be carried out after consulting with the Swedish Agency for Marine and Water Management, the Swedish Board of Agriculture, and the Swedish Forest Agency.



The inhabitants around the Baltic Sea place great value on the ecosystem services of the sea. According to the study BalticSTERN, their willingness to pay exceeds the costs of reducing eutrophication of the Baltic Sea (The Swedish Agency for Marine and Water Management 2013). Photo: T Dahlin/Azote

8. The government should commission the Swedish Board of Agriculture, the Swedish Forest Agency, and the Swedish Agency for Marine and Water Management to investigate, in connection with reviews and evaluations of each industry's support systems, how important ecosystem services are already supported and could be supported. Consultations with other agencies should take place whenever it is relevant to do so.
9. A larger proportion of agricultural support should be used for environmental payments. It should also be ensured that the direct payments to farmers is conditioned to maintain or increase the positive effect on biodiversity and ecosystem services in the agricultural landscape.

### ***Ecological compensation in the everyday landscape***

Opportunities to demand ecological restoration or enhancement to compensate for negative effects on ecosystem services due to the exploitation of land and water resources already exist, but are hampered by legal ambiguities. Ecological compensation is based on the polluter pays principle, and increased implementation of this principle could be expected to steer the exploitation to less valuable areas, as this would reduce the cost of compensation, but the consequences should be investigated further.

#### *Our proposal*

10. In 2014, the government should initiate a special Inquiry to analyse the opportunities for and consequences of increased and more consistent implementation of ecological compensation in the everyday landscape,

i.e. outside protected areas. If the Inquiry concludes that ecological compensation is an effective tool, a second stage could be to develop proposals for national guidelines and mechanisms for implementation. Related legislation should also be reviewed.

## ***Collaboration for capacity building and innovation***

Efforts to inform non-governmental actors are needed to strengthen the growing involvement of businesses and municipalities. Effective and mutual interaction between the public and private sectors are likely to be crucial to increasing the awareness of the importance of ecosystem services, stimulating innovation, and gathering the knowledge of the value of ecosystem services that is available and produced in the sectors working with regional development and business development. Measures to encourage the public sector to act as a role model have both pedagogical significance and direct environmental impact.

A cohesive actor is needed in the implementation to reach out with knowledge of the value of ecosystem services for different sectors and interests. We believe that none of the existing agencies are suited for such a task. Broad cross-sector government efforts are needed to develop the expertise of government agencies

and to collaborate effectively with various non-governmental parties that need assistance in managing their dependence and impact on ecosystem services.



The concept of ecosystem services helps us to see the web of functions and processes of the ecosystems that underpin our everyday groceries. Photo: N Kruys/Azote

The committee should serve as a knowledge hub that collaborates with and supports different actors in the implementation of the measures we are proposing. The committee should have two core tasks: to gather and disseminate knowledge about obstacles and successes in the efforts to evaluate ecosystem services and integrate these values into decision-making processes, and to ensure that the relevant national agencies develop the necessary capacity and expertise to, by 2018, assume the responsibility

## ***Our proposals***

11. The Government Offices should establish a committee for ecosystem services to meet the need for knowledge and support for learning about ecosystem services in the business sector, municipalities, and government agencies.



A large diversity of different ecosystems and species, and a large genetic variation within species, are important elements of the resilience of ecosystems and thus their long-term ability to produce important services. At the regional level, it becomes more apparent that ecosystem services are produced in an interaction between humans and nature; what scientists usually refer to as social-ecological systems. Photo: D Karlsson/Azote

for integrating the value of ecosystem services in economic positions and other decisions in society where it is relevant and reasonable to do so. The committee should be composed of representatives from the most relevant sectors, including industry associations and municipalities, as well as representatives of civil society organisations, researchers, and relevant actors dealing with communication of knowledge. The committee should be active between 2014 and 2018, report to the government in 2016 on conclusions from its work, and submit their final report in 2018, when the milestone target regarding the importance of biodiversity and the value of ecosystem services should be followed up.

12. An information portal about regional development and business development, ecosystem services, and biodiversity should be established in 2014. The portal should be based on the Swedish Environmental Protection Agency's proposal for a platform for the business sector and biodiversity. It should include guidance in Swedish and a collection of examples related to ecosystem service assessments, including good examples of when national and regional goals for ecosystem services were taken into account in physical planning.
13. A communication effort should be carried out between 2014 and 2018, based on the Swedish Environmental Protection Agency's pilot study.
14. The government should initiate an investigation on how the Swedish Environmental Protection Agency, the Swedish Board of Agriculture, the Swedish Forest Agency, the Swedish Agency for Marine and Water Management, the Swedish Energy Agency, and the Swedish Agency for Economic and Regional Growth (considering its responsibility for tourism) could support business development in their areas of responsibility through the development of ecosystem service-based products with positive effects on the environment.
15. The Swedish Governmental Agency for Innovation Systems should announce financial support for innovations that develop ecosystem service-based products and solutions that contribute to the achievement of the environmental quality objectives, where ecosystem multifunctionality is taken into account.
16. No later than 2016, the government should investigate different strategies to improve transparency regarding the dependence and impact of bond investments on the ecosystem services, including investments by the national pension funds.
17. In 2016, the government should commission the Swedish Competition Authority to investigate whether the valuation of ecosystem services could be used in life-cycle cost estimates, as part of a simple and efficient tool to make it easier for procurers to place demands on sustainability from an ecosystem services perspective.
18. By 2016, the state ownership policy should be complemented with the government's view on how the value of ecosystem services should be integrated into economic positions.

## B) Better knowledge base

We propose three measures to increase the knowledge base in order to make the work leading up to the target year 2018 as effective as possible. These measures should be included in an international context to facilitate comparability and impact in the decision-making processes that require international collaboration.

### ***Ecosystem service assessments***

During the current decade, current goals and processes in the environmental objectives system should be used to conduct a first national analysis of the value of ecosystem services, drawing on lessons from the TEEB project's methods and results. We propose that this analysis be conducted within the environmental objectives system and include proposals 5, 20, and 25, i.e. also the agencies' integration work (proposal 5) and a final synthesis (proposal 25). This work needs to be delimited in order to be manageable. The agencies' identification of important ecosystem services and reports on current work with ecosystem service assessments constitute a first stage. However, the emphasis is on following up the specifications to environmental quality objectives with regards to ecosystem services with the help of guidance and cross-agency collaboration within the existing environmental objectives system.



Soil formation is a regulating ecosystem service that is difficult to value in monetary terms, but still of fundamental importance for a variety of other services produced within economically important sectors as agriculture and forestry. Photo: B Kristersson/Azote

### *Our proposals*

19. Sweden should continue to support the TEEB collaboration with a focus on, for example, developing methods for ecosystem service assessments. In addition, Sweden should continue its active participation in the collaborative EU project MAES, with the involvement of the relevant agencies.
20. The government should commission the Swedish Environmental Protection Agency and the Swedish Agency for Marine and Water Management to develop guidelines regarding ecosystem service assessments by 2015. The guidelines should be targeted at other agencies with responsibilities in the environmental objectives system, with special focus on the Swedish National Board of Housing, Building and Planning and the agencies responsible for following up the milestone target. The task should be carried out after consultation with all agencies with responsibilities in the environmental objectives system. If a committee for ecosystem services is appointed, in accordance with our proposal 11, the guidelines should be developed after consultation with this committee.

### ***Development of relevant sustainability indicators***

Statistical data and methods for environmental accounts should be developed further by connecting existing and new indicators for the follow-up of environmental objectives more closely to economic and social sustainability. This will lead to a better basis for fiscal decisions.

### *Our proposal*

21. Statistics Sweden (SCB) should continue its task of supporting and participating in the ongoing processes within the EU and the OECD to develop a set of relevant indicators for sustainable development. In addition, SCB should be given a temporary assignment in 2014 to analyse which parts of the official statistics could be developed to meet the need for data on ecosystem services for environmental accounts, sustainability indicators, and follow-up of environmental objectives.

## **C) Learning about ecosystem services**

Finally, we propose five measures to stimulate the further development of the management of ecosystem services through learning about ecosystem functions and the effects of measures taken.

### ***General measures for involving stakeholders***

There is a need for research efforts related to basic ecological and economic linkages and the effects of different policy instruments, especially the kind of location-specific knowledge that is needed as a basis for concrete measures and application of valuation methods. There is also a need for interdisciplinary

and cross-sector knowledge about effective learning processes. This needs to be developed through collaboration between, for example, economists, ecologists, political scientists, sociologists, philosophers and psychologists, as well as between researchers, business professionals, policy makers, and civil society associations.

Obstacles to connecting research more closely to actual work in the municipalities, government agencies and businesses need to be analysed and addressed. Tools and forms of collaboration should be promoted to encourage the effective participation of stakeholders and other actors in the collection of knowledge and in dialogues prior to decisions involving ecosystem services.

### *Our proposals*

22. In 2014, the government should commission the Swedish Research Council Formas to analyse how research on ecological linkages, effects of economic policy instruments, methods for valuation of ecosystem services, and learning processes in the management of ecosystem services can be strategically supported. The task should include identifying and highlighting factors that affect the extent of active participation of researchers in the planning and evaluation of the management of biodiversity and ecosystem services.
23. The government should continue to secure the necessary funds for the Swedish Taxonomy Initiative in order to stimulate and assure the quality of the reports of sightings of species to the Swedish Species Gateway. In addition, the government should consider complementing the objectives of the Taxonomy Initiative so that it also stimulates awareness of ecosystem services by illustrating examples of species' ecological functions.

### ***Measures for learning processes at the local and regional levels***

Existing consultation processes should be utilised in the work with ecosystem services. Regional planning should take ecosystem service assessments at the municipal level into account when such are available. The municipalities' efforts are essential for achieving the national environmental quality objectives and should thus continue to be promoted through government co-funding.

### *Our proposal*

24. In 2014, the Government Offices should investigate the need for changes to the Local Nature Conservation Programme (LONA) in order to clarify the possibility of co-funding local work with ecosystem service assessments as a basis for local and regional planning.

### ***Learning in the national administration***

Finally, there is need for a national analysis of how the work with ecosystem services can be developed further. Through the measures proposed in this report,

Sweden should be better equipped to assess how well the generational goal and the environmental quality objectives have been achieved. In this way, Sweden will also be able to continue to play a leading role in the development of international policy.

### *Our proposal*

25. A new analysis of policy options should be conducted after the target year 2018, and a long-term plan should be developed for continued learning about sustainable production of ecosystem services. This work should be based on evaluations of the measures taken and the methods used to achieve the milestone target, syntheses of the state and development of ecosystem services in the follow-up of environmental objectives, and reviews proposed in this report, for example, of economic policy instruments.

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*Take a deep breath.*

*The oxygen that fills your lungs is the result of photosynthesis - a basic ecosystem service.*

This is a summary of the report from the Inquiry "Making the value of ecosystem services visible", Swedish Government Official Report 2013:68. The Inquiry was instructed to analyse actions and suggest methods and measures to better evaluate ecosystem services and to improve the knowledge base of the societal value of ecosystem services, as well as to propose ways that will increase the level of importance of biodiversity and to clarify the values of ecosystem services so that they become generally well known and thus can become integrated in economic positions and other decisions in the community where this is relevant and reasonable.

The Inquiry puts forward 25 proposals relating to the integration into decision-making, a better knowledge base and learning about ecosystem services. The concept of ecosystem services describes the ecosystems' direct and indirect contributions to human well-being. The Inquiry proposes ecosystem service assessments as a method to create a basis for decisions. By identifying both ecosystem services and users, it becomes clear how we depend on and affect ecosystem services in a given situation or at a certain location. This means that ecosystem services are valued more clearly. Calculating the monetary value of ecosystem services can also facilitate this visibility, but the monetary valuation is not always possible and even less appropriate if relevant knowledge is lacking or due to ethical reasons. The Inquiry also leaves proposals regarding economic incentives, collaborative processes for learning, research and innovation support.

The Inquiry has conducted literature studies and dialogues in Sweden where groups of actors helped to identify key barriers and ways forward for integrating ecosystem services. The Inquiry has collaborated with the Swedish Cross-Party Committee on Environmental Objectives and the Environmental Advisory Council and has had a reference group with representatives from state agencies and local and regional government, business representatives and organizations of civil society as well as scientists who have worked with and shaped the discussions on ecosystem services and valuation.

