Fifth National Report to the Convention on Biological Diversity

Sweden

Contents

1. An update on biodiversity status, trends, and threats and implications for human well being

1.1 The importance of biodiversity for Sweden

Sweden is a country in Northern Europe with a total area of 450 295 km^2, of which 39 959 consist of freshwater. Forests cover 280 940 km^2 (ca 68% of the land surface). Agricultural land covers approximately 8% of the land surface, slightly less than open wetlands (9,5%). On October 31, 2013, Sweden had 9 633 490 inhabitants, which gives a relatively low population density of 21 inhabitants per square kilometre. The majority of people live in the southern part of the country. Sweden is surrounded in the southwest, south and east by the Skagerrak, Kattegat, Baltic Sea proper and the Gulf of Bothnia, seas whose salinity decreases with distance from the North Sea (between 25 and 30‰ for the Skagerrak down to less than 3‰ for the far north of the Bothnian Bay).

With about 50 000 species of plants, fungi and animals, Sweden is relatively species poor, compared to many other countries. This is partly due to the northern location, and partly to the fact that the land was covered with ice until at least 15 000 years ago, when it slowly started receding, starting in the southwest. Because of this, and the continuing rising of the previously submerged land when the mass of the ice had disappeared, species are still spreading. However, for specific species groups, such as bryophytes, lichens and some groups of fungi, Sweden can be considered as rather species rich. Moreover, many species in Sweden occur at the edge of their distribution, often resulting in genetically distinct populations.

The Swedish Environmental Protection Agency has synthesized information on the importance of biodiversity, seen as ecosystem services, in an assignment given by the government. The definition of

ecosystem services was the one used by TEEB; *The direct and indirect contributions of ecosystems to human well-being.* See section 2.3.4 for more information.

1.2 Major changes in the status and trends of biodiversity in Sweden

There are as many ways to describe changes in the status and trends of biodiversity as there are kinds of biodiversity components. In this section two aspects of biodiversity are dealt with, based on two recent evaluations performed. One is on the threatened species and habitats listed by the European Union, and one is on Swedish national red list of threatened species.

The Habitats Directive (Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora) is one of EU's instruments aimed at halting the loss of biodiversity. In Article 17 of the Habitats Directive, it is stated that every sixth year, Member States shall draw up a report on the conservation status of the habitats and species listed in the Directive. The overall objective of the Directive is that all listed species and habitats should reach favourable conservation status as defined in Article 1 of the directive.

There are three classes of conservation status for reporting under Article 17 – favourable, inadequate and unfavourable. Also, the assessment classes should be qualified with a plus, minus or equal sign to indicate whether the trend is positive, negative or stable. For each and every species and habitat there are four components to be analysed and assessed: population size/habitat area and its trend, range and its trend, habitat for the species/habitat structure and function (including typical species) as well as future prospect. An aggregation of the results from the four components, according to a specific evaluation matrix, gives the overall assessment for the habitat or species and its overall trend.

Red listing in Sweden has been carried out since 1996, with the most recent assessment made in 2010. As far as possible the red list is an objective analysis of the status of flora and fauna in Sweden, evaluating the species' risk of extinction. The analyses follow the International Union for Conservation of Nature (IUCN) quantitative Red List Criteria from 2001 and IUCN's regional guidelines from 2003.

There are no major changes in status and trends of biodiversity in Sweden since the fourth national report. There is little evidence that the rate of loss of ecosystems, species and genetic diversity have been halted. Actions such as specific species action programmes and EU LIFE projects have had a positive effect on a few species and habitats, but the overall trend is still negative and many species are not viable in the long term. The general pattern is that the situation is better in the northern part of the country. However, due to climate change the pressure there is likely to increase in the future.

The number of red-listed species has risen marginally in 2010 compared to 2005. In the Swedish Red List 2010 there were 4127 species classified as red-listed. In 2005 there were 3653 species. However, the main reason for this is that more species have been assessed. The proportion of species that are red-listed, among those assessed, has risen from 19.1% to 19.8%. Some species have entered into a less threatened category.

The results of the Swedish assessment in the Article 17 reporting under the Habitats Directive in 2013 are similar compared to the reporting in 2007. In 2013 there were more species and habitats reported compared to 2007 which explains the change in the amount of species/habitats with unfavourable and inadequate conservation status. Another change is that

the number of species in favourable condition in marine Baltic region has increased, but that is only due to one species, the vendance (*Coregonus albula*) that was not reported in 2007. The other positive change is in the marine Atlantic region, where the harbour seal (*Phoca vitulina*) is responsible for the increase in number of species in favourable conservation status (Figure 1). The harbour seal went from unfavourable conservation status to favourable.

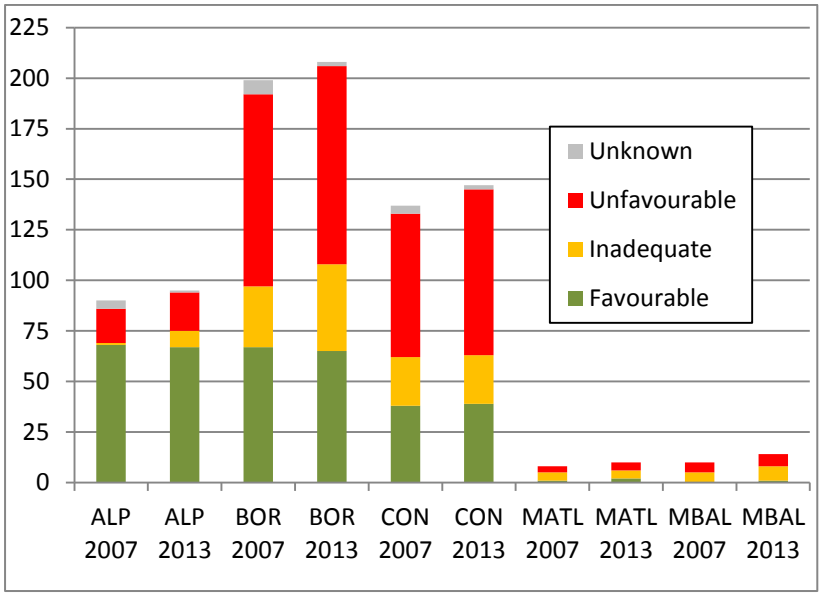

Figure 1. A comparison of the Swedish results from 2007 and 2013 of Article 17 reporting under the Habitats Directive. The chart shows number of species and habitats listed in the Habitats Directive that occur in Sweden divided among the five regions of the country. The differences in total bar length between years are mainly explained by the fact that more species and habitats where reported in 2013 compared to 2007. A species or habitat is counted once for each region in which it occurs. ALP = alpine region, BOR = boreal region, CON = continental region, MATL = marine Atlantic region, MBAL = marine Baltic region.

When trend data on population size, range and distribution of habitats are compared between 2007 and 2013 some differences are observed (Figure 2). The change in trends from 2007 to 2013 is primarily due to the fact that more species and habitats were reported in 2013 compared to 2007, but it is also explained by better data and better knowledge. Thus information on trends is more reliable in 2013.

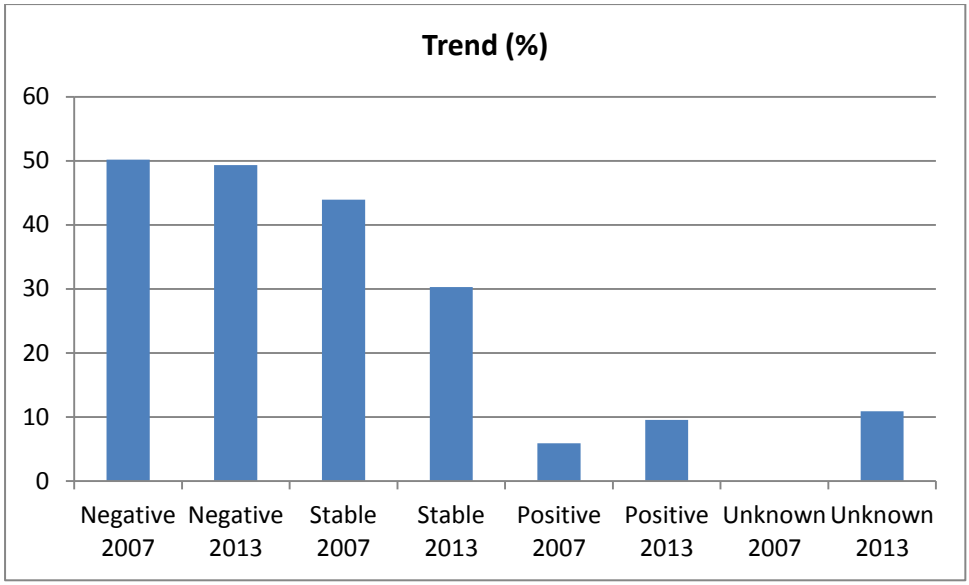

Figure 2. Number of species and habitats reported with an unfavourable or inadequate conservation status with a negative, stable or positive trend. The high proportion of unknown trends in 2013 is primarily due to a number of species, mostly bats, that were not reported in 2007, and for which data on trends do not exist. A trend is not reported for species and habitats with favourable conservation status. Note that even if the trend is positive the species or habitats in this chart are still in unfavourable or inadequate condition.

1.2.1 Agricultural ecosystems

The status of most of the habitats and species reported on in agricultural ecosystems in Sweden is not favourable (Figure 3), as it has been for the last 50 years. Due to fundamental structural changes of agriculture during the last 100 years the area of semi-natural pastures and meadows has decreased markedly and the management of remaining such ecosystems is often insufficient for preserving the values of these systems. These changes have also caused a severe loss of ecological functionality and diversity in the agricultural landscape. The structural changes are still ongoing in a way that is detrimental to the agricultural ecosystems.

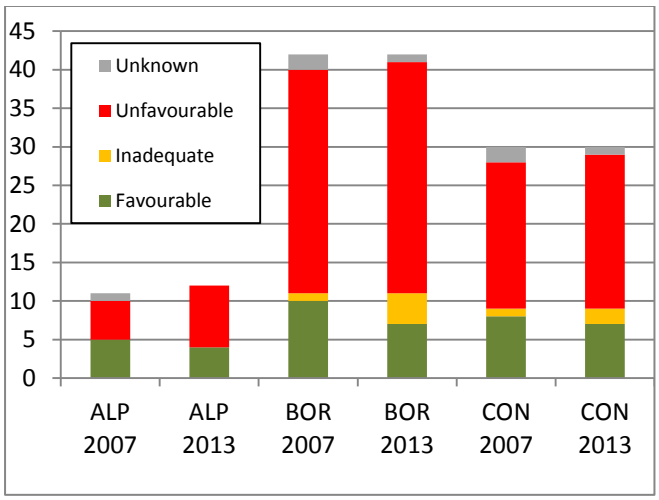

Figure 3. A comparison of the Swedish results from 2007 and 2013 of Article 17 reporting under the Habitats Directive concerning the agricultural ecosystem. The chart shows number of species and habitats listed in the Habitats Directive that occur in Sweden divided among the relevant regions of the country. The differences in total bar length between years are mainly explained by the fact that more species and habitats

where reported in 2013 compared to 2007. A species or habitat is counted once for each region in which it occurs. ALP = alpine region, BOR = boreal region, CON = continental region.

The trend is negative for most of the species and habitats (Figure 4). The small decrease in the proportion of negative trends that is seen between 2007 and 2013 is mainly due to a few species whose situation has turned from bad and deteriorating to a bad but stable one.

For many species the situation is worrying. Several went from a favourable situation to an unfavourable, e.g. *Botrychium simplex*, *Saxifraga osloensis* and *Encalypta mutica*. For some of the species the trend has changed from a bad but stable status to a bad and deteriorating status. This applies for the hermit beetle (*Osmoderma eremita)* and the great capricorn beetle (*Cerambyx cerdo)*. The number of red-listed species in the agricultural landscape has increased from 1694 in 2005 to 2064 in 2010.

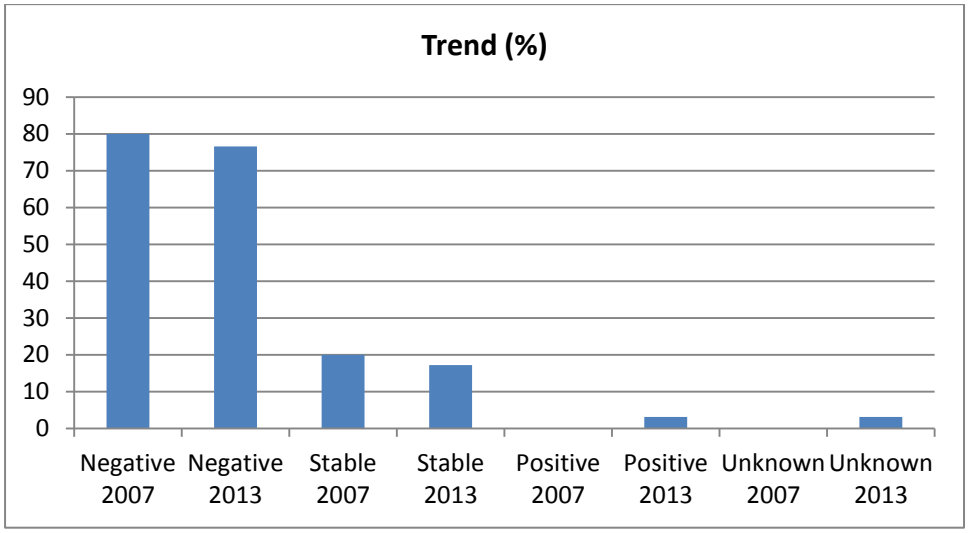

Figure 4. Number of species and habitats reported with an unfavourable or inadequate conservation status with a negative, stable or positive trend. A trend is not reported for species and habitats with favourable conservation status. Note that even if the trend is positive the species or habitats in this chart are still in unfavourable or inadequate condition.

1.2.2 Forest ecosystems

Forest habitat types listed in the Habitats Directive that occur in Sweden represent much of the forest in Sweden. Thus, using the data from the Article 17 reporting gives an approximate picture of the status of valuable forest habitats in Sweden of today. The article 17 reporting does not – however – give the full picture of the effects of actions taken since the last national report as it does not take into account the fact that forest biodiversity responds slowly on activities because of the long rotation periods.

The change in status of biodiversity since the fourth national report is minor (Figure 5) according to the Article 17 reporting. There are several habitats and species that are in unfavourable condition in terms of area or population size as well as in the quality of specific structures and functions of the habitats. To mention a few examples, the western taiga has unfavourable conservation status and the trend continues to be negative (Figure 6). The situation for Fennoscandian herb-rich forests with *Picea abies* is even worse. From a favourable situation in 2007 the status is now inadequate with a negative trend. Many species have shifted from a poor but stable situation to a situation where the status is getting worse,

e.g. *Dicranum viride* and *Agathidium pulchellum*. One subspecies, *Pulsatilla vulgaris* ssp. *gotlandica*, has improved its status from inadequate to favourable.

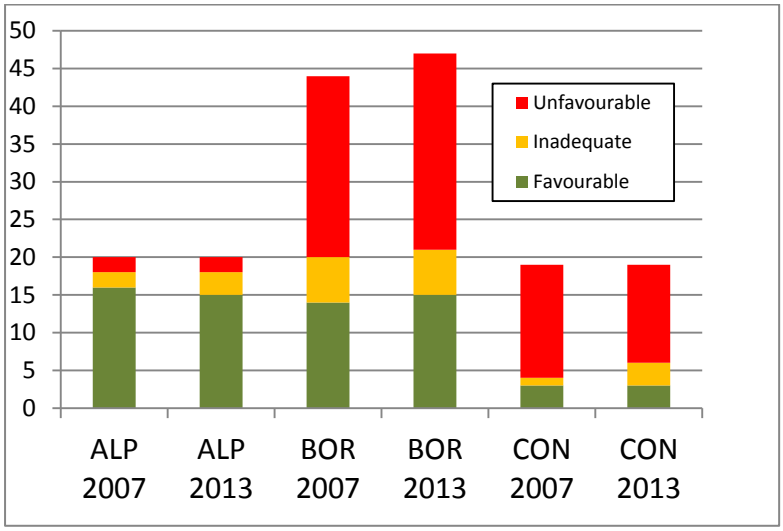

Figure 5. A comparison of the Swedish results from 2007 and 2013 of Article 17 reporting of the Habitats Directive concerning the forest habitat types and its species. The chart shows number of species and habitats listed in the Habitats Directive that occur in Sweden divided among the relevant regions of the country. The differences in total bar length between years are mainly explained by the fact that more species and habitats where reported in 2013 compared to 2007. A species or habitat is counted once for each region in which it occurs. ALP = alpine region, BOR = boreal region, CON = continental region.

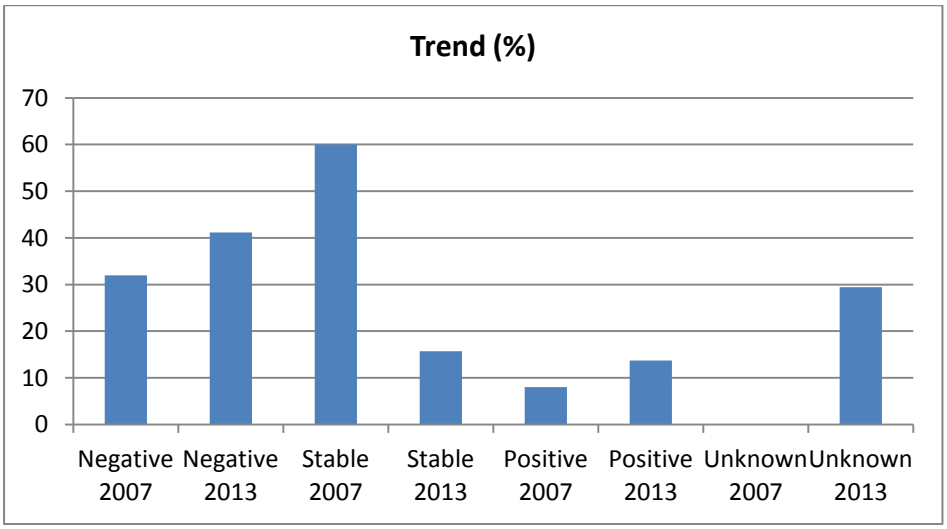

Figure 6. Number of species and habitats reported with an unfavourable or inadequate conservation status with a negative, stable or positive trend. The high proportion of unknown trends in 2013 is primarily due to a number of species, mostly bats, that were not reported in 2007, and for which data on trends do not exist. A trend is not reported for species and habitats with favourable conservation status. Note that even if the trend is positive the species or habitats in this chart are still in unfavourable or inadequate condition.

In forest ecosystems there are 2131 red-listed species according to the Swedish Red List 2010. Only about 800 of these species are however affected by forest management practices. Compared to the Red List 2005 it is an increase of threatened species by 269. The change is mostly due to more species having been assessed, but the number of deteriorations is 1,8%. However, the situation for some species has changed positively. The four big predators, the

wolf (*Canis lupus)*, the bear (*Ursus arctos)*, the wolverine (*Gulo gulo)* and the lynx (*Lynx lynx)*, are in a lower Red List category than they were in 2005.

1.2.3 Inland waters

The status of inland waters (freshwaters and wetlands) and their species is considered to be relatively good in the northern part of Sweden (Figure 7). The bad and inadequate assessments in the alpine region concern only one species and one habitat – the bryophyte *Hamatocaulis lapponicus* and Palsa mires. The situation for the Palsa mires continues to get worse but the status of the bryophyte is improving. It has changed category from unfavourable to inadequate. The marine Baltic region is included here because three fish species (white fish *Coregonus lavaretus*, vendance *Coregonus albula* and grayling *Thymallus thymallus*) that occur in freshwater also occurs in the Baltic sea, but were not reported from this region in 2007. The number of red-listed species of inland waters has increased from 731 to 1005.

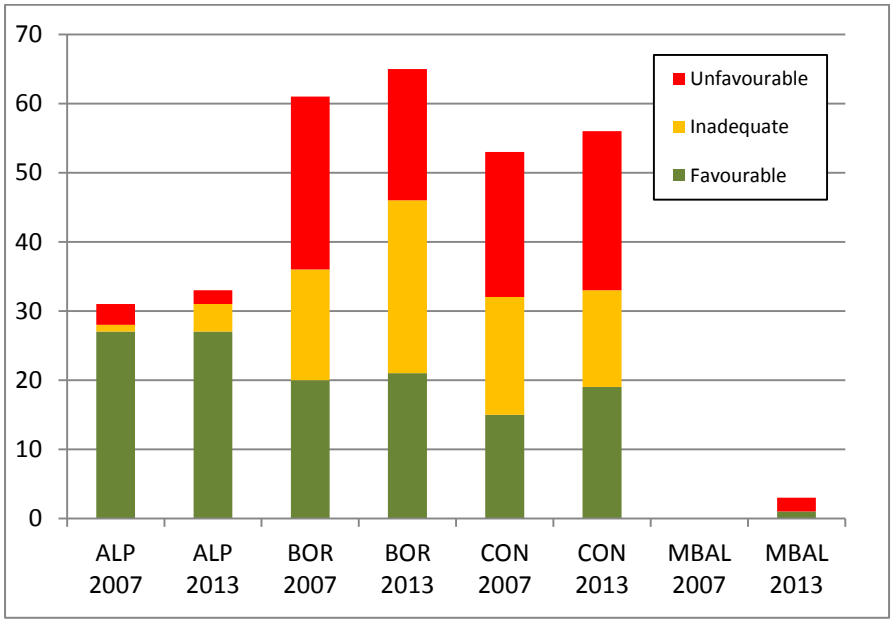

Figure 7. A comparison of the Swedish results from 2007 and 2013 of Article 17 reporting under the Habitats Directive concerning inland waters and its species. The chart shows number of species and habitats listed in the Habitats Directive that occur in Sweden divided among the the relevant regions of the country. The differences in total bar length between years are mainly explained by the fact that more species and habitats where reported in 2013 compared to 2007. A species or habitat is counted once for each region in which it occurs. ALP = alpine region, BOR = boreal region, CON = continental region, MATL = marine Atlantic region, MBAL = marine Baltic region.

The status of the amphibians has improved considerably since the previous Article 17 reporting. The status of fired-bellied toad (*Bombina bombina)* and European tree frog (*Hyla arborea)* has changed from inadequate and unfavourable to favourable. The trend for others, e.g. the natterjack toad (*Bufo calamita)*, the green toad (*Bufo viridis)*, the common spadefoot (*Pelobates fuscus)* and the agile frog (*Rana dalmatina)*, has turned from a negative to a stable or even positive trend.

However, there are still many species and habitats that suffer from a negative trend or a bad but stable situation, especially in the boreal and continental region (Figure 8). The small change in the proportion of positive trends is due to only three species – the green toad (*Bufo*

viridis), the asp (*Aspius aspius)* and a species not reported in 2007, the sea lamprey (*Petromyzon marinus)*.

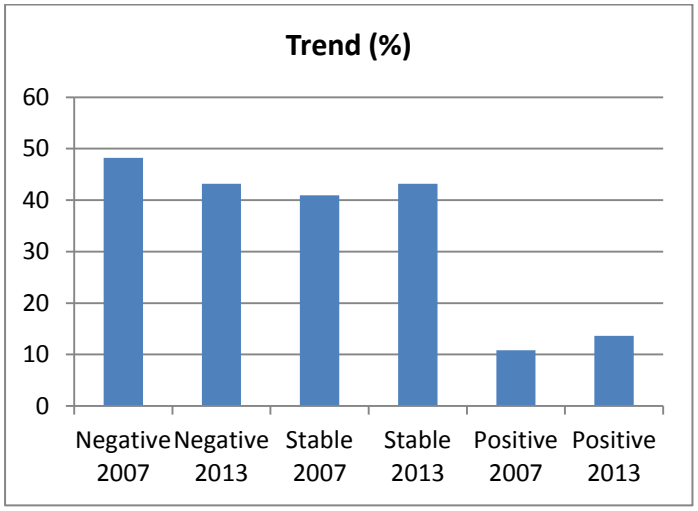

Figure 8. Number of species and habitats reported with an unfavourable or inadequate conservation status with a negative, stable or positive trend. A trend is not reported for species and habitats with favourable conservation status. Note that even if the trend is positive the species or habitats in this chart are still in unfavourable or inadequate condition.

1.2.4 Marine and coastal areas

Most of the reported habitats and species in marine and coastal areas are not in favourable conservation status (Figure 9). The small change towards favourable conservation status in boreal region are due to the habitats Baltic esker islands with sandy, rocky and shingle beach vegetation and sublittoral vegetation, boreal Baltic islets and small islands, and boreal Baltic sandy beaches with perennial vegetation. The status of these three habitats has changed from favourable to inadequate. The main reason for the change of conservation status of these habitats is because their typical species are not in favourable conservation status. The number of red-listed species increased from 520 in 2005 to 738 in 2010.

There is an increase in the proportion of negative trends in 2013 compared to 2005 (Figure 10). Several of the habitats have changed from a stable but bad situation to a bad and negative situation, e.g. sandbanks which are slightly covered by sea water all the time, mudflats and sandflats not covered by seawater at low tide, large shallow inlets and bays, and wooded dunes. The small, but still, positive change in trends is because the populations of harbour seal (*Phoca vitulina)* and the ringed seal (*Pusa hispida)* are slowly increasing.

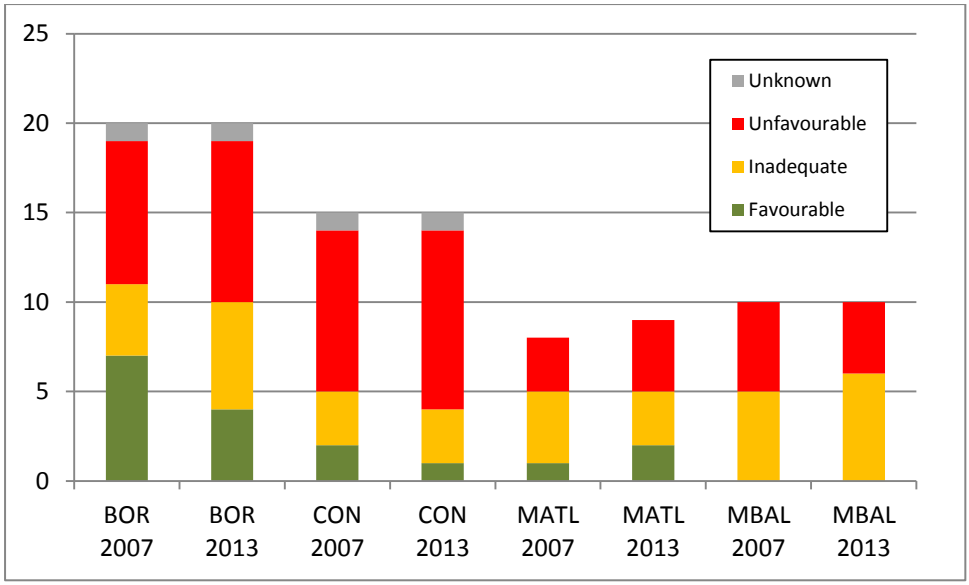

Figure 9. A comparison of the Swedish results from 2007 and 2013 of Article 17 reporting under the Habitats Directive concerning marine and coastal habitats and its species. The chart shows number of species and habitats listed in the Habitats Directive that occur in Sweden divided among the relevant regions of the country. The differences in total bar length between years are mainly explained by the fact that more species and habitats where reported in 2013 compared to 2007. A species or habitat is counted once for each region in which it occurs. ALP = alpine region, BOR = boreal region, CON = continental region, MATL = marine Atlantic region, MBAL = marine Baltic region.

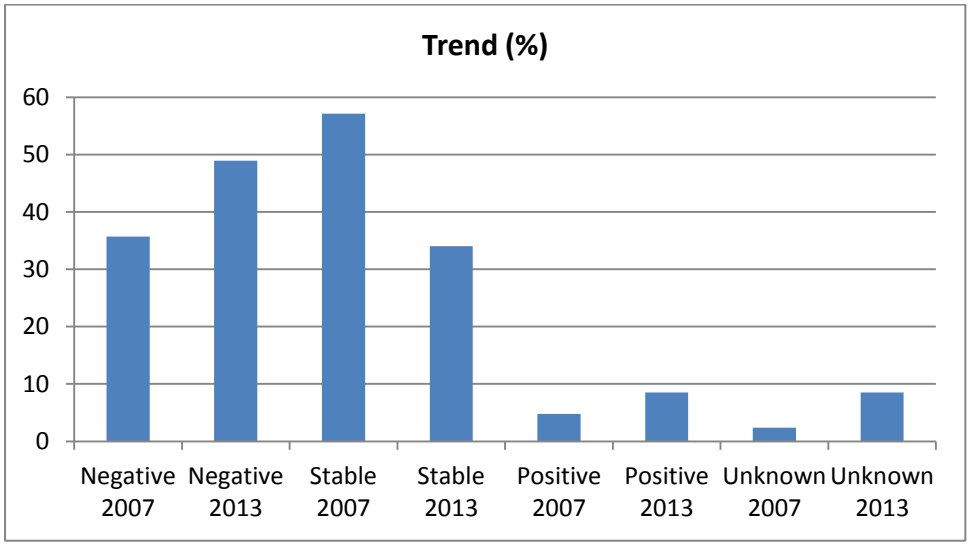

Figure 10. Number of species and habitats reported with an unfavourable or inadequate conservation status with a negative, stable or positive trend. A trend is not reported for species and habitats with favourable conservation status. Note that even if the trend is positive the species or habitats in this chart are still in unfavourable or inadequate condition.

1.2.5 Mountain ecosystems

The mountain ecosystems in Sweden have the highest proportion of favourable habitats and species (Figure 11). The major change is the change of status for one species, *Orthothecium lapponicum.* The status of this bryophyte has turned from favourable to unfavourable. However, there are more species where the status is far from favourable. *Agriades glandon*, *Boloria improba* and *Hesperia comma* ssp. *catena* have unfavourable conservation status. In

the Swedish mountains the number of red-listed species increased from 173 in 2005 to 210 in 2013.

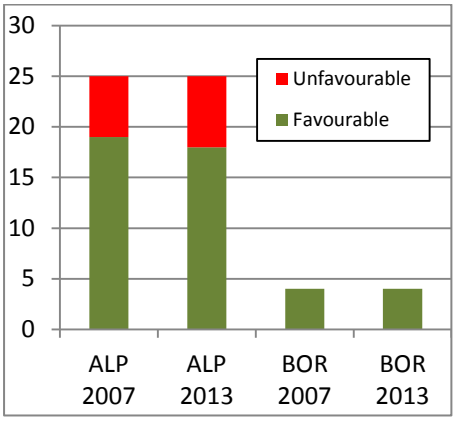

Figure 11. A comparison of the Swedish results from 2007 and 2013 of Article 17 reporting under the Habitats Directive concerning mountain habitats and its species. The chart shows number of species and habitats listed in the Habitats Directive that occur in Sweden divided among the relevant regions of the country. A species or habitat is counted once for each region in which it occurs. ALP = alpine region, BOR = boreal region

The arctic fox (*Alopex lagopus)* is the reason why the negative trends have decreased in proportion (Figure 12). The trend for this species has changed from bad and deteriorating to bad and stable.

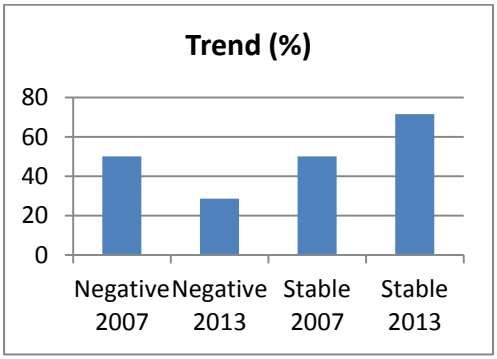

Figure 12. Number of species and habitats reported with an unfavourable or inadequate conservation status with a negative, stable or positive trend. A trend is not reported for species and habitats with favourable conservation status. Note that even if the trend is positive the species or habitats in this chart are still in unfavourable or inadequate condition.

1.3 Main threats to biodiversity

Major reason for the loss of diversity in terrestrial ecosystems is habitat change or degradation. For forests the loss is caused by former forest management. For agriculture the loss is mostly due to change in cultivation and abandonment. In the marine environment the major threats are unsustainable fisheries and the harvesting of aquatic resources. Intensification of water power is an emerging issue that put increased pressure on high conservation value waters.

1.3.1 Agricultural ecosystems

The most significant threat to the agricultural ecosystems is that pastures, meadows and other semi-natural grasslands are overgrown as a result of abandonment of pastoral systems and lack of grazing (Figure 13). Another threat is afforestation on previously open spaces. All this leads to a loss of the biodiversity in these ecosystems and a loss of connectivity. The intensification of agricultural production has also been detrimental to the biodiversity, and continues to be so. Continued abandonment of farmland, mainly in woodland regions, and more intensive farming in the plains, leads to problems. Lack of grazing livestock in parts of the country leads to fewer pastures that can be kept open, with subsequent reforestation as a consequence. Both the lower number of grazing animals and a higher concentration of these to fewer farmers is an increasing problem. If the trend continues, the agricultural landscape diversity and its cultural heritage, in addition to outdoor recreation, will be negatively affected and limit the living space for many species as well as their ability to spread.

The spread of two fungal diseases, Ash dieback and Dutch elm disease, is also a serious concern. They have a significant impact on a large number of species associated with these trees in the agricultural landscape.

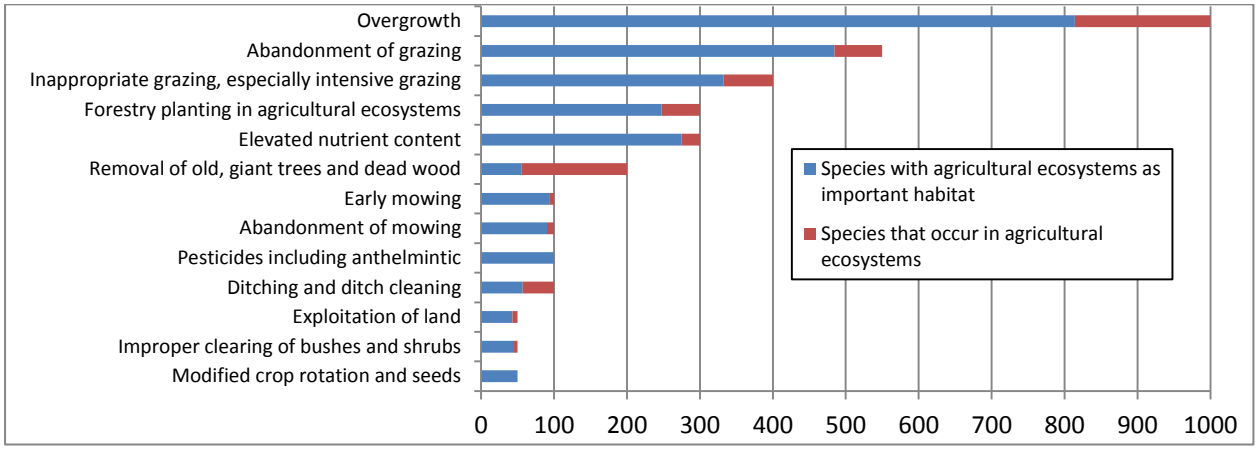

Figure 13. Main threats to red listed species in agricultural ecosystems. One species can be affected by several factors. The total sum exceeds therefore the number of red listed species.

1.3.2 Forest ecosystems

The main threats to the forest and its species are to a large extent caused by the intensification of forestry during parts of the 20th century which has lead to reduction of habitat connectivity and loss of specific habitat features, removal of dead and dying trees, as well as factors such as lack of forest fires and other disturbances, and change in species composition due to succession and climate (Figure 14). Forest operations can have detrimental effects on the microclimate which in turn can have a negative effect on the species composition of the forest, e.g. many lichens and fungi.

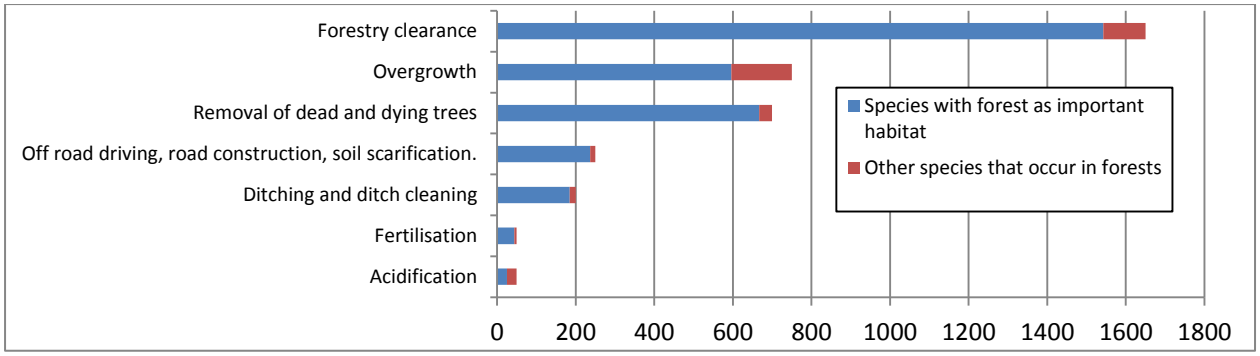

Figure 14. Main threats to red listed species in forest ecosystems. One species can be affected by several factors. The total sum exceeds therefore the number of red listed species.

1.3.3 Inland waters

One of the main threats to inland waters (freshwaters and wetlands) is overgrowth of trees and shrubs on open wetlands and mires. Old ditches and the dredging of them still continue the drainage of wetlands. Nitrogen input is a threat to both wetlands and freshwater environments. Intensification of water power is an emerging issue that put increased pressure on high conservation value waters. Invasive species are, as a consequence of a warmer climate, believed to increase in numbers. An emergent threat to water quality in especially the southern part of Sweden is the brownification, increased levels of humic substances, in watercourses and lakes. (Figure 15) One tangible effect of this is the decline of green algae, e.g. *Nostoc* (cyanobacteria) and *Chara* (stoneworts). Climate change, with a warmer climate and higher water temperature as a result, are believed to cause problems to cryophilous fish species such as white fish (*Coregonus lavaretus)*, vendance (*Coregonus albula)* and salmon (*Salmo salar).*

A new threat of great concern is a fungal disease affecting alder (*Alnus glutinosa)* populations along water courses, which has wiped out alder stands in several places in southern and western Sweden. Alder, both *Alnus glutinosa* and *A. incana*, are key species in ecosystems of small streams since they create a shaded environment for species dependent on cold water, e.g. brown trout (*Salmo trutta).*

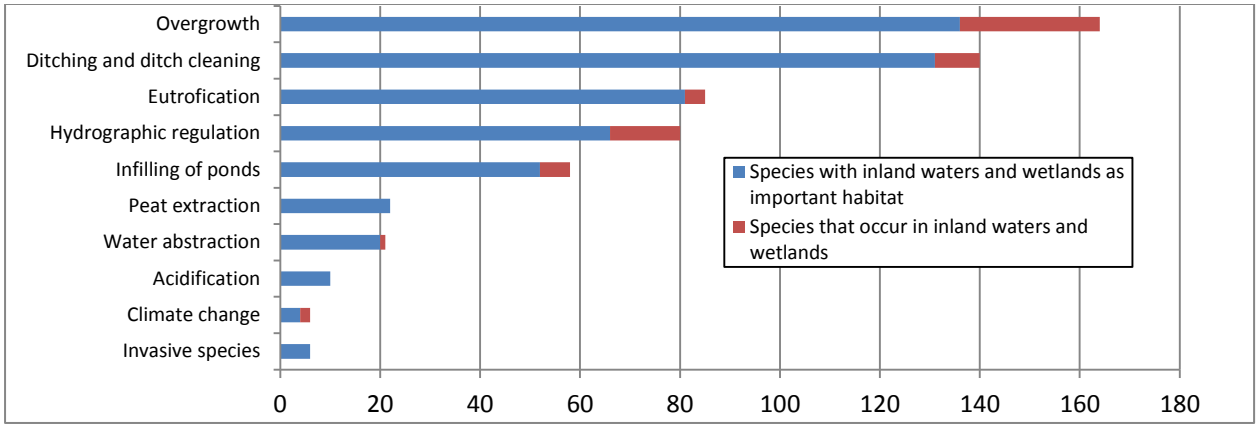

Figure 15. Main threats to red listed species of inland waters. One species can be affected by several factors. The total sum exceeds therefore the number of red listed species.

1.3.4 Marine and coastal areas

The marine environments are threatened mainly by unsustainable fisheries and the harvesting of aquatic resources, but also by pollution such as oil spill and toxic chemical discharge (Figure 16).

Abandonment of pastoral systems, lack of grazing and invasive alien species are the major threats to the coastal habitats and their species. Other threats are human induced changes in hydraulic conditions, species composition change (succession) and accumulation of organic material. Intensive cleaning of beaches is an important threat to the habitat annual vegetation of drift lines.

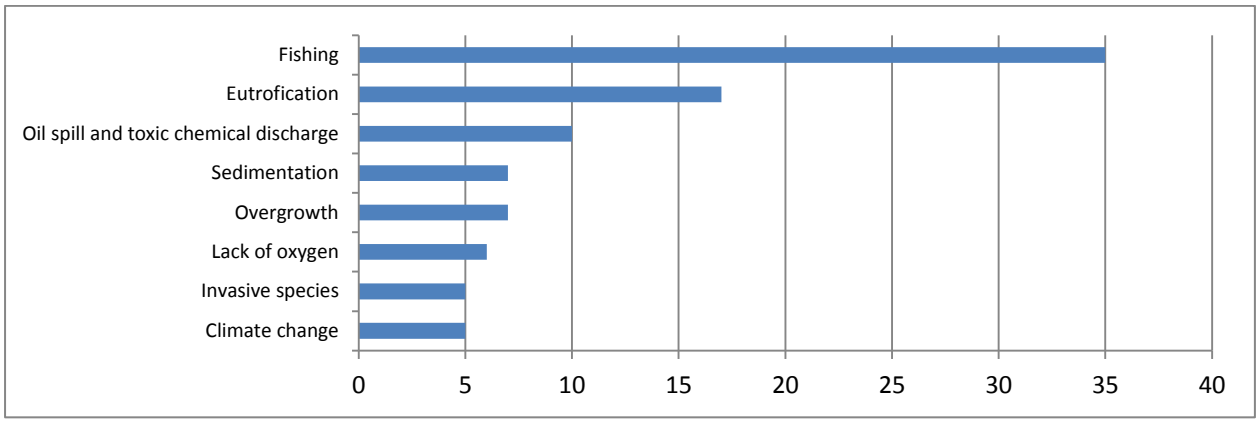

Figure 16. Main threats to red listed species in marine areas. One species can be affected by several factors. The total sum exceeds therefore the number of red listed species.

1.3.5 Mountain ecosystems

The species and habitats in mountain ecosystems, for which the conservation status is not favourable, are mainly threatened by climate change (figure 17). The combined effect of a rise in temperature and less precipitation as snow, is the reason for the unfavourable conditions for glaciers and palsa mires. The arctic fox (*Alopex lagopus)* is mainly threatened by competition from the red fox (*Vulpes vulpes)* which results in a reduction of prey availability.

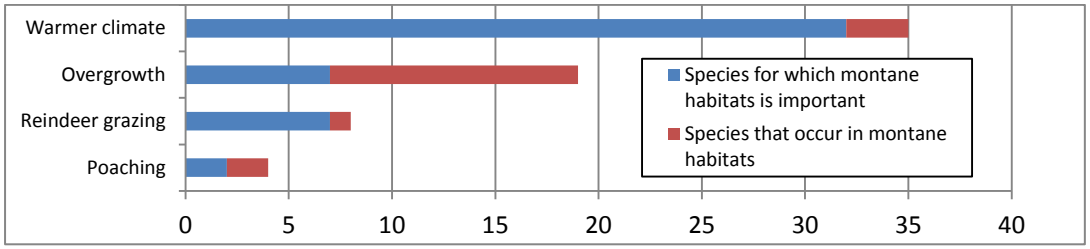

Figure 17. Main threats to red listed species in mountain ecosystems. One species can be affected by several factors. The total sum exceeds therefore the number of red listed species.

2. The national biodiversity strategy and action plan, its implementation, and the mainstreaming of biodiversity

In March 2014, the Swedish Government presented a bill to the parliament which outlines a strategy for biodiversity and ecosystem services until the year 2020. The strategy is framed within the Swedish Environmental Objectives system, with milestone targets which outline priority areas for action. Between 2010 and March 2014 twenty-four milestone targets were adopted by the Government, ten of which directly address biodiversity or ecosystem services. Several additional proposals for milestone targets are being developed during 2014.

This section of our national report describes the Swedish Environmental Quality Objectives system as the frame for the strategic work with environmental issues in Sweden, the Environmental Code being the basis on which it arises. The relationship between certain milestone targets and the Aichi targets is provided in section 2.2.

2.1 Sweden's Environmental Quality Objectives system

Since Sweden in 1993 ratified the Convention on Biological Diversity (CBD) the Swedish Government and Parliament have taken decisions at several occasions regarding biodiversity. The biodiversity strategy and sectoral action plans from the 1990:ies were superseded by a system of fifteen thematic environmental quality objectives, adopted by Government and Parliament in 1999, and a sixteenth objective on horizontal issues relating to the conservation and sustainable use of biological diversity, adopted in 2005.

In spring 2010, the Swedish Parliament approved the Government Bill 2009/10:155 *Sweden's Environmental Quality Objectives - For More Effective Environmental Action*, which outlined several changes to the environmental objectives system, including a new target structure for environmental efforts. Further changes are described in section 2.1.3 and 3.1.1.

The structure around which environmental action is formed includes:

- **a generational goal** that sets the direction for the changes in society that must be made within a generation in order to achieve the environmental quality objectives,
- **environmental quality objectives** that indicate the state of the Swedish environment to which environmental action is intended to lead, and
- **milestone targets** that indicate steps along the way to the environmental quality objectives and the generational goal.

2.1.1 The generational goal

The Parliament adopted a generational goal in spring 2010 (Box 1). The goal is to pass on to the next generation a society in which the major environmental problems have been solved, without increasing environmental and health problems beyond Sweden's borders. Policy instruments and measures to solve environmental problems in Sweden must be designed to ensure that Sweden does not export environmental problems. The generational goal is the overarching objective of environment policy and guides environmental action at every level of society.

Box 1. The generational goal

The overall goal of environmental policy is to be able to pass on to the next generation a society in which the major environmental problems have been solved, without increasing environmental and health problems beyond Sweden's borders. This calls for an ambitious environmental policy - in Sweden, in the EU and in international contexts. The generational goal means that the conditions for solving environmental problems are to be met within one generation and that environment policy should be directed towards ensuring that:

- ecosystems have recovered, or are on the way to recovery, and their long-term capacity to generate ecosystem services is assured,
- biodiversity and the natural and cultural environment are preserved, promoted and used sustainably,
- human health is exposed to minimal negative environmental impact, while the positive impact of the environment on human health is promoted,
- ecocycles are resource-efficient and as far as possible free from hazardous substances,
- natural resources are managed well,
- the share of renewable energy increases and use of energy is efficient, with minimal impact on the environment, and
- patterns of consumption of goods and services cause the least possible problems for the environment and human health.

2.1.2 The environmental quality objectives

The Parliament have adopted 16 environmental quality objectives (Box 2 and in supplementary material 1 the most relevant objectives are described). These objectives express the state of the Swedish environment aspired to. Each environmental quality objective is accompanied by a number of specifications to give the objective substance. They are intended to clarify the implications of the environmental quality objectives and describe the environmental status that is to be achieved.

The specifications associated with the environmental quality objectives are also intended to serve as criteria in assessing whether the objectives are being achieved and provide guidance for environmental efforts by all actors - government agencies, county administrative boards, municipalities and others.

When assessing whether the objectives are being achieved, account should be taken to the long recovery of environmental processes and that environmental problems are transboundary; in other words, Sweden is not in sole control of the action that needs to be taken.

Box 2. The 16 environmental quality objectives
Reduced Climate Impact
Clean Air
Natural Acidification Only
A Non-Toxic Environment
A Protective Ozone Layer
A Safe Radiation Environment
Zero Eutrophication
Flourishing Lakes And Streams
Good-Quality Groundwater
A Balanced Marine Environment, Flourishing Coastal Areas And Archipelagos
Thriving Wetlands
Sustainable Forests
A Varied Agricultural Landscape
A Magnificent Mountain Landscape
A Good Built Environment
A Rich Diversity of Plant and Animal Life

2.1.3 Development of milestone targets and strategies

Parliamentary support and broad political consensus are central to environmental work. The Government has therefore established a Cross-Party Committee on Environmental Objectives with the task to develop strategies and milestone targets for the implementation of the environmental quality objectives. The Cross-Party Committee on Environmental Objectives is intended to bring a clearer focus on measures to meet current environmental challenges.

The Committee advises the Government on how the environmental objectives can be achieved and delivers proposals on strategies including milestone targets, policy instruments and measures in priority areas. The Cross-Party Committee focuses on issues that are characterised by conflicts between the objectives of different interests in society or that are particularly complex and therefore require overarching and long-term political priorities. The Committee's mandate includes developing a broad dialogue with representatives of agencies, county administrative boards, municipalities, the business sector, non-profit organisations and the research community. Non-government actors will contribute their knowledge in the expert groups attached to the committee when proposals for strategies, including milestone targets, policy instruments and measures, are developed.

The government has as of today decided on two strategies including milestone targets, policy instruments and measures based on proposals from the Cross-Party Committee on Environmental Objectives. One of those strategies is the Swedish National Biodiversity Strategy and Action Plan.

A central element in the development of each environmental strategy is to identify the transition in society that is required to reach the environmental quality objectives and the generational goal. This is the type of transition that is to be expressed as milestone targets. In other words, milestone targets are to be used to promote the strategic changes that need to be implemented in order to meet the environmental objectives. The milestone targets shall indicate a clear political direction and contain fundamental considerations in support of the operative work of agencies and the rest of society. The milestone targets shall constitute a basis for governance and prioritisation. Milestone targets should also utilise any synergies there are between different environmental quality objectives and not be formulated based on one objective at a time.

The milestone targets are intended to identify a desired social change and specify steps towards achieving the generational goal and one or more of the environmental quality objectives. However, they are not to specify a state of the environment, since this is established in the environmental quality objectives and the associated specifications.

2.1.4 Follow-up/review and evaluation

An overall assessment of the possibilities of achieving the 16 environmental quality objectives is made annually. The assessments are made by 8 agencies that are responsible for assessment of an environmental quality objective and coordinated by the Swedish Environmental Protection Agency.

Every four years, an in-depth evaluation is undertaken of the environmental quality objectives and the generational goal. The most recent in-depth evaluation was made in 2012. The in-depth evaluation was conducted in collaboration with county administrative boards and some thirty central government agencies, together with stakeholder and environmental organisations. The Swedish Environmental Protection Agency is now preparing the next in-depth evaluation, which is to be reported to the government in September 2015.

2.2 The Swedish National Biodiversity Strategy and action plan

On 13 March 2014 the Swedish government adopted a bill on biodiversity and ecosystem services, which presents the government's comprehensive strategy for biodiversity and ecosystem services. It concerns the Swedish environmental quality objectives and the generational goal as well as the Aichi targets and the targets of the EU strategy for biodiversity 2011-2020. The strategy contains the ten milestone targets on biodiversity, eocosystem services and sustainable land use that the government has adopted as well as measures to reach the environmental quality objectives and the generational goal and to contribute to reaching the Aichi targets and the EU targets.

The government has assigned authorities to further develop the strategy and will consider making additions. In particular, further additions on milestone targets and measures for sustainable land-use and water policy as well as on the agricultural landscape and mountain landscape will be considered.

The following milestone targets are parts of the Swedish NBSAP . Their contribution to specific Aichi targets is stipulated.

Milestone target on ecosystem services and resilience
The milestone target regarding ecosystem services and resilience means that important ecosystem services and factors that affect their maintenance are to be identified and systematised by 2013.

The target contributes to Aichi target 2, 14, 15 and 19. The Swedish Environmental Protection Agency and the Swedish Agency for Marine and Water Management have been engaged to compile knowledge on important ecosystems and their ecosystem services, and to identify factors important to their conservation. The mission also includes giving a clear definition of the concept ecosystem services. The report on this assignment provides a basis for the continued work with ecosystem services as laid down in the bill on biodiversity and ecosystem services (see also section 2.3.4).

Milestone target on the importance of biodiversity and the value of ecosystem services
The milestone target regarding the importance of biodiversity and the value of ecosystem services means 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.

The target contributes to Aichi target 1, 2, 3, 14, 15, 18, 19 and 20. The bill presents measures for better integration of ecosystem services into economic decision-making, policy considerations and other decisions in society. For example, ecosystem services need to be included in environmental accounting, planning by public authorities, decisions on land use, the design of economic instruments and in collaboration with industry to develop business models, innovations and standards. To strengthen this work, the Government intends to appoint a national coordinator for ecosystem services. The coordinator will enhance skills and increase the knowledge base on biodiversity and ecosystem services in industry, municipalities and other public authorities. Guidance on ecosystem assessment will be developed for central, regional and local authorities. Available statistics will be further analysed in order to meet the need for data on ecosystem services in environmental accounting, sustainable development indicators and follow-up to the national environmental quality objectives. This work need to be performed in co-operation with ongoing

international development processes, to facilitate international comparisons, and employ the latest scientific evidence on ecosystem services.

Milestone target on threatened species and habitat types
The milestone target regarding threatened species and habitat types means that action plans to achieve favourable conservation status for those threatened species and habitat types that cannot be safeguarded through ongoing measures for sustainable use of land and water and existing site protection are to be implemented, or in the process of being implemented, by 2015.

This target contributes to Aichi target 5 and 12. It can be reached by continuing the present work on action plans for specific threatened species and habitat types. By 2011 a total of 161 action plans had been adopted, and further plans are being developed, to reach a total of 214 action plans. The action plans will mainly be implemented by agencies and non-governmental organisations, but private actors may contribute on a voluntary basis. The county administrative boards will be responsible for coordination of the implementation regionally. The Swedish Environmental Protection Agency will decide on individual action plans and distribute the necessary resources.

As announced in the bill on biological diversity and ecosystem services, a special investigator should be appointed to oversee the legislation on species protection with a view to account for national and international interests while at the same time adapt the legislation in order to facilitate practical implementation. Also, government authorities should be required to report to government on measures taken to prevent crime and to strengthen, coordinate and cooperate on species protection crimes, and also to produce an action plan for improved compliance and supervision in matters relating to implentation of the Convention on International Trade in Endangered Species.

Milestone target on invasive alien species
The milestone target regarding invasive alien species means that the impact of invasive alien species in Sweden as regards biodiversity, and their socio-economic impact on health etc., are to be assessed and prioritised measures to control them are to be initiated by 2015.

The target contributes to Aichi target 9. The Swedish Environmental Protection Agency has produced, together with a number of other government agencies, a draft national strategy and action plan for invasive alien species and genotypes. The Government has assigned the relevant authorities to revise the strategy and action plan and take into account new European Union legislation on the issue. The compilation of information on invasive alien species in Sweden, as well as assessments of their effects, can however start immediately, as can the work to prioritise action to be taken. These ongoing activities will support the Governments decision on a national strategy and action plan. When implemented, the action plan may include inventory and monitoring, risk assessments, and control measures aimed at the extermination or control of population size or distribution.

Milestone target on knowledge about genetic diversity
The milestone target regarding knowledge about genetic diversity means that mapping and monitoring of genetic diversity are to be initiated by 2015.

The target contributes to Aichi target 13 and 19. The Swedish Environmental Protection Agency, a number of other government agencies, and the Swedish University of Agricultural

Sciences have presented a draft national action plan for conservation of genetic variation in wild plants, animals and fungi. The Cross-Party Committee on Environmental Objectives have concluded that monitoring of genetic diversity can be initiated by 2015. Such monitoring shall be integrated in existing and planned environmental monitoring, e.g. within the EU on invasive alien species, and the ongoing work to document and protect the genetic diversity of Sweden's crop species. The bill presents measures for coordination of the work of the authorities relating to mapping and monitoring of genetic diversity of wild and domesticated species.

Milestone target on a holistic approach to the use of land
The milestone target on a holistic approach to the use of land is that coordination in central government administration has been strengthened by 2016 so that the holistic approach to the use of land has increased.

The target contributes to Aichi target 7 and 14. A special investigator should be appointed to investigate how coordination can be improved within the national administration with a particular focus on activities that are important for land use, such as nature conservation, agriclulture and forestry, transport and energy suppliance.

Milestone target on the protection of land areas, freshwater areas and marine areas
The milestone target on the protection of land areas, freshwater areas and marine areas is that at least 20 per cent of Sweden's land and freshwater areas, and 10 per cent of Sweden's marine areas, by 2020 contribute to achieving national and international biodiversity targets. This will take place through protection or other conservation in areas of particular importance to biodiversity or ecosystem services. This conservation will take place with ecologically representative and well-connected systems, which include reserves, other effective area-based protective measures or environmentally sound usage. These systems are to be well integrated in the surrounding landscape and managed in an efficient and inclusive way. Between 2012 and 2020, at least 1 142 000 additional hectares are to be protected as follows:
- High nature value forests are to be protected from tree-felling. This will take place through an increase in formally protected forest land of approximately 150 000 hectares of high nature value forests in need of formal protection below the montane forest zone.
- Voluntary set-asides by the forestry industry should have increased by approximately 200 000 hectares to a total of 1 450 000 hectares of forest land in areas that are, or may develop into, high nature value areas.
- The formal protection of wetlands has increased by 210 000 hectares as a result of boglands and fens of high nature value being protected under the 'National plan for conservation of boglands and fens'.
- The formal protection of lakes and watercourses has increased by at least 12 000 hectares.
- The formal protection of marine areas has increased by at least 570 000 hectares.
- The ecological connections have been strengthened so that protected areas and areas and biotopes conserved in other ways are well connected and integrated in the landscape, including the marine environment.

The target contributes to Aichi target 5, 7, 11 and 15. The Government emphasises that the implementation of this target should also contribute to the fulfilment of international targets for biological diversity. Among the measures presented the Government foresees an assignment to the Swedish EPA and the Swedish Forest Agency to revise the national strategy for formal protection of forests. The government also foresees a review of n

assignment to deepen the analysis of ecological representativeness of Swedish protection of land and freshwater areas and how this can be strengthened. An overview of methods for protection of forests with high nature value as well as other ecosystems is also foreseen. In order to enhance connectivity and integration of protected areas into the landscape, regional action plans for green infrastructure should be developed (see also section 2.3.3 and 2.4.3). Their purpose should be to identify nature areas, biotopes, structures and elements in the landscape that enables conservation of biological diversity and ecosystem services in the landscape, including through nature management, protection, conservation of restoration.

Milestone target on environmental consideration in forestry
The milestone target on environmental consideration in forestry is that by 2015 the expectations of society on environmental considerations in forestry are clarified and known to the forestry industry so that they can be applied in practice.

The target contributes to Aichi target 5 and 7. Measures to achieve this target include development of a plan for supervision of the implementation of the Forestry Act. Further measures could also be developed in the light of the results of the ongoing dialogue with the forestry sector which is performed by the Swedish forest agency. Se section 2.3.8 for further information on the dialogue.

Milestone target on varied forestry
The milestone target on varied forestry is that provisions have been clarified so that by 2015 there are good conditions for varied forestry.

The target contributes to Aichi target 5 and 7. In order to achieve this target, the Government proposes to change the Forestry Act in order to facilitate and clarify the use of a diverse range of methods for logging in order to conserve or develop nature values or cultural values, or in order to enable scientific activities.

Milestone target on a dialogue process in a national forestry programme
The milestone target on a dialogue process in a national forestry programme is that an open dialogue with stakeholders in forests and their value chain has been established by 1 July 2015. This dialogue covers economic, social and environmental values and aims for forests and their value chain to further contribute to the development towards a sustainable society and a growing bio-based economy.

The target contributes to Aichi target 7. The government intends to iniate an open dialoge process with stakeholders to deal with the role of forests in the development of a sustainable society, including a bio-based economy. The aim is to create a broad consensus on an efficient use of forest resources. A national forestry programme should as far as possible follow international recommendations, with consideration for Swedish circumstances.

The bill on biodiversity and ecosystem services also outlines the need for concrete measures to preserve the marine environment, including ecosystem based management and planning, sustainable fisheries, improved knowledge abour marine ecosystems and restoration. Particular emphasis is placed on the need for scientific research on ecosystem services and learning processes. Dialogue to resolve differences in interest between stakeholders will require an ability to understand the needs and fears of various groups. The conditions for including relevant stakeholders and to make appropriate use of local and traditional knowledge needs to be further clarified. An analysis of how to strategically strengthen

research on biodiversity and ecosystem services should therefore be performed. The analysis should include how to facilitate active participation of scientists in planning and evaluation of ecosystem management, and also factors that determines the utilisation of stakeholders' knowledge in management as well as research.

2.3 Actions taken to implement the Convention and outcomes of these actions

Action taken is mainly guided by the environmental quality objectives. The sectors, including authorities, organizations and companies, have been given a clear responsibility to fulfil the objectives. Hence, the following summary of actions taken to implement the Convention is structured according to the most important sectors. In addition, a number of cross-cutting subjects have been the object of much action, such as green infrastructure, ecosystem services, and policy instruments.

2.3.1 Species and genes

The CBD targets for halting loss of biodiversity by 2010 were incorporated into Swedish policy in 2005. Following this, alongside measures for sustainable use and for protection of areas important for biodiversity, measures have been developed whose main focus is the preservation of species and their genetic variation. Recent analyses by the authorities responsible for monitoring of species status show that further measures will be necessary in order to achieve favourable conservation status of species in Sweden. The government's decision in 2012 on a first set of milestone targets for biodiversity emphasised the need for enhanced action by 2015, to complete the work on threatened species action plans, to take measures to eradicate high priority invasive alien species based on improved assessment of their ecological and social impact, and to initiate monitoring of genetic diversity.

The Swedish taxonomy initiative, which had been initiated in 2002, received increasing resources during its initial years, and a long term mission and financial commitment was confirmed by Parliament in 2005. The aim was initially to survey all multicellular species in the country, perform taxonomic work on less well-studied groups, and to publish a popular scientific book series covering all species. In 2012 the Government made the objective for the initiative more precise and called for the work to be done more effectively. Parliament handed the responsibility of deciding on funding for the initiative back to the Government from the year 2013 onwards. A focus on digitalising the results is now being instituted.

The Swedish Environmental Protection Agency embarked on a large-scale set of action programmes for threatened species and their habitats in 2004 and by the end of 2012 a total of 121 programmes had been adopted. The last programmes to be adopted in 2012 considered the protection of the natterjack toad, beetles of lying dead oak wood, threatened *Harpalus* ground beetles, and species of open calcareous flat rock areas in Dalsland. A further 54 programmes are being developed. The action programmes will serve as guides for action to conserve and promote more than 400 species that need further action, above that offered by the basic conservation instruments, such as sustainable use, protected areas and legal protection. The measures include restoration of these species' habitats, which will favour considerably more species than those specifically identified in the programmes. For example, the action plan for trees of high conservation value in the cultural and urban landscape is expected to benefit at least 400 species on the Swedish Red List. The current level of funding is 64 million SEK per year for the development and implementation of the programmes.

Monitoring of genetic diversity has focused on a few high profile species, including the wolf, despite an increased recognition among responsible authorities of the importance of genetic diversity for the maintenance of threatened species in general. A draft action plan for the protection and monitoring of genetic variation in wild species has been produced, but so far it has not been funded nor implemented.

A national strategy for the work with invasive alien species was developed in 2008, but implementation of the strategy was to a large extent dependent on the development of international policy, in particular within the EU. The draft EU legislation on invasive alien species appeared in 2013, and following its adoption Sweden will continue its work on alien species. Additional resources for measures against invasive alien species were provided from 2013. An example of successful activities is the project for control of raccoon dogs in northern Sweden.

2.3.2 Protected areas

According to a review of the use of instruments for conservation of biological diversity, which was undertaken by the Swedish EPA and the Swedish Forest Agency in 2012, about 6.3 million hectares (14%) of Swedish land and freshwater area is under some form of nature protection. This includes national parks, nature reserves, habitat protection areas, Natura 2000 areas, nature conservation areas and various forms of agreements with landowners. About 6% of marine waters have been protected At the same time, voluntary set asides by forestry amounted to more than 1 million hectares (2.3% of the total area). In total 25% of the forest area is exempted from forestry through different instruments

In several counties private owners may apply for protection of their lands, if criteria for establishment of a protected area are fulfilled. The Swedish EPA has laid down a programme for administration and management of protected areas and conservation management plans has been laid down by the regional county boards for the Natura 2000 sites. Mechanisms for assessing management effectiveness are under development. The Swedish EPA and the regional county boards give high priority to local participation and agreements with landowners for nature conservation management of protected areas. Municipalities have the right to decide to protect habitat areas. The aim is to give local authorities a greater role in improving the protection of valuable nature.

In 2009 Sweden celebrated the 100 year anniversary of nature conservation and the first marine national park, Kosterhavet, was inaugurated. In 2011 the Hamra national park was expanded from 27 hectares to 1360 hectares including high conservation value forests, wetlands and a small river.

The use of state owned land to compensate for protection on private land has become increasingly important and will make it possible to protect large high conservation value forests. The Swedish Government has found that exchange of land is a successful tool for nature conservation.

The distribution of protected areas of different habitats and in geographic regions is uneven. Of open mountain areas 46 % or 1.8 million hectares have been protected. The protection of mountain areas thus covers a large proportion of this habitat. The protection of open wetlands also covers a relatively large proportion, 20 % or 840 000 of this habitat, but the protection is

not representative, as a large proportion of the areas in the Mire Protection Plan are unprotected. In total 7.5 % or 2.1 million hectares of forest are formally protected, 77 % of the protected forested area in the country is within the mountain region and the major part is nature reserves. In Sweden, the Natura 2000 network covers to a large extent strictly protected areas, with regulations against, for example, forestry. These areas include a considerable proportion of the large natural forests and undrained wetlands of Western Europe. There is an increasing pressure on the Natura 2000 network that affects the connectivity and habitat quality.

The Government have appointed 3,803 sites of the Swedish Natura 2000 sites as Special Areas of Conservation and/or Special Protection Areas, thus it is finally determined that these areas are included in the Natura 2000 network. The Government has approved requests that Vänerskärgården med Kinnekulle, Blekinge Arkipelag, the river landscape Nedre Dalälven and Östra Vätternbranterna be appointed biosphere reserves in the UNESCO program Man and the Biosphere. The Government has given the county administrative boards in Stockholm, Västra Götaland and Skåne commission to implement their programs for the protection of urban nature.

The Government has approved a new local administrative organization for the World Heritage Laponia, which means that management is handled by the NGO Laponiatjuottjudus.

2.3.3 Green infrastructure

In recent decades, there has been an increasing understanding that biodiversity cannot be secured solely by traditional methods such as nature reserves, national parks etc. and that it is necessary to strengthen efforts for biodiversity preservation in the wider landscape. The need for integration of biodiversity into all parts of the landscape was increasingly highlighted within the EU as a whole during the first decade of the 21th century and the concept of green infrastructure was introduced, to ensure that there are enough structures and natural areas in the landscape that create a spatial structure for biodiversity, enabling connectivity and species dispersal, even in a changed climate. The European concept of green infrastructure corresponds very closely with the ecosystem approach concept of CBD. The achievement of a green infrastructure would also contribute to achieving the Aichi targets 5, 7 and 11.

The Swedish Government highlighted in a bill on nature protection (2008/09:214) the need to analyse measures needed for building a green infrastructure to ensure the long-term survival of species and the delivery of important ecosystem services, in the light of possible future climate changes. In 2010 the Government gave the Swedish Environmental Protection Agency the assignment to prepare a feasibility study on building a green infrastructure. In the resulting report a number of proposals for action and further development were presented. The Agency identified 12 components of a national strategy for the building of a green infrastructure (Box 3). The Environmental Protection Agency has also presented two additional reports, containing a basic landscape analysis, a review of policy instruments for achieving a green infrastructure, and a strategy for regional work on a green infrastructure.

The Swedish Environmental Protection Agency, together with range of relevant government agencies, concluded that the necessary methods and data are now available to perform a basic landscape analysis of core areas of importance for biodiversity and their distribution and connectivity in the landscape. Their report presented such analyses for terrestrial habitats of

the forested and agricultural landscapes, and comments on important aspects of corresponding analyses for lakes, watercourses and coastal areas.

The main conclusions regarding forests were that the remaining areas of forest with a long history of forest management without clear-felling are essential to the building of a green infrastructure, the connectivity of spruce forests can easily be increased through sustainable use in commercially managed forests in line with the Forestry Act, the area and connectivity of valuable broad-leaved forests need to be increased through measures even outside protected areas, the managed forest in central and southern Sweden must be managed in line with the Forestry Act and core areas for biodiversity should remain and be connected, and finally, the amount of habitat structures (such as dead wood) known to promote biodiversity should increase.

Regarding grasslands the agencies concluded that the area of semi-natural grasslands is too small and the conservation status of the habitat types concerned is not favourable, and the active management of grasslands should be extended and intensified, to increase the area, quality and connectivity of valuable grasslands. For mixed landscapes with both forestry and agriculture, change in management, such as reintroduction of forest grazing, should be done with due consideration of the mosaic pattern of habitats. The variation in the landscape, with many ecotones, is important. Human habitation in both urban and rural areas should be planned and managed consistent with a green infrastructure.

Comprehensive data on the valuable areas and structures of lakes, watercourses and coastal areas are not available to the same degree, and corresponding landscape analyses are not possible at this stage. The agencies concluded that work on a green infrastructure should concentrate on the conservation, restoration and reinforcement of the quality and functioning of habitats, possibilities for species to disperse within their natural area of distribution, natural water regimes, the natural productivity of water bodies, and structures that offer food and protection and make reproduction possible for aquatic organisms.

The Swedish Environmental Protection Agency, together with other government agencies, also performed a review of policy instruments relevant to strengthening of the green infrastructure. Green infrastructure is a complex issue, and the report presented about a hundred different existing policy instruments. Not all of them contribute to the green infrastructure, however, and there is a need to revise some instruments, as well as to create new instruments.

The Swedish Environmental Protection Agency, together with the Swedish Agency for Marine and Water Management, has presented a strategy for regional work on a green infrastructure, with the aim to guide to production of regional action plans for a green infrastructure. The purpose of a regional action plan is to bridge administrative borders and to facilitate regional cooperation among actors, while employing methods and information produced at the national level. The strategy outlines nine essential components (Box 3) of a regional action plan for a green infrastructure.

Box 3. Essential components of a regional action plan for a green infrastructure.

1. A statement of the purpose of the action plan, e.g. how it contributes to the environmental quality objectives.

2.	An assessment of existing or potential core areas for natural habitats (supplementary material 2) and species, structures or functions that enable a functioning green infrastructure, and areas of rapid change and/or severe pressure.
3.	A comprehensive description of the present state of the landscape, including important activities and actors, and known problems.
4.	A description of the knowledge base, using existing databases, maps, inventories, strategies and action plans.
5.	Identification of priority natural habitats, landscape structures or species that the green infrastructure will be built around.
6.	Identification of key factors necessary for the maintenance of the selected priority habitats, structures or species.
7.	A landscape analysis of key factors identified, showing amounts, distributions, connectivity, and deficiencies.
8.	Analysis of action necessary, and identification of actors, with a specified time plan.
9.	A monitoring and evaluation plan involving all actors and stakeholders.

2.3.4 Ecosystem services

The Swedish Government's outspoken ambition is to achieve the integration of the value of ecosystem services into economic policy, political considerations and other decisions in society where it is relevant and reasonable to do so, as expressed in the Government Bill on environmental quality objectives. One challenge is to find financial and other mechanisms to further strengthen biodiversity conservation and ecosystem resilience to secure vital ecosystem services in the long term. Tools to calculate the values of ecosystem services are to be developed, both in monetary and non-monetary terms.

In November 2012 the Swedish Environmental Protection Agency and the Swedish agency for Marine and Water Management published a report on Sweden's most important ecosystem services. The report made an inventory of important ecosystems in Sweden (Table 1), and analysed them within the framework of theoretical work on ecosystem services.

The inventory made use of the Common International Classification of Ecosystem Services (CICES), developed from the work on environmental accounting undertaken by the European Environment Agency (EEA). As in the CICES system, the Swedish inventory only considered services provided by a biological component, i.e. physical processes, mineral and fossil fuel resources, and topography were not considered. There are however supporting services provided by biological components, that should be considered, and they are not included in the CICES system.

The table below lists ecosystem services judged to be particularly important, based on four criteria. They are of great economic importance, they are important for the provision of other services, they are easy to relate to and communicate, and they are characteristic for the Swedish ecosystem types.

The inventory also considered pressures and driving forces that have an impact on the ecosystem services. The most important pressures and forces were judged to be changing land- and water use, polluting substances, eutrophication, climate change, acidification, invasive alien species, and human demography.

Table 1. Important ecosystem services in Sweden classified according to the CICES system.

Classification	Class	Service
Provisioning: Nutrition:	Cultivated crops	Cereals, vegetables, fruits etc.

Biomass	Reared animals and their outputs	Meat, dairy products, honey etc.
	Wild plants, algae and their outputs	Wild berries, fruits, mushrooms for food
	Wild animals and their outputs	Game, freshwater fish, marine fish and shellfish for food
	Animals from in-situ aquaculture	In-situ farming of freshwater and marine fish
Provisioning: Nutrition: Water	Surface water for drinking	Abstracted surface water from rivers, lakes and other open water bodies for drinking
	Ground water for drinking	Freshwater abstracted from groundwater layers for drinking
Provisioning: Materials: Biomass	Fibres and other materials from plants, algae and animals for direct use or processing	Fibres, wood, timber; material for production e.g. industrial products such as cellulose for paper, packaging material; chemicals extracted or synthesised from plants.
Provisioning: Materials: Water	Surface water for non-drinking purposes	Abstracted surface water from rivers, lakes and other open water bodies for domestic use, irrigation, livestock consumption, industrial use etc.
Provisioning: Energy: Biomass-based energy sources	Plant-based resources	Wood fuel for energy production
Regulation & maintenance: Mediation of waste, toxics and other nuisances: Mediation by biota	Bio-remediation by micro-organisms, algae, plants and animals	Bio-chemical detoxification/decomposition /mineralisation in land/soil, freshwater and marine systems including sediments; decomposition/detoxification of waste and toxic materials e.g. waste water cleaning, degrading oil spills by marine bacteria, (phyto)degradation, (rhizo)degradation etc.
	Filtration/sequestration/storage/ accumulation by micro-organisms, algae, plants, and animals	Biological filtration/sequestration/storage/ accumulation of pollutants in land/soil, freshwater and marine biota, adsorption and binding of heavy metals and organic compounds in biota
Regulation & maintenance: Mediation of waste, toxics and other nuisances: Mediation by ecosystems	Filtration/sequestration/storage/ accumulation by ecosystems	Bio-physicochemical filtration/sequestration/storage/accumulation of pollutants in land/soil, freshwater and marine ecosystems, including sediments; adsorption and binding of heavy metals and organic compounds in ecosystems
	Dilution by atmosphere, freshwater and marine ecosystems	Bio-physico-chemical dilution of gases, fluids and solid waste, wastewater in atmosphere, lakes, rivers, sea and sediments
	Mediation of smell/noise/visual impacts	Green infrastructure to reduce noise
Regulation & maintenance: Mediation of flows: Liquid flows	Hydrological cycle and water flow maintenance	Capacity of maintaining baseline flows for water supply and discharge; e.g. fostering groundwater; recharge by appropriate land coverage that captures effective rainfall.
Regulation & maintenance: Maintenance of physical, chemical, biological conditions: Lifecycle maintenance, habitat and gene pool protection	Pollination and seed dispersal	Pollination by bees and other insects
	Maintaining nursery populations and habitats	Habitats for plant and animal nursery and reproduction e.g. sea grasses, microstructures of rivers etc.

Regulation & maintenance: Maintenance of physical, chemical, biological conditions: Pest and disease control	Pest control	Pest and disease control including invasive alien species
Regulation & maintenance: Maintenance of physical, chemical, biological conditions: Water conditions	Chemical condition of freshwaters	Maintenance / buffering of chemical composition of freshwater column and sediment to ensure favourable living conditions for biota e.g. by denitrification, re-mobilisation/re-mineralisation of phosphorous, etc.
Regulation & maintenance: Maintenance of physical, chemical, biological conditions: Atmospheric composition and climate regulation	Global climate regulation by reduction of greenhouse gas concentrations	Global climate regulation by greenhouse gas/carbon sequestration by terrestrial ecosystems, water columns and sediments and their biota; transport of carbon into oceans (DOCs) etc.
	Micro- and regional climate regulation	Modifying temperature, humidity, wind fields; maintenance of rural and urban climate and air quality
Cultural: Physical and intellectual interactions with biota, ecosystems, and land/seascapes: Physical and experiential interactions	Experiential use of plants, animals and land/seascapes in different environmental settings	In-situ bird watching, snorkelling, diving etc.
	Physical use of land/seascapes in different environmental settings	Walking, hiking, climbing, boating, leisure fishing (angling) and leisure hunting
Cultural: Physical and intellectual interactions with biota, ecosystems, and land/seascapes: Intellectual and representative interactions	Scientific	Subject matter for research both on location and via other media
	Heritage, cultural	Historic records, cultural heritage e.g. preserved in water bodies and soils
	Aesthetic	Sense of place, artistic representations of nature
Cultural: Spiritual, symbolic and other interactions with biota, ecosystems, and land/seascapes: Other cultural outputs	Existence	Enjoyment provided by wild species, wilderness, ecosystems, land-/seascapes

2.3.5 Local and traditional knowledge

In December 2005 the Government decided to establish a National Programme on Tradional Ecological Knowledge, NAPTEK. Since its establishment, NAPTEK has surveyed and documented traditional knowledge, especially related to the Saami culture. During 2013 NAPTEK has been specifically assigned to develop a plan of action concerning the implementation of articles 8(j) and 10(c) focussing on the work of a number of governmental agencies, for example the Swedish Environmental Protection Agency, the Board of Agriculture, the Forest Agency, the National Heritage Board, the Transport Administration, the National Food Agency, and the Saami Parliament. The overall purpose is to identify specific tasks, responsibilities and obligations for the individual agencies with the aim of fully implement articles 8(j) and 10(c) in order to achieve Aichi target 18.

2.3.6 High mountain environments

Action taken under the environmental quality objective *A magnificient mountain landscape* is aimed at all kinds of activities in the high mountains environment, and threats to and

protection of mountain biodiversity. The Swedish EPA is currently working on an assigment from the Government to propose a strategy with milestone targets, aiming to reach the environmental quality objective *A Magnificent Mountain Landscape*.

A research programme was initiated in 2013, aiming to deepen knowledge of relevance for the mountain landscape and to encourage applying a holistic perspective. The programme applies close cooperation between stakeholders and is expected to lead to enhanced understanding of sustainable development within the mountain landscape.

The Swedish Forest Agency, the Swedish Agricultural University, the Saami parliament and Saami reindeer herding communities cooperate in the establishment of reindeer herding management plans. One component of this work is a comprehensive inventory of land used for reindeer grazing. Until 2012 a total of 22 million hectares have been inventoried and 300 reindeer keepers have been trained to carry out field inventory work, satellite image interpretation, and to use GIS. A database for inventory data has been created. Data collected include information about factors that affect reindeer herding, such as biological data and competing land use.

The use of off-road vehicles, including snowmobiles, is a potential threat to mountain soils and vegetation, but also a necessary component of reindeer herding practices. The relevant county administrative boards, together with 30 Saami reindeer herding communities, develop plans for the use of such vehicles, with the aim to minimize the negative effects. The total budget for the project is about 40 million SEK, which includes measures to protect watercourses and to reinforce soil.

2.3.7 Wetlands

Wetlands still cover a large proportion of Sweden, and they occur within the agricultural landscape, in forests, and in the high mountains. Action taken under the environmental quality objective *Thriving wetlands* is aimed at all kinds of activities in wetlands, and threats to and protection of wetland biodiversity.

During 2013 Sweden designated 15 new Ramsar areas and expanded 2 existing such areas. With this decision by the Government the Swedish Ramsar areas will cover a wider range of habitats, including previously underrepresented habitats. In 2011 the existing National park in Hamra was expanded with 1400 hectares of wetland.

Restoration of wetlands continue within the Rural Development Program (see section 2.3.7). In 2012 for example, financial support for restoration or creeation of 755 hectares was granted.

2.3.8 The forestry sector

Within the forestry sector several actions has been taken to implement the Convention further since the previous national report.

In Sweden the forestry sector works within the scope of the convention in many ways. Through voluntary set aside areas without any economical compensation, through environmental consideration at all forestry activities and through education and planning. The general awareness of conservation issues in forestry has improved significantly the last 20 years through education and the implementation of forest certification systems. The forestry planning has promoted ecological aspects through green management plans . Large-scale

education programmes have been targeted at people employed in forestry. About 200 000 forest owners and forest workers have been engaged in several different training activities during the last years. Significant efforts have been made but there is still a potential for improvement, mainly regarding prioritizing of considerations taken. .

Environmental consideration in forestry

When it comes to legislation the Forestry Act is the main section of law affecting forestry policy, although other acts, such as the Environmental Code and the Cultural Heritage Act, can also affect forestry. In the Swedish Forestry Act of 1994, the production goal and the conservation goal are given equal importance. The Forestry act is a rather deregulated legislation with the expectation that the forest owners and the forestry sector as a whole have large responsibility for achieving the goals.

The Forestry Act regulates what considerations to biodiversity values and cultural heritage that must be taken within the forest management. This means for example the form and size of felling areas, the retention of individual trees and groups of trees, retention of snags and the establishment of buffer zones along watercourses, fertilisation, and the routing of forest roads. Environmental consideration requires modifications of logging practices and other forestry operations, on the part of landowners. They should be applied on all forest land. Examples include the retention of snags and trees on clear-cut areas and the establishment of buffer zones along watercourses.

To secure that the sector reaches the environmental forestry goals, a large cooperative project about environmental consideration in forestry has been run by and carried out by the Swedish Forest Agency the last couple of years (*Dialogue on environmental consideration*). Within the project one important task has been to reach a common view of what is good environmental consideration in practice. This has resulted in new/updated guidelines and a new system for monitoring and evaluation. Participants in the project have been authorities, landowner organisations, forest companies, and non governmental organisations.

The full effect of this work is yet to be seen. Improvements regarding for example the amount of dead wood, amount of broad leaves and area of old forest have been observed in line with goals set within the system of environmental quality objectives. Despite the improvements in the awareness among foresters and forestry methods, the overall situation of the red-listed species has not improved since 2005, according to the 2010 Red list. Within a large research programme for forestry in Sweden (Future Forest) prognoses for the future forestry landscape has been carried out showing that results in the change in forest management since early 1990 has not yet been shown but will be clear in the future. Apart from a few indicators, thorough monitoring and evaluation of biodiversity in forest ecosystems is lacking.

The Swedish Forest Agency monitors each year the environmental considerations in practice. The most common deficiency is insufficient consideration to sensitive biotopes, for example along watercourses and to habitats of red-listed species. The controls show that about 35 % of the sensitive biotopes is negatively affected by the logging. One improvement though regards crossingwatercourses. Only in 19 % of the loggings has there been driving across watercourses, compared to 43 % around the year 2000. It is however shown that the amount of wood left for nature conservation purposes at the felling areas was in line with expectations. What is lacking is the prioritizing of what kind of environmental considerations was taken. This shows that the ambitions of forestry is at the right level, but the detailed knowledge of selection of trees can be improved.

Adapted management methods
Adapted management methods include goals both for production and environment.Recent knowledge and iterative evaluation is an important part in the implementation, one example is regeneration without clear-cutting. Since 2005 the Swedish Forest Agency has worked to develop continuous cover forestry. Much of the work is about capacity-building, building up knowledge, starting test sites and encouraging the forestry sector to use more continuous cover forestry. In 2012 the area of continuous cover forestry in large-scale forestry was 17000 hectares, which must be seen as a minor part of forestr is practises of today. Continuous cover forestry is probably more used in small-scale forestry by public owners in more densely populated areas where social values of forests are highly valued, but at present there are no statistics presented.

Certification programmes
A vast majority of the Swedish forest owners have a Forest Management Plan (FMP). Today all commercially established FMPs in Sweden include a detailed forest inventory in situ including economical as well as environmental aspects. The plans describe forest condition, show environmental values in the forest, and lists planned management activities. The plans also normally include overarching management goals for the estate.

Forestry certification takes place within the Forest Steward Council (FSC) system and/or Programme for the Endorsement of Forest Certification (PEFC). More than 60 percent of forest areas are certified and is a way for the forestry sector to show the sustainable forest management carried out to meet market demands. The major forestry companies are all certified and certain enterprises are double-certified. The standard which is set within the framework of the certification system has been, in addition to the regulatory framework and other national policy instruments, an important factor for the environmental care of forestry and voluntary agreements since 1997 when FSC certification began in Sweden and since 2000 when PEFC Certification was introduced. Both FSC and PEFC-certification entail the requirement to keep FMPs.

Voluntary set-asides
Voluntary set-aside areas are established when landowners remove areas from forestry production to establish conservation sites without economical compensation from the public. The concept of voluntary set-asides has been developed during the last decades in cooperation between the certification systems, the acting of the state and international movements. There are similarities and dissimilarities between the certification standards and the environmental objectives. The voluntary set-asides are mostly a result of certification standards.

The voluntary set-asides were investigated during 2009 – 2011 in total 1.2 million hectares were set-aside, of which 1,1 million hectares in lowland areas, have a documentation in a forestry plan. Since the previous investigation in 2007 this represents an increase of 15 %. Slightly more than 60 % of the set-asides are of high conservation value and 13% have the potential to develop such values rather shortly. The larger forestry companies have also made their set-asides public on a web site. Information of certified family owned forest areas are available on demand according to the certification rules.

One example of a cooperative mechanism is the Komet Program, for testing new ways of protection of biologically valuable forests. This voluntary scheme, initiated by the Swedish

Government and introduced in spring 2010, is a partnership of three government bodies. The Komet Program aims to take care of and promote the landowners interest and conditions to nature conservation and also to raise the awareness of the conservation value of their land. The program encourage landowners to enter nature conservation agreements or other forms of site protection for their forests or to make a voluntary set aside area on their land.

The last report from 2013 concludes that the Komet Program, in many aspects, has a very good reputation with regard to collaboration between land owners and government authorities. Several of the reference group's organisations have indicated that the Komet Program, as a way of working, is very appreciated by land owners and their local organisations. The report also states that the method does not lead to a sufficient level of target fulfilment of *Sustainable Forests* in the form of protected areas, the biodiversity quality in the protected areas is lower, and the areas of habitat protection areas are smaller, as compared with the rest of Sweden where outreach efforts by government authorities predominate. The Komet Program will be fully evaluated during 2014.

To facilitate the use of nature conservation agreements it is possible for both the county administrative boards and the Swedish Forest Agency to seal and pay for these agreements with landowners.

To ensure proper management in protected areas the Swedish Forest Agency adopted a strategy for management in legally protected areas in 2010.

Financial support

Grant for nature- and cultural values in forests

There is a grant to promote management in nature conservation and cultural heritage areas in forests. The objective of the grant is to stimulate active measures in the forest to promote management in nature conservation and cultural heritage areas of public interest. The most commonly used actions were to favour deciduous forests or management of small water resources. During 2013 grants for 10 million SEK were disbursed.

Grants for noble broadleaved forestry

According to the Swedish Forestry Act, broadleaved noble stands must remain as such after felling. The objective of the financial support program for regeneration or establishing broadleaved noble woodland is to compensate forest-owners for the increased costs due to regeneration of broadleaved noble species compared to , for example, spruce or pine. During 2013 grants for 8,7 million SEK were disbursed.

The Swedish rural development program

The Swedish rural development program 2007-2013 included measures to enable enhanced consideration for biological diversity into forestry management. In the end of the period there were more applications then available resources. There were three different types of financial support for landowners and forestry companies to apply from:

Preserving and developing the biological diversity in forest. The objective of this financial support was to preserve and develop woodland biodiversity, cultural heritage assets and recreational values. These actions were taken on 21 500 hectares forested areas, 1500 km paths and trails has been prepared and more than 2 100 cultural relics has been made visible to the public. In addition to this, close to 180 000 hectares forest land have been classified.

The classification give the forest- owners a good basis for planning their silviculture. . The budget for this aid was 166 million SEK during the period of 2007-2013..

Vocational training and information actions. The purpose of this support was to strengthen competitiveness in rural areas and contribute to sustainable forestry through skills development. The areas included in this action were climate, nature- and cultural values in forests, bio-energy and economics. There are two kinds of economic support available, project support and enterprise support. Project support was aimed at those who intend to educate others. Enterprise support was aimed at those who wish to educate themselves or co-workers in a business/organization. The budget for this grant was 474 million SEK during the period of 2007-2013.

Promote biodiversity in broad-leaved deciduous forest. The objective of the financial support was to increase the area of woodland with hardwood species in Sweden as these areas are declining which entail large scale effects on biodiversity. During program period the amount of deciduous forests raised with 4 500 hectares The budget for this aid was 90 million SEK during the period of 2007-2013.

The rural development program for 2014-2020 is now under preparation. The new program 2014-2020 will continue to include forestry although the volume will be reduced in comparison to the former program.

Invasive alien species

Invasive alien species are a comparatively small problem in Swedish forests, but one locally large problem is the aggressive spread of the Sycamore, *Acer pseudoplatanus*, in some southern broad-leaved forests. The spread of *Pinus contorta* into areas with high value for biodiversity and protected areas is a potential problem.

In 2009, the Swedish Forest Agency proposed to the Government an amended national legislation concerning forestry with alien tree species. This proposal is still under consideration, partly as a result of ambiguity regarding the definition of invasive alien tree species. Recently, scientific studies have addressed the identification and management of the ecological risk of using potentially invasive alien species in Swedish forestry. Such studies highlight the complexity of benefits, risks, cost and uncertainties involved.

Forest genetic resources

The Swedish Forest Agency decided in 2013 on a new strategy to conserve forest genetic resources. The aim is to include all native tree species in protected so called habitat protection areas. Management, regeneration and monitoring of the gene conservation units is possible. The number of trees per gene resource for different tree species follows the European (EUFGIS) guidelines. The strategy will become a crucial part of safeguarding genetic diversity of native forest trees in Sweden.

Forestry databases

The Swedish Forest Agency has in place an online database which includes up-to-date aerial imagery and GIS based information from the National Forest Inventory as well as area-based information from other relevant authorities, for all productive forest land. Combined with the fact that all final fellings (>0.5 ha) have to be notified or applied for, to the Swdish Forest Agency prior to harvesting, this provides for an overview of the current state of affairs in the forest.

The data on areas of special environmental values (such as Natura 2000 areas, nature reserves, habitat protection areas, woodland key habitats, nature conservation agreements etc.) and cultural sites (e.g. prehistoric heritage) derive from another database, hosted by the Swedish Forest Agency. Therefore, any notified harvesting operation is automatically checked against environmental values, which leads to further investigation and extension services by the Swedish Forest Agency as regards the notification made by the forest owner. All database information is available to all forest owners for their property.

Research
The Swedish University of Agricultural Sciences hosts the interdisciplinary program *Future Forests*. The vision of *Future Forests* is to provide scientifically robust knowledge to enable an increased and yet sustainable provision of ecosystem services from forests in a future characterized by climate change, energy transition and altered markets for forest goods and services. Stakeholder involvement is a key to success of the research. Hence, communication is a central activity in the program.

Awareness
The *Forest in School* is a national cooperation program between schools and the Swedish forestry sector including the Swedish Forest Agency which started as early as in 1973. The program enhances the benefits of out-door learning and encourage the schools to get their own (by agreement with the forest owner) school-forest in the vicinity of the school. The pupils' awareness of the values of biodiversity as well as the values of forestry is the main objective of the programme.

2.3.9 The agricultural sector

The Swedish Board of Agriculture is the authority responsible for the environmental quality objective *A Varied Agricultural Landscape*. Action taken under this objective is aimed at all kinds of activities in the agricultural landscape, and threats to and protection of agricultural biodiversity, including domestic crops and breeds.

The Rural Development Programme
The Rural Development Programme 2007-2013 is the main instrument today for maintaining wild biodiversity in the agricultural landscape. A significant part of farmland biodiversity is linked to unfertilised meadows and semi-natural pastures. Continuous management is necessary to preserve the biological values that exist here and payments within the Rural Development Programme have in fact contributed to the conservation and management of many pastures and meadows. Without compensation, these lands, which are mostly irrelevant to the production, would have disappeared. Pasture acreage within environmental payments increased until 2005, after which it has decreased.

Preserving biodiversity is also a question of restoring variation both in space and in time, at all levels of diversity. In the intensively managed arable countryside biodiversity is dependent upon habitats such as fallows, ponds and field islets. There is a continued lack of these small habitats, but how much is unclear. The Rural Development Programme includes several actions to increase the amount of small habitats in farmland. More than 7000 hectares of wetlands have been constructed or restored, which together with improvement of water and action plans for threatened species have benefited many freshwater species, including amphibians.

Maintenance and/or restoration of ecosystem services within the agricultural landscape is intimately linked to upholding a rich and varied agriculture that is conscious about run-off problems of fertilizers and agro-chemicals, and practices of integrated pest management, and that allows people to access extensively-managed farmland areas for leisure activities. As such, these aspects are being addressed through the economic incentives of the Rural Development Programme.

The design of the next Rural Development Program (2014-2020) will be of great importance for the possibility of achieving the desired biodiversity goals in the agricultural landscape.

Genetic resources of domestic animals
Since 2010 Sweden has an action plan for sustainable management of Swedish animal genetic resources. The plan covers the period 2010 - 2020 and has several activities in the area of conservation and sustainable use. The plan was developed in accordance with the Global Plan of Action (FAO) and the signed Interlaken declaration. The implementation of the action plan has however not been fully funded.

Populations of threatened breeds have been strengthened. Certain breeds consist of only a few individuals and it takes a long time to build up population size to a safe level. The work is done by individual farmers and it is depending upon payments. So far this has been possible to achieve through the Rural Development Programme.

Genetic resources of domestic plants
For plant genetic recourses there is a national Programme for the Diversity of Cultivated Plants. The inventory of what is regarded as genetically unique and valuable Swedish plant material ended in 2010. Seed-propagated plants are kept under long-term storage at the Nordic Genetic Resource Centre (NordGen) but for vegetatively propagated plants there is on-going work building up a new national gene bank. Major areas of the programme also include utilisation and research which are expected to form the most important parts of the program after 2015.

Complementary collecting of red-listed wild relatives of crops (CWR) has been carried out, although insufficiently. Prioritized taxa of important CWR have been identified but explicit *in situ* conservation remains to be established, including the development of management plans. Genetic characterization has been done in some plant groups but much work remains.

2.3.10 Marine and freshwater environments

The Swedish Agency for Marine and Water Management is the authority responsible for the environmental quality objectives *Zero Eutrophication*, *Flourishing Lakes And Streams*, and *A Balanced Marine Environment, Flourishing Coastal Areas And Archipelagos*. The first objective is aimed at one of the important pressures to biodiversity, whereas the latter two concern all kinds of activities that affect lakes, watercourses, the coastal region, and the marine environment, and threats to and protection of biodiversity in water bodies.

There has been a basic change to the governance structure in the government agencies responsible for marine and aquatic management. The Swedish Agency for Marine and Water Management (SwAM) was formed with parts of the previous Board of Fisheries and parts of the Environmental Protection Agency. This change was primarily meant to better integrate management of aquatic resources.

The EU Marine Strategy Framework Directive 2008/56/EC is adopted and implementation has started, partly overlapping with the implementation of the EU Water Framework Directive. According to the marine directive, each EU Member State shall establish environmental quality standards for good environmental status of marine habitats, and adopt goals and indicators by 2012, and then adopt an action plan by 2015. The overarching goal is that the marine environment shall receive good environmental status by 2020. The Swedish Agency for Marine and Water Management has hence established standards and produced a first set of indicators (see section 3.1.2) for the Baltic Sea and the North Sea. The marine directive has been implemented in Swedish legislation through a Marine Environmental Regulation (2010:341).

Restoration plans for freshwater environments have been adopted in line with the Water Framework Directive.

Implementation of the EU Habitats and Birds Directives continues. Sweden, as well as other EU Member States, has experienced difficulties where environmental and fisheries competences mix, for example within marine Natura 2000 areas. Work on appropriate management measures has progressed, however, including with a national report on how fisheries management measures in Natura 2000 sites can be introduced.

Sweden has contributed to a new legally binding target in the reformed EU Common Fisheries Policy (CFP) to restore stocks of marine resources, to above levels able to produce a Maximum Sustainable Yield, by 2015 and by 2020 at the latest. For some stocks recovery will take longer than that even if no anthropogenic mortality is assumed, such as the European eel. The new article 2.2 in the CFP Basic Regulation provides for the application of this target to all species managed under the CFP. Article 12 provides for the regulation of fisheries in Natura 2000 sites. Current problems with management plans for certain managed species must be solved. As the new CFP has not entered into force, the implementation phase is still to come.

Action programmes for threatened species (see above) have been produced for the three seal species, the harbour porpoise and the European eel. For the seals the situation is improving. For the eel and the harbour porpoise the situation looks less favourable. A management plan for the Baltic salmon has been proposed but not adopted.

2.4 Mainstreaming of biodiversity into relevant sectoral and cross-sectoral strategies, plans and programmes

2.4.1 Mainstreaming environmental policy

The agricultural sector

The Swedish agri-environmental policy is an important element for several areas of action towards good environmental conditions. The national environmental quality objectives, as well as other societal objectives such as the development of rural areas, competitiveness of agricultural businesses and animal welfare are all embedded in the agri-environmental policy priorities and measures.

The long term sustainable use of resources, simplification and reduced administrative burden, cost effectiveness, flexibility and room for innovative initiatives for businesses to meet market demand as well as environmental objectives are all guiding principles for the agri-

environmental and rural development policy. In the Swedish Rural Development Programme there is a strong focus on environmental issues, such as plant nutrient management, reduced risk from use of plant protection products and maintenance of biodiversity linked to agriculture.

In the agricultural sector, there has been strong focus on the improvement of water quality, in particular the Baltic Sea, with an integrated mix of policy instruments and a range of measures. Further, focus has been on wise use of plant protection products, the maintenance of a varied agricultural landscape and biological and cultural values. Climate change and energy issues are increasingly becoming more important.

The mainstreaming of environmental and biodiversity issues in the agricultural sector is challenging. To keep grazing livestock on semi natural grasslands in order to maintain the natural and cultural values of these and the agricultural landscape is particularly challenging in areas dominated by forest and where agricultural land is scattered. The targeting of environmental performance, without adding administrative burden or loosing flexibility for agricultural enterprises to find individual smart solutions, is another challenge. Some environmental legislation (some national and some EU-based) may, if not designed properly hinder economic efficiency, in reaching desired environmental outcomes as well as the development of farms.

A change in climate will have far-reaching implications for agriculture, which is dependent of the climatic conditions where they take place. A longer growing season are expected when the weather gets warmer, but increased temperatures and more rainfall and flooding also increases the risks of rot and pests. It is of great importance that the agriculture sector works both with mitigation and adaptation to climate change.

The aim is active and proactive farmers where environmental issues are integrated in the farm and business management. A project called Focus on Nutrients, with focus on the single farm environmental performance and aim of strengthening of farmers' management skills, is carried out through the cooperation of farmers' federations, agriculture and food industry and public authorities. Farmers have to a large extent participated in a wide range of agro-environmental payment schemes of the rural development programme.

Specific environmental achievements include: improved farm scale nutrient management, reductions of nutrient losses to air and water, improved plant protection management practices, reduction of cadmium in fertilisers initially due to fertiliser tax and subsequently resulting in an agreement between the market operators and farmers, large areas of semi natural grasslands have been maintained and restored.

The forestry sector

The forestry policy adopted by the Parliament in 1993 is characterised by two equally important goals: an environmental goal and a production goal. The introductory section of the Forestry Act was revised in 2008 to further stress that forestry resources are renewable and have a role in combating climate change: "The forest is a national and renewable resource. It shall be managed in such a way as to provide a valuable yield and at the same time preserve biodiversity. Forest management shall also take into account other public interests".

The Swedish forestry policy and environmental policies are important elements that together form a comprehensive policy area to safeguard sustainable use of the national forest resource.

The forest legislation, the monitoring and supporting work of the Swedish Forest Agency, the national environmental quality objectives, the recent communication platform "the Forest Kingdom" as well as other societal objectives such as the development of rural areas are all embedded in overall forest policy priorities and measures.

The targeting of environmental performance without adding administrative burden or loosing flexibility for forest enterprises is a challenge that requires ongoing analyses and policy development. There is a need to find the balance between different interests and valuation of forest resources without decreasing the property rights. On the EU-level, policy fragmentation is another ongoing challenge to a balanced, effective and well-functioning national forest policy. The dialogue on environmental considerations, common headline targets and clearer provisions, formal and voluntary commitments for conservation of biodiversity, a strategy for long-term sustainable land use and a pro-active and coordinated participation in the EU policy-making affecting forestry are different policy tools in the toolbox addressing these challenges. At EU-level Sweden considers the implementation of the EU Forestry Strategy, in conjunction the EU strategy for the Bio-based Economy and the EU Biodiversity Strategy to be important. It provides the strategy framework for the Commission services and the Member States' joint actions in the field, primarily seeking exchange of knowledge, information and best practices.

Since the last comprehensive national reform took place in the beginning of the 1990s, a deregulated forestry policy with increased willingness by forest owners to assume responsibility and skills has developed. Increased knowledge based on research and empirical experience since many decades has been an important factor in the sustained increase in overall annual growth in Swedish forests, recorded for almost 100 years. During the last 20 years, this has also been combined with a substantial increase in the area of formally and voluntary protected forests and in the proportion of older forests, the amount of dead wood and broadleaves, in line with the ambitions stated in the environmental quality objectives. Key to this development has been an active co-operation and communication between authorities like the Swedish Forest Agency, the Swedish Environmental Protection Agency, the forest owners and forest sector stakeholders.

The fisheries sector

The Swedish Government's aim is that commercial fishing, the processing industry, aquaculture and recreational fisheries should produce fish and fisheries products, which are demanded by consumers and are creating jobs, wealth and high living standards in coastal and inland communities. The prerequisite for success is that all fishing is resource-efficient and environmentally sustainable, including effective fishing rules and selective fishing gear.

Especially within the framework of the EU Common Fisheries Policy, the Government emphasizes the importance of establishing and implementing multi-annual plans for all commercial stocks of fish. Furthermore, to reduce the overcapacity of the fleet, to adapt to the depleted stock situation, the number of vessels and the fishing effort should decrease. It is important to introduce a discards ban, and the bycatch of endangered species of fish, birds and mammals must be reduced to a minimum, so that stocks can recover and loss of vital genetic variation can be avoided. A key factor to address the latter problem is the development and use of effective selective fishing gear. Fisheries control is one of the cornerstones of the Common Fisheries Policy and continuous improvement is important.

Sweden has over the years made some important strategic priorities when working with CITES. One of the most important ambitions has been to have the European Eel (*Anguilla anguilla*) listed on CITES. Preparing for CoP14 in Hague in 2007 Sweden was working intensively to develop drafts for discussion, and to get other member states to take an active stand in this issue. The work succeeded and from 2009 on the European Eel is listed in Appendix II.

As previously noted, there is over-capacity in both the EU and the Swedish fishing fleet. This is reflected in the low profitability of Swedish professional fishing. The Operational Programme of the European Fisheries Fund, 2007-2013, estimated the amount of over-capacity for a number of segments based on current fleet capacity, available quotas and economic data. This formed the basis of the objectives set by the Government in the fishing program. Efforts to reduce capacity have also been made in the context of the previous structural programs for the periods 1995-1999 and 2000-2006. As one of the overall objectives in the present fishing program, it was established that the capacity of the Swedish fishing fleet will be reduced, so that fishing effort can be adapted to a sustainable stock situation and profitability in the industry can increase.

The business sector

The business sector is a key player in achieving all the environmental quality objectives, and the environmental efforts of companies are crucial. They contribute by developing products and services in which new technologies are combined with better environmental performance, by working on resource management, and taking measures to reduce pollution in all stages of production. The environmental efforts of the business sector need to be given greater visibility and factored into the environmental objectives system. Measures to achieve this are described in Section 2.2 in conjunction with the presentation of the milestone target on the importance of biodiversity and the value of ecosystem services.

Development cooperation

The Swedish Policy for Global Development is[1] based upon eight guiding principles of which one – sustainable use of natural resources and protection of the environment – is especially relevant to the articles of the CBD. The Government has identified climate change and environmental impacts as one of six global challenges where Sweden can make an effective contribution towards achieving the goal of equitable and sustainable global development. Environment and climate is also one of the three thematic priorities that the government set out for Swedish development assistance from 2007 and onwards.

The majority of the world's poor, especially women, live in rural areas and depend on forests, agriculture, waters, wetlands, fields and pastures for their livelihood. Many of these ecosystems and related biodiversity are under threat and poorly managed. The Millennium Ecosystem Assessment (MA) concluded that 60% of the world's ecosystems are degraded or unsustainably used. This directly impacts the livelihoods of the poor who depend on these resources for subsistence, security and income. The links between sustaining ecosystems and fighting poverty implies that Sida by its work on sustainable agriculture, environment and biodiversity, makes a crucial contribution to the Swedish Policy for Global Development

The guiding document for Sweden's engagement in this sector sector for the period covered by the report has been the "Policy for environmental and climate issues in Swedish

[1] http://www.government.se/sb/d/14232

development cooperation, 2010-2014"[2] issued by the Government in September 2010. The Policy notes that environmentally sustainable development is not only a specific Millennium Development Goal (MDG) in itself, but also a precondition for the achievement of most of the others. A starting point for the policy is that it is important to thoroughly consider the development potential versus the risks of negative environmental impact of a development intervention. Biodiversity is an important feature when assessing the environmental impact, climate change effects and associated risks in the analyses, planning, implementation as well as follow-up of Swedish development cooperation with individual countries, regions and multilateral organisations.

Ecosystem services and biodiversity are at the heart of sustainable development and, if rightly managed, can contribute to poverty alleviation and the wellbeing of the society. The ecosystem services conceptual framework provided by the MA has proven effective for communicating how ecosystems underlie human well-being. Early efforts to apply ecosystem services concepts and information have strengthened both public and private sector development strategies and improved environmental outcomes. Sida's long term and strategic work on environment with a specific and strong focus on biodiversity has been instrumental to bring the issue high on the global development agenda. Examples of that is the support to the MA follow-up that is now interlinked with the developments under the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, IPBES.[3]

International processes like IPBES, and The Economics of Ecosystems and Biodiversity (TEEB),[4] will help to mainstream biodiversity and ecosystem services further into national development agendas and decision making. Sida's support to related activities has been of significant importance.

Sweden has for a long time been working proactively through incorporating biodiversity aspects within bilateral and regional programmes and support to multilateral organisations such as FAO, World bank and UNEP, focused on natural resource management (agriculture, rural development, marine/coastal, forestry etc.). Sida consequently gives strong focus on sustainable use within managed landscapes and acknowledge the importance of ecosystem approach and the role of ecosystem services for human well-being and poverty alleviation. Sida, and organisations Sida contributes to, make linkages to the MDGs, through mainstreaming biodiversity into activities related to for example poverty alleviation, food security/local livelihoods and health as well as ensuring synergies with climate change and biodiversity. In addition there has also been an aim to integrate equity aspects and the role of local communities and indigenous peoples in managing biological resources. It is important to ensure involvement of stakeholders such as poor people, indigenous and local communities and key sectoral agencies in biodiversity strategies and plans.

[2] http://www.government.se/sb/d/574/a/156498

[3] IPBES is an independent intergovernmental body to strengthen the science-policy interface for biodiversity and ecosystem services for the conservation and sustainable use of biodiversity, long-term human well-being and sustainable development. It was established in Panama City, on 21 April 2012 by 94 governments. Read more at http://www.ipbes.net/

[4] TEEB is a global initiative focused on drawing attention to the economic benefits of biodiversity including the growing cost of biodiversity loss and ecosystem degradation. TEEB presents an approach that can help decision-makers recognize, demonstrate and capture the values of ecosystem services & biodiversity. Read more at http://www.teebweb.org/

Sweden also sees the need for increased capacity building and consideration regarding the link between ecosystem services and economic development. Building on the Millennium Ecosystem Assessment[5] framework and focusing more on making the value of ecosystem services visible and integrated in development plans and decision making for sustaining ecosystem services, could potentially lead to better joint planning and implementation of e.g. Poverty Reduction Strategy Papers, PRSPs, and National Biodiversity Strategies and Action Plans , NBSAPs, since the term "ecosystem services" has a potential to make the concept of biodiversity easier to grasp for stakeholders in society that is not familiar with why biodiversity is important for human well-being. Sida has contributed towards that strategies as *NBSAPs* and instruments such as PRSPs as well as interventions to attain the MDGs should be mutually reinforcing. Sida finds it important that NBSAPs are considered in national budget processes, PRSPs, sector support etc.

In the dialogue with partners regarding development cooperation implementation Sida focus on "up-streaming" planning by including biodiversity aspects in policies and strategies. Special attention is given to addressing natural resources and their importance for poverty alleviation in design of the Result Strategies that guides Sida's cooperation with partner countries. Sida also includes biodiversity in guidelines and practice for environmental assessments of contributions.

In addition Sweden is interacting closely with OECD-DAC's work such as with Biodiversity and Development Co-operation Scoping Paper and to develop a series of Good Practice Guidance on how donor agencies could support developing countries to generate greater value and welfare from biodiversity, such as payments for ecosystem services. Sweden has for a long time contributed to OECD-DAC methods manuals and policy documents on integrating biodiversity and associated ecosystem services into development cooperation such as Policy Statement on Integrating Biodiversity and Associated Ecosystem Services into Development Co-operation[6], and an Advisory note on Strategic Environmental Assessment and Ecosystem Services [7].

Sida, has also provided support to projects relating to the objectives of the CBD and worked with integrating the objectives of the convention into Sida's work since it was ratified. Sida supports a large number of initiatives that is classified under the Rio marker on biodiversity and contributes to CBDs Aichi Biodiversity Targets[8]. In the next chapters some examples are presented. Support is also provided to projects/programmes with biodiversity objectives and/or components, e.g. through NGOs like Swedish Society for Nature Conservation, SSNC[9], International Union for Conservation of Nature, IUCN, and Worldwide Fund for Nature, WWF, to research (e.g. CGIAR and others) and to strategic smaller initiatives

[5] http://www.unep.org/maweb/en/index.aspx

[6] http://www.oecd.org/dac/environment-development/thedacpolicystatementonbiodiversity.htm , The former Sida expert function SwedBio helped to write this document.

[7] http://www.oecd.org/environment/environment-development/41882953.pdf, Prepared by the Sida-funded Swedish International Biodiversity Programme (SwedBio) in close consultation with: World Resources Institute; Sida¨s
Helpdesk for Environmental Assessment, Swedish EIA Centre; and others.

[8] The Aichi Biodiversity Targets are a set of 20, time-bound, measureable targets agreed by the Parties to the Convention on Biological Diversity in Nagoya, Japan, in October 2010, that are now being translated into revised national strategies and action plans by the 193 Parties to the Convention. Achievement of the targets will contribute to reducing, and eventually halting, the loss of biodiversity at a global level by the middle of the twenty-first century. http://www.cbd.int/sp/targets

[9] http://www.naturskyddsforeningen.se

focused on methods- and policy development for equitable and sustainable management of natural resources, as wells as to research organisations such as WRI and IIED. Sida also supports civil society participation in key international meetings and events related to biodiversity.

A sample of biodiversity initiatives supported by Sida has been provided with Sweden's reply on the Notification 2013-050 on resource mobilization. This provides examples on how biodiversity is considered in international cooperation through Sida in order to provide a reply to the supplementary question to Q8 of the guidelines.

2.4.2 Sectoral responsibility for the environment

The environmental quality objectives and their implementation have been mainstreamed into all relevant sectoral government agencies. The objectives include Sweden's biodiversity objectives and targets, explicitly through clearly formulated objectives and specifications, or implicitly through objectives and specifications concerning pressures and conditions for biodiversity.

A total of 25 government agencies have been given explicit responsibilities in the environmental objectives system. Within their own operational areas, they are all required to promote the achievement of the generational goal and the environmental quality objectives and to propose measures to further develop environmental action where necessary. Eight of these agencies, moreover, are specifically responsible for following up and evaluating one or more of the environmental quality objectives. All 25 agencies also have to consult with and assist the Swedish Environmental Protection Agency on the data needed for following up and evaluating the objectives.

2.4.3 Green infrastructure: application of the ecosystem approach

The cross-cutting project of developing the green infrastructure in the entire Swedish landscape is essentially an implementation of the ecosystem approach of the CBD. Mainstreaming of biodiversity issues is thus a necessary component of the green infrastructure project. This means that goals, action taken, and follow-up regarding biodiversity components must be integrated into all relevant sectors, and the sectors must work together to achieve the goals. There is also a need to connect actors at different scales, from the Government to local communities.

The sectoral responsibility to achieve the environmental quality objectives is an important basis for strengthening of the green infrastructure, but it is not sufficient, shows the feasibility study on green infrastructure presented by the Swedish Environmental Protection Agency. For example, certain biotopes, such as ecotones between forest and agricultural land, easily fall between the mandates of sectoral agencies. Economic incentives in different sectors may overlap in an incongruous way. The holistic landscape perspective is hard to achieve. Issues concerning genetic diversity of wild organisms tend not to be dealt with at all.

The Swedish Environmental Protection Agency has identified three overarching principles that must govern the work to build a green infrastructure, all related to the mainstreaming of biodiversity.

- A holistic perspective is necessary, a spatial landscape perspective, through which threatened natural environments and important ecosystem functions can be highlighted.
- Cross-sectoral work is essential, nationally as well as regionally.

- Cooperation must involve and strengthen all actors and stakeholders.

3. Progress towards the 2020 Aichi biodiversity targets and contributions to the relevant 2015 targets of the millennium development goals

3.1 Progress towards the implementation of the strategic plan for biodiversity 2011-2020 and its 2020 Aichi biodiversity targets

3.1.1 A new Swedish organisation for the evaluation of goals, objectives and targets

The Swedish Environmental Protection Agency has received overall responsibility for environmental objectives follow-up, in collaboration with other environmental objective agencies and county administrative boards. The Swedish Environmental Protection Agency will also be assigned broader coordination responsibility for environmental information management, which is to result in a more solid basis for follow-up that is accessible and quality assured. The Swedish Environmental Protection Agency is tasked with coordinating a government agency platform with links to the research community with the aim of developing the application of economic analysis within the environmental objectives system.

More knowledge is required on how to achieve environmental quality objectives in an economically efficient manner. Independent functions that can evaluate efforts to achieve the environmental quality objectives should therefore be established. Policy instruments and measures also need to be reviewed and evaluated, particularly in relation to their effect on the economy.

A follow-up of progress on achieving the 16 environmental quality objectives is made annually. The assessments are made by agencies responsible for assessment of an environmental quality objective and coordinated by the Swedish Environmental Protection Agency. Every four years, an in-depth evaluation is undertaken of the environmental quality objectives and the generational goal. The most recent in-depth evaluation was made in 2012, and i was the first time the new generational goal was included. The in-depth evaluation was conducted in collaboration with county administrative boards and some thirty central government agencies, together with stakeholder and environmental organisations. As well as assessments and forecasts relating to both the environmental quality objectives and the generational goal, the evaluation includes analyses that cut across the different objectives: an analysis of synergies and goal conflicts affecting environmental action, a review of available policy instruments, and a progress report on environmental efforts at the regional and local levels. The most comprehensive assessments of the possibilities to reach each objective is made during the in-depth evaluation; the annual follow-up does not change conclusions made during the in-depth evaluation, unless there are marked changes in actual circumstances.

The basis for assessing progress towards the objectives has been clarified. An environmental quality objective should be considered achievable if the analysis shows that either the state of the environment expressed in the objective and its specifications is achievable, or that sufficient measures - national and international - have been decided and are expected to be implemented within one generation. In the most recent in-depth evaluation, which was the first occasion when the clarified assessment basis was employed, the assessments were guided more than in previous years by actual decisions putting in place conditions - in the form of policy instruments and measures - for meeting the objectives. This is in line with the new basis for assessing progress, set out in the Government Bill *Sweden's Environmental*

Objectives - For More Effective Environmental Action. Earlier interpretations of the prospects of achieving the desired state of the environment were freer, in that agencies' assessments took into account the possibility of creating conditions in the form of instruments and measures. With the new way of assessing progress, decisions taken and measures introduced by policymakers and in different sectors will rapidly be reflected in assessments of whether the environmental quality objectives will be achieved.

The evaluation of formal goals, objectives and targets is made based on a set of dedicated indicators, but also on data produced within the much wider environmental monitoring programme. The actors conducting or otherwise contributing to environmental monitoring and environmental stocktaking include agencies at national and regional level, municipalities, higher education institutions, consulting companies, research institutions, associations and individual people. The findings are made available to all interested parties by publishing data, compilations and analyses in reports and on web sites.

3.1.2 Swedish national and regional biodiversity indicators

The environmental quality objectives are evaluated using more than 100 national and regional indicators (supplementary material (6) list of national indicators). Each indicator was initially created with one particular objective in mind, but they are often useful for several objectives. About 40 indicators are thus relevant to the evaluation of the 16th objective on *A Rich Diversity of Plant and Animal Life*, whereas only one of them was created for that purpose. The present indicator system is however not fully sufficient to cover all aspects of biological diversity. A large number of indicators measure variables at the ecosystem level, whereas much fewer measure species or populations, and none measures genetic variation. A number of indicators give relevant information regarding sustainable use of biological diversity and ecosystem services, but none was specifically designed for this purpose.

Another bias in the indicator system is that they often express action taken, e.g. the area of a particular habitat being protected, or the number of wetlands being restored, or factors acting on biodiversity, such as nutrient leaching or air pollution emissions, but less they measure the actual quantity or quality of biodiversity as such. At the species level, there is also a strong bias, as there are indicators for 70 bird species (an aggregated index), two mammal species and one mussel. For a number of important factors or components of biological diversity there are no indicators at all, e.g. invasive alien species, genetically modified organisms, green infrastructure, ecosystem functioning and resilience, genetic variation, fragmentation of populations, and urban green space.

The indicator system is now being revised, and some indicators will be reformulated, and a number will be added. One aim is to better utilise available data, and another to adapt to international reporting, such as to the CBD. The revised set of indicators should be operable by 2016, when the next in-depth evaluation will be made. In addition to the changes and draft indicators there is also work on a new set of indicators for the environmental quality objective *A Magnificent Mountain Landscape*.

The present draft set of indicators is still not sufficient for the follow-up of the Marine Strategy Framework Directive. There are for example too few indicators that measure biodiversity , invasive alien species, and physical damage to the sea bed. Further proposals for new indicators will follow in 2014.

3.1.3 Progress towards national goals, objectives and targets

The generational goal
The generational goal is elaborated on in seven bullet points, which describe the direction of the changes in society needed within one generation, by 2020, if the environmental quality objectives are to be achieved. The conclusion drawn from the in-depth evaluation performed in 2012 is that the generational goal will not be met. Only the bullet point relating to energy is judged to have relatively good prospects of being achieved by 2020. The other six are not considered to be attainable, either within Sweden or in terms of Sweden's impacts on other countries.

In many areas, trends are pointing in the right direction, that is, we are moving towards the desired states which the bullet points describe. This is true, not least, in the area of waste, where the EU's Waste Framework Directive has resulted, and is expected to result, in far-reaching action. Regarding human health, developments are positive in several respects, although further measures are required. For ecosystem services such as drinking water, food and forest raw materials, good conditions exist for maintaining supplies in the future. Climate change could further increase the capacity to produce food and forest raw materials. In the energy sector, the share of renewable energy shows a steady rise, and energy intensity (energy input in relation to GDP) is falling.

Assessments have also been made of what scope Sweden has to act within the areas for further action proposed in this report. In several cases, the scope for measures at a national level is judged to be considerable. Where it is limited, this is often due to world trade prices and to agreements, regulatory frameworks etc. being jointly negotiated by a large number of countries.

The environmental quality objectives
The in-depth evaluation performed in 2012 concludes that several steps along the way to sustainability have been taken since the last in-depth evaluation of Sweden's environmental objectives in 2008. Despite this, the evaluation is that 14 of the 16 environmental quality objectives adopted by the Parliament will not be achieved by the target year 2020. The annual follow-up in 2013 confirmed the results of the in-depth evaluation.

Inadequate implementation of policy instruments is a problem in the case of over half the objectives, and for several others sufficient instruments have not been adopted. For only a third of the objectives is the difficulty considered to be a result of Sweden not being in a position to take the necessary decisions itself. Progress towards most of the environmental quality objectives is affected by changes taking place in other areas of society or economic sectors. There is also competition with other policy objectives. The clear conflicts that exist between different interests, such as land use and resource use resulting from lifestyles and consumption of goods, need to be handled at the political level.

The specific shortcomings in the effectiveness and implementation of policy instruments vary widely between instruments and environmental quality objectives. It may be a matter of inadequate supervision, knowledge or competence, or equally of environmental aspects not being given priority when a balance is struck between different interests.

For most of the environmental quality objectives the situation is complex, with positive trends for some components of them, but more negative trends for other components. The

goals with the most negative trends are *Reduced Climate Impact*, *Thriving Wetlands*, *A Varied Agricultural Landscape* and *A Rich Diversity of Plant and Animal Life*. The objectives *Clean Air*, *Natural Acidification Only*, *Good-Quality Groundwater* and *A Magnificent Mountain Landscape*, on the other hand, show positive trends, albeit weak.

Certain emissions, for example of phosphorus, nitrogen, sulphur dioxide and lead, have been reduced to some extent, but in some areas the beneficial effects, for instance on air quality, acidification and eutrophication, are taking time to emerge, owing to nature's slow capacity for recovery and the complex relationships between emissions and levels in the environment. The use of certain well-known and long prohibited toxic pollutants has declined, yet concentrations in freshwater fish, for example, remain high. Worldwide, production and consumption of chemicals are increasing, a factor which, together with inadequate knowledge of many substances and the combined effects of substances, obstructs progress towards the environmental quality objective *A Non-Toxic Environment*.

Global emissions of greenhouse gases are rising, and future climate change will have negative implications for many of the environmental quality objectives. *Reduced Climate Impact* is among the objectives that are furthest from being attained.

Certain aspects of the environmental status of seas, lakes, watercourses and groundwater, and of several terrestrial ecosystems, remain problematic, not least as regards eutrophication and biodiversity. For several environmental quality objectives, the elements relating to cultural heritage and outdoor recreation will be difficult to achieve.

3.1.4 Progress towards the vision and mission of the CBD strategic plan

The vision of the CBD Strategic plan is a world of "Living in harmony with nature" where "By 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people."

Sweden fully embraces the vision and the mission of the CBD Strategic plan. The Swedish generational goal matches the CBD vision, as it aims to pass on to the next generation a society in which the major environmental problems have been solved, without increasing environmental and health problems beyond Sweden's borders. The generational goal is the overarching objective of environment policy and guides environmental action at every level of society. The 16 national environmental quality objectives together express the contents of the CBD mission.

The present evaluation of the Swedish implementation of its national goals, objectives and targets, and of the CBD, indicates however that the CBD mission will not be fulfilled by the year 2020, given the present action taken, and current decisions and plans.

The European Union 2020 strategy for biological diversity was adopted in 2011. Sweden's work to implement the Convention is tightly linked to the EU strategy. The EU Commission has initiated implementation of several measures, and Sweden participates actively in EU working parties. Work to implement the EU strategy will be stepped up over the next few years. If the strategy is to be fully implemented and goals reached by 2020 significant efforts will be necessary.

3.1.5 Progress towards the Aichi biodiversity targets

Sweden has high ambitions regarding the implementation of the Convention on biological diversity. Full implementation of the 2020 Strategic plan of CBD, and the Aichi biodiversity targets, can only be achieved through a major change in the way the human society is organised and functions. This insight is reflected in Sweden's environmental strategies, goals and objectives. We accept the challenge to achieve true sustainable development, including the wise use of natural resources and the conservation of biodiversity.

Still, Sweden did not reach the 2010 targets, and we are a long way from reaching the 2020 targets. We still struggle with a number of challenges, as described in sections 2.3 and 2.4. Some challenges may seem trivial, such as simple lack of funds, resources, understanding, knowledge and interest, but are still very real. Other challenges go to the heart of perceived conflicts between, for example, long-term sustainable development and short-term economic gain, and require new ways of thinking to find a solution.

For each of the Aichi biodiversity targets we assess progress made (Table 2). A major step in implementation of the CBD Strategic plan in Sweden was taken with the adoption of milestone targets on biodiversity and ecosystem services, in 2012 and 2014. The contribution of adopted milestone targets to the implementation of the Aichi targets is described in section 2.2 above.

Action to reach the Aichi targets is summarised based on the Swedish environmental strategies and milestone targets (section 2.2), and evaluation of the 2010 interim targets and the description of action taken in sections 2.3 and 2.4.

Progress made in terms of a change in society or nature is described based on the presentation in section 1.2, the description of results of action taken in sections 2.3 and 2.4, the evaluation of the 2010 interim targets, the evaluation of the generational goal (section 3.1.3), and the in-depth evaluation and annual follow-up of the environmental quality objectives (section 3.1.3), making use of relevant indicators.

Table 2. Sweden's progress towards the Aichi biodiversity targets.

CBD strategic goals and Aichi targets	**Sweden's progress**
Strategic goal A. Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society	
Target 1: By 2020, at the latest, people are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.	Sweden is promoting public participation in support of the implementation of the national environmental objectives and targets. A communication strategy for ecosystem services is being prepared, but the subject already appears in other strategies and programmes. One example is the "Forest in School", a national cooperation programme between schools and the Swedish forestry sector. The pupil's awareness of the values of biodiversity as well as the values of forestry are main objectives.
Target 2: By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and	Important ecosystem services in Sweden have been preliminary identified and classified. A planned national strategy for the building of a green infrastructure will constitute a tool for a more detailed identification of ecosystem services, and for the management of landscape structure and function that will promote the continued delivery of ecosystem services.

reporting systems.	
Target 3: By 2020, at the latest, incentives, including subsidies, harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio-economic conditions.	A report presented in 2012 contained an overall survey of policy instruments for achieving Sweden's environmental quality objectives. The survey established what market failures exist in the area of each objective, and describes whether there are policy instruments in place to correct these market failures. The survey showed that many policy instruments are already in place, but that additional or improved instruments will be needed if the environmental quality objectives are to be achieved. A separate study of policy instruments was performed as part of a planned national strategy for the building of a green infrastructure. The report presented about a hundred different relevant existing policy instruments. There is a need to revise some instruments, as well as to create new instruments. Policy instruments that regulate the current use of land and water bodies need to be strengthened to achieve sustainable use in a landscape perspective. There is a wide range of economic incentives available to the agricultural and forestry sectors that are judged to be positive for biodiversity. Examples include agri-environmental payments for management of semi-natural pasture, mown meadows, buffer zones and catch crops to limit nutrient leaching, and restoration of wetlands. In the forestry sector subsidies are issued for broad-leaved forest, measures for the preservation of nature and cultural heritage, preserving and developing of biodiversity in forest, and promoting biodiversity of broad-leaved deciduous forest. There is also compensation to landowners for habitat protection and nature conservation agreements. The EU Rural Development Programme has a key part to play in slowing the negative trend regarding natural and cultural values of the farmed landscape. The action being taken within the Programme is however probably not sufficient. The growing emphasis on environmental measures in the EU Common Agricultural Policy will be beneficial in terms of achieving the environmental quality objectives.
Target 4: By 2020, at the latest, Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.	A concern is the significant impact of high and growing consumption, which among other things swallows up the benefits of technological advances, improved efficiency and greener consumer choices. The use of land and water is intensive, and with demand for resources such as food, fibre, energy and water expected to increase, the situation could become worse. This could jeopardise the stability of ecosystems. A one-sided focus on particular ecosystem services, such as production of certain goods for which there is a market, could lead to overexploitation and adversely affect other functions and processes.
Strategic goal B. Reduce the direct pressures on biodiversity and promote sustainable use	
Target 5: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.	Many lakes and watercourses fail to achieve good ecological status. Acidiphication has abated, but still lakes and watercourses are negatively affected. Fragmentation of habitats remains a problem, as does habitat loss, where entire habitats of a species are eliminated. For both these phenomena, insufficient policy instruments exist to prevent the present trend continuing. The indicator on streams with reproduction of the freshwater pearl mussel offers some encouragement, as there is a steady increase in both number of streams with mussel populations, and in the proportion of streams with recruitment, which signals that actions to protect and restore streams give positive results.

	At present, only 18 % of Sweden's coastal waters are judged to be at good or high ecological status. Eutrophication problems are most pronounced in the Baltic Sea, but also affect the state of the environment in the Kattegat and Skagerrak. Encouragingly, concentrations of some toxic pollutants are falling. Other issues which also affecting the marine environment are ocean acidification, oxygen depletion and physical disturbance of sensitive habitats. Outside the mountain region, only a few wetland types are at favourable conservation status, and for many of them the situation is deteriorating. Contributory factors include vegetation changes due to drainage, cessation of mowing or grazing, and the fertilising effect of nitrogen deposition. We are still a long way from achieving the objective. There is however a slow increase in wetlands in the agricultural landscape. The status of several types of forest is unfavourable. The area of oldgrowth forest increases, but there is a regional imbalance. In southern Sweden the area of oldgrowth forest is very restricted and fragmented. The amounts of dead wood and deciduous trees in forest have increased. The area of mainly broad-leaved deciduous oldgrowth forest is however not increasing. Forests of very high nature conservation value are still being logged. There are about 400 000 hectares of identified woodland key habitats, and the estimated total area is twice that area. Around 500 hectares of woodland key habitats are logged annually, of which a third were identified and known prior to the logging. From satellite surveys it is estimated that in total 2000 hectares of high-value cores are being felled every year. The area of damaged high-value cores due to thinning activities is unknown. In the agricultural landscape natural and cultural values are threatened by abandonment, or by intensified agriculture practices. In some areas there is a lack of grazing livestock, which are needed to keep grasslands open. Several bird species now have a negative trend. On the southern and central agricultural plains there is a lack of small-scale habitats, i.e. small areas of land or water that are important for different plants and animals. The mountain habitats are affected by several factors. Off-road vehicles cause increasing damage to soil and vegetation. Growing interest in extraction of minerals could have an adverse impact, depending on where and how it is undertaken. In all ecosystems significant and valuable action against the loss and degradation of habitats have taken place. For example, within the marine environment, steps have taken to implement the Marine Framework Strategy Directive, the Helcom Baltic Sea Action Plan, the Water Framework Directive, the Habitats and Birds Directives, and much efforts have been invested to reform the EU Common Fisheries Policy. In terrestrial ecosystems, the proposed national strategy for the building of a green infrastructure includes a landscape analysis of the spatial distribution and connectivity of important habitats, with the aim to maintain and restore sufficient natural habitats for the conservation of biodiversity and ecosystem services. Sweden has certainly reduced the rate of habitat loss and degradation in many habitats, but more remains to be done. Valuable natural habitats are still being degraded. The main obstacles are shortage of agency manpower, insufficient knowledge about appropriate habitat management practices, unclear criteria for the achievement of sustainable use at the ecosystem level, and competing exploitation interests. In several cases international cooperation is necessary, for example to improve the habitat status in the Baltic Sea.

Target 6: By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.	The two relevant 2010 interim targets on reducing bycatches and unsustainable fisheries were not met, despite efforts at the national level. Overfishing of the seas remains a major problem today. The trends vary for different fish stocks: some are declining, for example cod, haddock and pollock in Kattegat and Skagerrak, while the situation of the Baltic Sea cod population has improved in recent years. A key challenge in the immediate future is to influence the EU Common Fisheries Policy (CFP) and support mechanisms such as the European Fisheries Fund. The most important measure may be the new legally binding target in the reformed CFP to restore stocks of marine resources to above levels able to produce a Maximum Sustainable Yield, by 2020 at the latest. For some stocks recovery will take longer than that even if no anthropogenic mortality is assumed, such as the European eel. As the new CFP has not entered into force, the implementation phase is still to come.
Target 7: By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.	Sustainable use is a cornerstone in the Swedish biodiversity strategy. Policy documents, objectives and targets express that protected areas will not be sufficient; a well managed landscape that is also used for commercial gain is expected to support a large proportion of the biodiversity. The objectives and targets have been well integrated into sectoral plans and processes, including in the private sector. The sectors have put significant resources into the implementation of sustainable use, for example through the certification of forestry activities. Sweden has however not achieved sustainable use in any single sector. A particular obstacle is that the concept has not been given an operational definition within the sectors. It is still not clear what action is needed to achieve sustainability, nor how it is measured and monitored. Consideration for the environment in conjunction with felling is now seen as a self-evident part of forestry. Measures taken have increased the amount of dead wood, the area of oldgrowth, and the area of mainly broad-leaved deciduous oldgrowth forest. There are shortcomings in this respect, however, and a dialogue on sustainable forestry is under way between stakeholders, to achieve greater consensus across the forest sector. A vast majority of the Swedish forest owners have a Forest Management Plan (FMP). Today all commercial established FMPs in Sweden include a detailed forest inventory including economical as well as environmental aspects. The plans describes forest condition, show environmental values in the forest, and lists planned management activities. Forestry Certification takes place within the Forest Steward Council (FSC) system and/or Programme for the Endorsement of Forest Certification (PEFC). More than 60 percent of forest areas are certified. The major forestry companies are all certified and certain enterprises are double-certified. The standard which is set within the framework of the certification system has been, in addition to the regulatory framework and other national policy instruments, an important factor for the environmental care of forestry and voluntary agreements. The area of organic agriculture is 424,600 hectares or 15.7 % of arable land.
Target 8: By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.	The generational goal and 12 different environmental quality objectives express different aspects of the Aichi target, including on air pollution, acidification, eutrophication, and the physical, chemical, and biological qualities of different ecosystems. Eight milestone targets have been adopted on air pollution, hazardous substances and waste.

	High concentrations of air pollutants still cause serious damage to human health and to plant life. International action is needed to decrease concentrations of particles and ground level ozone. The deposition of acidifying substances has decreased significantly during recent decades. An improvement can be observed in the status of lakes and water courses, but not in forest soils and groundwater. Further international action is needed, especially to curb emissions of nitrogen oxides from international shipping. In Sweden, further measures are needed to mitigate the acidifying effects of forestry. Sulphur dioxide emissions in Europe have fallen by almost 80 per cent in the last two decades, and releases of nitrogen oxides by more than 40 per cent over the same period. Still, emissions are not expected to fall as much as is required. The desired state of the environment is not expected to be achieved by 2020 either, given the long timescale of recovery following decades of acidification. Concentrations of certain toxic pollutants are decreasing, but persistent substances are still a problem. The use of particularly hazardous substances has been regulated within the EU. Policy instruments are being developed, but further action is needed. The eutrophication status of many sea areas and fresh waters is unsatisfactory. The worst conditions exist in the Baltic Sea. Measures to decrease emissions of eutrophying pollutants have produced results, but corresponding improvements in the environment take time. One particular concern is the long water exchange time in the Baltic Sea in combination with the high levels of nutrients stored in the sediments. That results in a situation where effects of measures cannot be detected until many years after implementation. Emissions must decrease further in all countries surrounding the Baltic Sea, Skagerrak and Kattegat. For the country's fresh waters, the situation looks somewhat better. If loads to lakes and watercourses continue to decrease, almost all lakes in forest and mountain areas could reach good status with respect to nutrients by 2020. For lakes in farming regions, however, this will be considerably harder to achieve. Contaminated ground water is common, especially in intensively farmed and densely populated areas. Two main problems are nitrogen compounds and pesticides. The work to protect ground water resources makes progress. Sweden has put much effort into meeting this target, and much progress has been made, for example in the reduction of emissions of sulphur dioxide, gases that threaten the ozone layer, and in many toxic compounds. Among the 18 relevant 2010 interim targets, nine were met on time. The situation in natural habitats is however still far from satisfying, with toxic compounds stored in sediments or still accumulating in trophic chains.
Target 9: By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.	The number of alien species in Sweden increases steadily, especially in the freshwater and marine environments, and alien species are expected to pose an increasing threat. Sweden has achieved a high level of protection against invasive alien species that could threaten crops, livestock and human health. Most intentional releases of such species are strictly regulated, and risk analysis and permit systems are in place. Alien species that could threaten wild fauna and flora or ecosystem functioning are much less well regulated. Many pathways of unintentional introductions are still not controlled, for example ballast water

	transportation. There is no comprehensive organisation to monitor or control invasive species outside the agricultural and forestry sectors. In 2009, the Swedish Forest Agency proposed to the Government an amended national legislation concerning forestry with alien tree species. This proposal is still under consideration. Scientific studies have addressed the identification and management of ecological risk of using potentially invasive alien species in Swedish forestry. Such studies highlight the complexity of benefits, risks, cost and uncertainties involved. It is unclear which tree species, pathogens and pests that may be classified as invasive on the EU or national level, as a result of the proposed new EU regulation.
Target 10: By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.	The indicator for climate change effects on a breeding bird index has already signalled that the Swedish bird community is being affected by climate change. The community temperature index has increased somewhat, and the change is statistically significant. Bird species adapted to a warmer climate are thus doing better than cold climate species Our ability to maintain and enhance resilience of the components of biodiversity in the face of climate change is very much dependent on the achievement of the whole range of environmental quality objectives. There is lack of knowledge of the relationship between biodiversity and climate change, and about measures to increase resilience. There is still uncertainty regarding which ecosystems and habitats will be most affected by climate change, and about the kind of changes to be expected. The high mountains and wetlands have been identified as vulnerable ecosystems, but other ecosystems are also likely to be affected. A planned national strategy for the building of a green infrastructure will constitute a tool for a more detailed identification of vulnerable species, ecosystems and habitats, and for the management of landscape structure and function that will promote resilience. Measures to physically protect the few coral reefs in Sweden are in place, although solutions to ocean acidification require measures to reduce greenhouse gas emissions. Sweden has made progress in the reduction of greenhouse gas emissions, but . the global emissions of greenhouse gases increase, as do the concentrations in the atmosphere. A global climate agreement is necessary to reduce emissions by half by 2050, and to reach zero emissions by the turn of the century.
Strategic goal C. Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity	
Target 11: By 2020, at least 17 per cent of terrestrial and inland water areas, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.	As shown by a range of different indicators, the amount of protected land and water area increases steadily. A relatively large proportion of the mountain area is already protected, but not all habitats are represented equally well. Many lakes and streams are included in protected areas, but only 2% of nature reserves were established specifically to protect valuable limnic environments. Of the sites identified as requiring protective measures in the Mire Protection Plan for Sweden, for example, 350 have still to be safeguarded. The area of protected forests increases steadily, but the area covered by habitat protection and agreements increases slowly, due to a shortage of funds for compensation to land owners. About 6.3 million hectares (roughly 14%) of the area of terrestrial and freshwater habitats is formally protected or protected through conservation agreements with landowners. At the same time, voluntary set asides by

	forestry amounted to more than 1 million hectares (about 2% of the total area).The distribution among geographical regions and ecosystems is uneven. Typically, in central and southern Sweden, only 2-3% of most ecosystems and habitats are protected. In the marine environment, just under 7% of Sweden's territorial waters and some 6% of its exclusive economic zone are now protected as national parks, nature reserves or Natura 2000 sites. The main obstacles to the formal protection of habitats are competing land and water utilisation demands, lack of agency manpower, and inefficient processes for the involvement of local communities, and.
Target 12: By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.	A large proportion of the Swedish fauna and flora has been assessed and a national red-list based on internationally accepted criteria is available. More than 4100 species are included (19.8% of all assessed). There has been no overall improvement in the status of red-listed species, and a large number of common species show negative trends. There are certainly a large number of successful cases, in which species have recovered, but they are outnumbered by the declining ones. Half of the species and three-quarters of the habitat types listed in the EU Habitats Directive show negative trends and are in danger of disappearing from Sweden in the long term. A great deal is being done to safeguard ecosystems and halt the loss of biodiversity, but on the whole progress is too slow. To reverse the negative trend, existing policy instruments must be fully implemented by all stakeholders, and natural resources used with greater consideration for the environment. The needs of the majority of species are addressed through general habitat management measures, sustainable use and protected areas. More than 400 species have however been identified, that need further action, above that offered by the basic conservation instruments. By the end of 2012 a total of 121 action programmes for such species had been adopted, and a further 54 programmes are being developed.
Target 13: By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.	Major progress has been made in conserving the genetic breadth of cultivated plants and livestock breeds, but much remains to be done as regards other aspects of this objective The genetic diversity of crops, including the associated indigenous knowledge, is addressed through a national programme that will meet the target regarding cultivated plants. *Ex situ* collections have been, or are in the process of being, extensively established. Complementary collecting of red-listed crop wild relatives has been carried out, although insufficiently. Genetic characterization has been done in some plant groups but much work remains. The commercial breeds of for example cattle, pig and sheep are all decreasing, while the situations for many of the rare breeds are currently stable. Strategies such as breeding and conservation plans are in place. The Swedish Forest Agency decided in 2013 on a new strategy to conserve forest genetic resources. The aim is to include all native tree species in protected so called habitat protection areas. Management, regeneration and monitoring of the gene conservation units are possible. The strategy will hopefully become a crucial part of safeguarding genetic diversity of native forest trees in Sweden.

Strategic goal D: Enhance the benefits to all from biodiversity and ecosystem services	
Target 14: By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.	A preliminary report on Sweden's most important ecosystem services has been produced. The inventory also considered pressures and driving forces that have an impact on the ecosystem services. The most important pressures and forces were judged to be changing land- and water use, polluting substances, eutrophication, climate change, acidification, invasive alien species, and human demography. Climate change is expected to have a strong negative influence on biodiversity and ecosystem services, both directly through changes in temperature, rainfall and ice conditions and indirectly through changes in land use. A change in climate will have far-reaching implications for agriculture, which is dependent of the climatic conditions where they take place. In Sweden a longer growing season is expected when the weather gets warmer, but increased temperatures and more rainfall and flooding also increases the risks of rot and pests. For ecosystem services such as drinking water, food and forest raw materials, , it is therefore crucial that the agricultural sector works both with mitigation and adaptation to climate change. A planned national strategy for the building of a green infrastructure will constitute a tool for a more detailed identification of ecosystem services, and for the management of landscape structure and function that will promote the continued delivery of ecosystem services. Maintenance of ecosystem services within the agricultural landscape is intimately linked to upholding a rich and varied agriculture that is conscious about run-off problems of fertilizers and agro-chemicals, practices of integrated pest management, etc., and that allows people to access extensively-managed farmland areas for leisure activities. As such, these aspects are being addressed through the economic incentives of the Rural Development Programme. No specific measures have been taken in respect to gender or other sociological aspects.
Target 15: By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.	Our ability to maintain and enhance resilience of the components of biodiversity is very much dependent on the achievement of other goals. Work is under way to restore disturbed inland waters, but progress is slow. To enable a sufficient quantity of ecologically sustainable and diverse habitats to be reinstated, both the financial and the legal frameworks for restoring rivers and streams need to be strengthened. Restoration plans for freshwater has been adopted in line with the Water Framework Directive. There is a need for more wetland restoration. Many damaged wetlands have a reduced capacity to deliver important ecosystem services, such as uptake of carbon dioxide, clean water, flood protection and biological production. Certain drained wetlands may even act as sources of carbon dioxide, thereby contributing to current climate change. Progress in establishing new wetlands is also slow, compared with the targets set. There is also a need for new or improved instruments to promote wetland restoration in forest areas. Restoration in forests is generally proceeding slowly. There are great needs of restoration in most forest landscapes. Restoration has to be carried out in a strategic and systematic way and the history of the landscape must be considered. Earlier assessments state that there is a long-term need for restoration of at least 500 000 hectares of forests with low nature values in order to re-establish ecological functionality. The calculated needed area for restoration should be seen as an absolute minimum figure that could need to be increased if the short- or long-term functionality shows not to be adequate.

Target 16: By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.	Sweden has signed the Nagoya Protocol. As a Member of the EU the rules of the Protocol will be in force as soon as the EU Regulation is agreed upon.
Strategic goal E. Enhance implementation through participatory planning, knowledge management and capacity-building	
Target 17: By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.	In March 2014 the Government adopted a bill laying down a strategy for biodiversity and ecosystem services until 2020. The strategy may later be updated based on ongoing analyses in the Cross-party committee on environmental quality objectives regarding, for example sustainable use of land areas and freshwater and marine issues. The main content of the bill is outlined in section 2.2.
Target 18: By 2020, the traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.	A national programme on local and traditional knowledge related to conservation and sustainable use of biological diversity (NAPTEK) was launched by the government in 2006 with the mission, in close collaboration with relevant stakeholders, to work with issues regarding the documentation, maintaining and spreading of local and traditional knowledge, as well as to initiate research. NAPTEK is currently preparing a national plan of action in order to reach the Aichi target 18. This work is aiming at identifying the specific tasks, responsibilities and obligations that different individual governmental agencies have when it comes to the full implementation of articles 8(j) and 10(c). During 2013 ten governmental agencies, including the Environmental Protection Agency, the Board of Agriculture, the Forest Agency, the National Heritage board, the Transport Administration, the Food Administration, and the Saami Parliament, are studied in depth, in close collaboration. A further 30 agencies are involved in different aspects of the national implementation in order to fully achieve the intended work and to reach the Aichi target 18. The Government has approved a new local administrative organization for the World Heritage Laponia, which means that management is handled by the NGO Laponiatjuottjudus where the Sapmi People have a large influence.
Target 19: By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.	In the evaluation of the generational goal and the environmental quality objectives a lack of knowledge is often expressed, for example regarding the impacts climate change will have on forests and other ecosystems, how ecosystem services are to be safe-guarded, and about the status of genetic variation in wild animals and plants. Research on the natural science of biodiversity is strong in Sweden, each year adding to a considerable wealth of knowledge. What is lacking to a high degree is research on the active management of biodiversity, especially within the social sciences and humanities. A large number of databases store information on biodiversity, such as the Species Gateway, held by the Swedish Species Information Centre. Focus now lies on the coordination and analysis of data combined from different databases. New tools for this are being developed, for example in the project Life Watch. A great challenge lies in the dissemination of knowledge to all agencies, companies and persons involved in the implementation of CBD. The new organisation Mistra Council for Evidence-based Environmental Management

	(EviEM) works for environmental management to be placed on a scientific foundation. Through systematic reviews of various environmental issues, EviEm aims to improve the basis for decisions in Swedish environmental policy.
Target 20: By 2020, at the latest, the mobilization of financial resources for effectively implementing the strategic plan for biodiversity 2011-2020 from all sources, and in accordance with the consolidated and agreed process in the strategy for resource mobilization, should increase substantially from the current levels. This target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.	Sweden will report on the implementation of the CBD Strategy for resource mobilization in accordande with Notification 2013-050 of the CBD Secretariat. Sweden has developed a clear policy for its international development cooperation that includes biodiversity issues. A wide range of cooperative programmes and projects constitute Sweden's contribution to this goal. Financial resources as well as technology and knowledge are routinely transferred to developing countries. Sweden is also gaining insights and knowledge from this cooperation. In March 2013 the Government adopted a new policy platform for the Swedish development cooperation. In the platform, one out of six targets deals with improved environment, reduced climate impact and strengthened resilience against environmental degradation, climate change and natural disasters. Under this target, sustainable management of ecosystems and sustainable use of ecosystem services is highligted among key actions.

3.2 Contribution to the relevant Millennium Development Goals

As previously stated in this report The Swedish Parliament has, as a part of the Swedish Policy for Global Development established as an overarching goal for Swedish development cooperation: "To contribute to an environment supportive of poor people's own efforts to improve their quality of life. Since Sida is the main responsible government body for implementing Policy for Global Development we have made the assumption that all Sida's development interventions support the fulfilment of the MDGs.

Below are comments on how Sida's biodiversity interventions contribute to the different MDGs and the relevant targets as requested in the Guidelines.

MDG 1 Eradicate extreme hunger and poverty:
The loss of biodiversity, resulting in a reduction of crop and livestock genetic diversity and the decreased availability of wild biological resources, threatens food security for the poor.

Sida's many initiatives described above are relevant and contribute to partner countries, to be able to better plan, produce and use biodiversity in the fight against hunger and poverty. Furthermore, Sida's support to multilateral organisations such as FAO have direct relation to MDG 1 and management of natural resources and biodiuversity, including disaster risk reduction.

Relevant target that Sida contributes to: "Target 2. Halve, between 1990 and 2015, the proportion of people who suffer from hunger"

MDG 2 Achieve universal primary education:
Many families in the developing world depend on biological resources, collected from their surrounding environment. A shortage of these resources increases the workload of families, including children, which makes it harder for them to attend school. Sida's biodiversity

initiatives might not directly contribute to the goal but they help providing an enabling environment for achieving universal primary education.

Relevant target that Sida contributes to: "Target 3. Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling"

MDG 3 Promote gender equality and empower women:
Biodiversity degradation reduces the availability of firewood, non-timber forest products and potable water, which makes the daily tasks of women and girls more time-consuming and difficult. Many of the poorest farmers are women often without recognised right to access to resources. Since women are responsible for the management of biodiversity resources in many contexts, they should be involved in all efforts to conserve biodiversity. It is a requirement for all biodiversity initiatives supported by Sida that gender issues (that is to consider the different roles of both women and men) are mainstreamed in order that the interventions shall be successful. Sida's biodiversity initiatives might not directly contribute to the goal but they help providing an enabling environment for achieving promotion of gender equality and empowerment of women.

Relevant targets that Sida contributes to: It is not possible to see how Sida's biodiversity interventions contribute clearly to the MDG3 ***targets*** *but the contribution to the overall goal is without doubt*

MDG 4 Reduce Child Mortality, MDG 5. Improve Maternal Health and MDG 6. Combat Major Diseases
The WHO has documented that human health is highly dependent on a healthy, well-functioning environment, which cannot exist without high biodiversity. Deforestation and ecosystem degradation are contributing to the rise of dengue fever, malaria, rabies and yellow fever in developing countries in subtropical and tropical regions.

Diseases (such as diarrhoea) tied to unclean water and inadequate sanitation and respiratory infections related to pollution are among the leading killers of children under five. Lack of fuel for boiling water also contributes to preventable waterborne diseases.

Inhaling polluted indoor air and carrying heavy loads of water and fuel wood hurt women's health and can make them less fit to bear children, with greater risks of complications during pregnancy. Lack of energy for illumination and refrigeration, as well as inadequate sanitation, undermine health care, especially in rural areas.

A general intensification in chemical usage and a growing population without sanitation infrastructure is leading to an increased burden on ecosystems, which in turn leads to increased polluting of water bodies, spread of disease and genetic damage to humans. Availability of safe drinking water, provided by ecosystem services, is directly related to health. A diverse agriculture lowers the risk that an entire harvest is lost, for instance during drought or pest invasions. It can also contribute to increased flexibility in labour input in the field and a more nutritious diet which improves health of, for example, AIDS-infected people and the elderly.

Up to 20% of the disease burden in developing countries may be due to environmental risk factors (as with malaria and parasitic infections. Preventative measures to reduce such

hazards are as important as treatment and often more cost-effective. New biodiversity-derived medicines hold promise for fighting major diseases.

It is thereby safe to say that all Sida's initiatives to protect biodiversity and sustain ecosystem services are crucial for fulfilling MDG 4, 5 and 6.

Relevant target that Sida contributes to: "Target 5. Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate" "6. Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio" "8.Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases"

MDG 7 Ensure environmental sustainability:
Biodiversity loss will directly affect the quality and quantity of ecosystem services provided, such as carbon sequestration, watershed protection, recycling of nutrients, control of erosion and pollination of crops and trees.

Relevant targets that Sida contributes to: In particular "Target 9. Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources"

MDG 8: Global partnership for development:
A stronger partnership between all stakeholders is necessary to achieve poverty alleviation and development, and the protection of biodiversity upon which both depend. As for MDG 2 there are no Sida biodiversity initiatives directly contributing to the goal but they help providing an enabling environment for a global partnership for development.

Relevant targets that Sida contributes to: In particular Target 12: Develop further an open, rule-based,, predictable, non-discriminatory trading and financial system Includes a commitment to good governance, development, and poverty reduction – both nationally and international (Aichi Target 3 Incentives reformed are of high relevance for this MDG Target).

Information concerning the reporting Party and preparation of the fifth national report

The preparation of the national report was coordinated by the Swedish Environmental Protection Agency (www.naturvardsverket.se) on behalf of the government.

The first draft of the report was compiled by the Swedish Biodiversity Centre (www.slu.se/en/collaborative-centres-and-projects/swedish-biodiversity-centre1), at the Swedish University of Agricultural Sciences, based on published literature, government bills and decisions, government agency reports, texts commissioned from The Swedish Species Information Centre (www.slu.se/sv/centrumbildningar-och-projekt/artdatabanken), and on text contributions from government agencies and non-governmental organisations.

All consulted published literature, bills, decisions and reports were produced after the previous national report to the CBD, and together reflect the assessments and reviews

regarding biological diversity performed between 2009 and 2013. The main focus of such sources is the Swedish national environmental goal system and its evaluations. A number of reports were also produced by the government as part of the ongoing OECD Environmental performance review.

The agencies and organisations consulted for the draft report were the Swedish Board of Agriculture (www.sjv.se), the Swedish Forest Agency (www.skogsstyrelsen.se), The Swedish Agency for Marine and Water Management (www.havochvatten.se), the National Board of Housing, Building and Planning (www.boverket.se), the Resilience and Development programme (ResDev, formerly known as Swedbio, www.stockholmresilience.org/21/research/research-programmes/resdev-programme.html) at the Stockholm Resilience Centre, Naptek (A national programme on local and traditional knowledge concerning the conservation and sustainable use of biological diversity, www.naptek.se/eng.php) at the Swedish University of Agricultural Sciences, Svenska Jägareförbundet (a hunters' association, http://jagareforbundet.se), the Federation of Swedish Farmers (www.lrf.se/In-English), the Swedish Association of Local Authorities and Regions (http://english.skl.se), the Sami Parliament (www.sametinget.se/english), Svenska Samernas Riksförbundet (a Swedish sami association, www.sapmi.se), the Nature Conservation Society (www.naturskyddsforeningen.se), and WWF Sweden (www.wwf.se/header/english/1129071-about-wwf). Among the 13 approached agencies and organisations, only 7 contributed texts.

Appendix I. Further sources of information

1	Regeringen 2009. Fourth national report to the Convention on biological diversity. Sweden.
2	Naturvårdsverket 2013. Miljömålen. Årlig uppföljning av Sveriges miljökvalitetsmål och etappmål 2013. Rapport 6557.
3	Regeringen 2013. OECD Environmental performance reviews: Sweden. Questionnaire. Part 3. Actions taken to implement the 2004 OECD Environmental performance review: recommendations and results achieved.
4	Regeringen 2013. OECD Environmental performance reviews: Sweden. Questionnaire.
5	Regeringen 2013. OECD Environmental performance reviews: Sweden. Questionnaire. Part 2. Section 5. EPR of Sweden. Marine ecosystem services. Background report.
6	Miljömålsberedningen 2011. Etappmål i miljömålssystemet. Delbetänkande av Miljömålsberedningen. SOU 2011:34.
7	Havsmiljöinstitutet 2012. Havet 2012. Om miljötillståndet i svenska havsområden.
8	Havs- och vattenmyndigheten 2012. God havsmiljö 2020. Marin strategi för Nordsjön och Östersjön. Del 1: Inledande bedömning av miljötillstånd och socioekonomisk analys. Havs- och vattenmyndighetens rapport 2012:19.
9	Havs- och vattenmyndigheten 2012. God havsmiljö 2020. Marin strategi för Nordsjön och Östersjön. Del 2: God miljöstatus och miljökvalitetsnormer. Havs- och vattenmyndighetens rapport 2012:20.
10	Regeringen 2010. Svenska miljömål – för ett effektivare miljöarbete. Proposition 2009/10:155.
11	Regeringen 2012. Preciseringar av miljökvalitetsmålen och etappmål i miljömålssystemet. Regeringsbeslut I:4. M2012/1171/Ma.
12	Regeringen 2013. Etappmål för farliga ämnen. Regeringsbeslut I:8. M2013/1740/Ke.
13	Naturvårdsverket 2012. Styrmedel för att nå miljökvalitetsmålen. En kartläggning. Rapport 6415.
14	RUS 2012. Hur går miljöarbetet regionalt och lokalt? Delprojekt i fördjupad utvärdering av Sveriges miljömål 2012. Rapporter från Länsstyrelsen i Dalarnas län 2012-06.
15	Naturvårdsverket 2012. Miljömålen – fokus på förutsättningarna. Årlig uppföljning av miljökvalitetsmålen 2012. Dnr NV-08927-11.
16	Cross-party committee on environmental objectives 2012. Reducing the risks of hazardous substances. A Swedish strategy for a non-toxic environment. Interim report by the Cross-party committee on environmental objectives SOU 2012:38.
17	Miljömålsberedningen 2013. Långsiktigt hållbar markanvändning. Del 1. Delbetänkande av Miljömålsberedningen. SOU 2013:43.
18	Regeringen 2013. Uppdrag om framtagande av förslag till handlingsplan för grön infrastruktur på regional nivå. Regeringsbeslut I:1. M2013/1086/Nm.
19	Regeringen 2012. Submission of information from Sweden, in response to the invitation of the 4th meeting of the working group on the review of implementation of the Convention on biological diversity to provide information on the review and update of the National biodiversity strategy and Action plan.
20	Miljömålsberedningen 2013. Nedladdat material från http://www.sou.gov.se/sb/d/17400, 2013-10-18.
21	Havs- och vattenmyndigheten 2013. Sötvatten 2013. Om miljötillståndet i Sveriges sjöar och vattendrag.
22	Larsson, A., Bjelke, U., Dahlberg, A. & Sandström, J. 2011. Tillståndet i skogen – rödlistade arter i ett nordiskt perspektiv. ArtDatabanken Rapporterar 9. ArtDatabanken SLU, Uppsala.
23	Naturvårdsverket 2011. Miljömålen på ny grund. Naturvårdsverkets utökade årliga redovisning av miljökvalitetsmålen 2011. Reviderad version av rapport 6420. Rapport 6433.
24	Regeringen 2012. Kronologi 2004-2012.
25	Regeringen 2009. En sammanhållen svensk havspolitik. Proposition 2008/09:170.
26	Regeringen 2009. En sammanhållen klimat- och energipolitik. Klimat. Proposition 2008/09:162.
27	Regeringen 2009. Hållbart skydd av naturområden. Proposition 2008/09:214.
28	Naturvårdsverket 2012. Steg på vägen. Fördjupad utvärdering av miljömålen 2012. Rapport 6500.
29	Naturvårdsverket 2012. Skog & mark 2012. Om tillståndet i svensk landmiljö.
30	Naturvårdsverket 2012. Sammanställd information om ekosystemtjänster. Skrivelse 2012-10-

	31. Ärendenummer NV-00841-12.
31	SOU 2013. Synliggöra värdet av ekosystemtjänster. Åtgärder för välfärd genom biologisk mångfald och ekosystemtjänster. Betänkande av utredningen Synliggöra värdet av ekosystemtjänster. SOU 2013:68.
32	Naturvårdsverket 2013. Grön infrastruktur. Redovisning av regeringsuppdrag. NV-03367-13.
33	SFS 2010. Havsmiljöförordning. SFS 2010:1341.
34	Miljömålsberedningen 2010. Handlingsplan för att utveckla strategier i miljömålssystemet. Delbetänkande av Miljömålsberedningen. SOU 2010:101.
35	Regeringen 2012. Tilläggsdirektiv till Miljömålsberedningen (M 2010:04) – strategi för en sammanhållen och hållbar vattenpolitik. Kommittédirektiv Dir. 2012:95.
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38	Regeringen 2009. Ny förordning ställer krav på miljöledningssystem i Sveriges alla myndigheter. Nedladdat material från http://www.regeringen.se/sb/d/119/a/129865, 2013-10-23.
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41	Nilsson, T. 2013. Utkast till remissyttrande för Länsstyrelsen på strategin om hållbar markanvändning.
42	UNGA 2000. United Nations Millenium Declaration. Resolution adopted by the General Assembly. A/RES/55/2.
43	CBD 2010. The Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets. Decision X/2.
44	CBD 2012. Monitoring progress in implementation of the Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets. Decision XI/3.
45	UNEP 2013. The Millennium Development Goals Report.
46	Ebenhard, T. 2013. Nyckelindikatorer för miljökvalitetsmålet Ett rikt växt- och djurliv. Rapport. Centrum för biologisk mångfald.
47	Naturvårdsverket 2011. Förslag till plan för att skapa och behålla en grön infrastruktur. Redovisning av ett regeringsuppdrag. NV4042-10.
48	Naturvårdsverket 2013. Förslag till hur en handlingsplan för grön infrastruktur kan tas fram på regional nivå. NV-03367-13.
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50	Regeringen 2013. OECD Environmental performance reviews: Sweden. Questionnaire. Annex 4. Mainstreaming environmental policy.
51	Regeringen 2013. OECD Environmental performance reviews: Sweden. Questionnaire. Annex 5. Summaries of in depth evaluations regarding Environmental Quality Objectives 2012.
52	Regeringen 2013. OECD Environmental performance reviews: Sweden. Questionnaire. Annex 6. Structure and organisation of the environmental objectives system.
53	Regeringen 2013. OECD Environmental performance reviews: Sweden. Questionnaire. Annex 7. More effective environmental efforts with new environmental objectives system.
54	Regeringen 2013. OECD Environmental performance reviews: Sweden. Questionnaire. Annex 8. The Swedish environmental objectives system. Information sheet from the Ministry of the Environment.
55	Regeringen 2013. OECD Environmental performance reviews: Sweden. Questionnaire. Annex 9. Specifications and milestone targets for the environmental quality objectives.
56	Naturvårdsverket 2012. Sweden's environmental objectives – an introduction.
57	Boverket 2013. Miljökvalitetsmålen i kommunernas översiktsplanering. Rapport.
58	Länsstyrelsen Dalarna 2013. Dalarnas miljömål. Remissversion.
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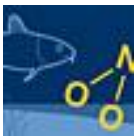
Supplementary material 1

Zero Eutrophication



Eutrophication - nutrient over-enrichment - affects not only lakes, rivers and seas, but also soils. It is a problem above all in the south of Sweden, but there are indications that mountain areas are also affected. Eutrophication causes gradual changes in vegetation, as species adapted to nutrient-poor conditions are displaced. In the Baltic in particular, eutrophication is one of the most serious threats to the marine environment. In both sea areas and lakes, symptoms include plant overgrowth and algal blooms. In the worst cases, oxygen depletion occurs on the sea or lake bed, killing plants and animals. If blooms are formed by toxin-producing algae, both human and animal health can be threatened. Eutrophication is caused by excessive levels of nitrogen and phosphorus in soil or water. These nutrients can enter the environment via atmospheric emissions, for example of nitrogen oxides from road traffic, shipping and power stations. Other sources of eutrophication are leaching from agriculture and discharges from sewage treatment plants and factories.

Environmental quality objective 7: *Zero Eutrophication*
Nutrient levels in soil and water must not be such that they adversely affect human health, the conditions for biological diversity or the possibility of varied use of land and water.

The environmental quality objective ***Zero Eutrophication*** is specified to mean that the aim is to ensure that:
- Swedish and total inputs of nitrogen and phosphorous compounds into the seas surrounding Sweden are less than the maximum loads established within the framework of international agreements,
- atmospheric deposition and land use do not result in ecosystems showing any substantial long-term harmful effects of eutrophying substances in any part of Sweden,
- lakes, watercourses, coastal waters and groundwater achieve at least good status for nutrients in accordance with the Water Quality Management Ordinance (2004:660), and
- sea areas achieve at least good environmental status as regards eutrophication in accordance with the Marine Environment Ordinance (2010:1341).

Flourishing Lakes and Streams

Lakes and watercourses are under pressure from many quarters, including forestry, agriculture, industry and hydroelectric power. Many plant and animal species are dependent on free-flowing rivers and streams, and naturally fluctuating water levels. This may conflict with our wish to build houses near lake shores and riverbanks, or our need to regulate river flow to generate electricity. Preserving the natural productive capacity of aquatic environments is also important. Rivers are used for example for fishing and provide drinking water. Fresh waters are important for recreation too, for instance for bathing and boating. In their vicinity, moreover, there is valuable cultural heritage that needs to be conserved and managed so that it can be enjoyed by generations to come.

Environmental quality objective 8: *Flourishing Lakes and Streams*
Lakes and watercourses must be ecologically sustainable and their variety of habitats must be preserved. Natural productive capacity, biological diversity, cultural heritage assets and the ecological and water-conserving function of the landscape must be preserved, at the same time as recreational assets are safeguarded.

The environmental quality objective ***Flourishing Lakes and Streams*** is specified to mean that the aim is to ensure that:
- lakes and watercourses achieve at least good ecological status or potential and good chemical status in accordance with the Water Quality Management Ordinance (2004:660),
- unexploited and essentially undisturbed watercourses retain natural water flows and water levels,
- surface water supplies that are used for the production of drinking water are of good quality,
- important ecosystem services of lakes and watercourses are preserved,

- lakes and watercourses have structures and water flows that facilitate habitats and dispersal pathways for wild plant and animal species as a part of a green infrastructure,
- habitats and naturally occurring species associated with lakes and watercourses have a favourable conservation status and sufficient genetic variation within and between populations,
- threatened species have recovered and habitats have been restored in valuable lakes and watercourses,
- alien species and genotypes do not threaten biodiversity,
- genetically modified organisms that can threaten biodiversity are not introduced,
- the natural and cultural heritage values of lakes and watercourses are preserved and the conditions for continued preservation and development of these values are in place, and
- the value of shore and bank environments, lakes and watercourses for recreational fishing, bathing, boating and other outdoor activities is safeguarded and maintained, and the impact of noise is minimised.

Good-Quality Groundwater

Groundwater is important as drinking water for humans, and also affects the habitats of plants and animals in surface waters. Emissions of environmentally hazardous substances can contaminate this water resource - pesticides are one example, particularly in agricultural areas of southern Sweden. Sodium chloride (common salt) from roads salted in winter has also found its way into groundwater. As well as affecting the quality of the water, this causes corrosion of water mains. Water moves in a continuous cycle. It evaporates as water vapour from lakes and seas, and falls to the earth's surface as rain and snow. Some of it seeps down through soil and rock to form groundwater, which in turn, after a certain residence time in the ground - determined by local conditions - discharges into lakes, watercourses and seas.

Environmental quality objective9: *Good-Quality Groundwater*
Groundwater must provide a safe and sustainable supply of drinking water and contribute to viable habitats for flora and fauna in lakes and watercourses.

The environmental quality objective ***Good-Quality Groundwater*** is specified to mean that the aim is to ensure that:

- the quality of groundwater is such that, with few exceptions, it does not limit the use of groundwater for public or private supply of drinking water,
- bodies of groundwater covered by the Water Quality Management Ordinance (2004:660) have good chemical status,
- discharging groundwater is of such quality that it contributes to good habitats for plants and animals in springs, lakes, wetlands, watercourses and seas,
- bodies of groundwater covered by the Water Quality Management Ordinance (2004:660) have good quantitative status,
- groundwater levels are such that there is no negative impact on water supply, ground stability or animal and plant life in nearby ecosystems, and
- natural gravel deposits that are of major importance to the supply of drinking water, energy storage and the natural and cultural heritage continue to be preserved.

A Balanced Marine Environment, Flourishing Coastal Areas and Archipelagos

The marine environment is affected by fishing, the spread of toxic pollutants, and emissions of nutrients that end up in the sea and cause eutrophication. Alien species, for example from ships' ballast water or fish farms, can also become established there. All these things disturb biodiversity and important habitats, affecting marine production of food and other key resources. Seas, coasts and archipelagos offer a wide range of opportunities for recreation and a rich cultural heritage, values that can also be adversely affected by human activities. Archipelago and coastal environments come under pressure, for instance, from heavy development, settlements, shipping and boating. Cultural heritage, in the form of lighthouses, boathouses, meadows and pastures, is harder to conserve in areas affected by depopulation, while there is a risk of it suffering damage where

there are concentrations of second homes and large-scale tourism. Growing settlements and traffic also reduce recreational access.

Environmental quality objective 10: ***A Balanced Marine Environment, Flourishing Coastal Areas and Archipelagos***
The North Sea and the Baltic Sea must have a sustainable productive capacity, and biological diversity must be preserved. Coasts and archipelagos must be characterised by a high degree of biological diversity and a wealth of recreational, natural and cultural assets. Industry, recreation and other utilisation of the seas, coasts and archipelagos must be compatible with the promotion of sustainable development. Particularly valuable areas must be protected against encroachment and other disturbance.

The environmental quality objective ***A Balanced Marine Environment, Flourishing Coastal Areas and Archipelagos*** is specified to mean that the aim is to ensure that:
- coastal and sea waters achieve good environmental status as regards physical, chemical and biological conditions in accordance with the Marine Environment Ordinance (2010:1341),
- coastal waters achieve at least good ecological status or potential and good chemical status in accordance with the Water Quality Management Ordinance (2004:660),
- important ecosystem services of coasts and seas are preserved,
- shallow coastal areas are characterised by a rich biodiversity and natural recruitment of fish, and offer habitats and dispersal pathways for plant and animal species as a part of a green infrastructure,
- habitats and naturally occurring species associated with coasts and seas have a favourable conservation status and sufficient genetic variation within and between populations, and populations of naturally occurring fish species and other marine species remain viable,
- threatened species have recovered and habitats have been restored in valuable coastal and sea waters,
- alien species and genotypes do not threaten biodiversity and cultural heritage,
- genetically modified organisms that can threaten biodiversity are not introduced,
- the natural and cultural heritage values of sea, coastal and archipelago landscapes are preserved and the conditions for continued preservation and development of these values are in place,
- the status of cultural heritage remains under water is unchanged, and
- the value of sea, coastal and archipelago landscapes for recreational fishing, bathing, boating and other outdoor activities is safeguarded and maintained, and the impact of noise is minimised.

Thriving Wetlands

A large number of plants and animals are dependent on wetlands. Many threatened or near-threatened species are associated with these habitats. One reason for this is that around a quarter of Sweden's wetland area has been drained and lost since the early 19th century. Other wetlands are becoming overgrown as a result of drainage. In addition, a range of species face more difficult conditions when habitats they depend on are modified by nitrogen deposition, establishment of alien species, or because they are no longer mown or grazed. Many types of wetlands will also be adversely affected by climate change. What is more, damaged wetlands have a reduced capacity to provide important ecosystem services, such as uptake and storage of carbon, clean water, flood protection and biological production. Many wetlands also have archaeological remains that may suffer damage when sites are restored or cut for fuel peat.

Environmental quality objective 11: ***Thriving Wetlands***
The ecological and water-conserving function of wetlands in the landscape must be maintained and valuable wetlands preserved for the future.

The environmental quality objective ***Thriving Wetlands*** is specified to mean that the aim is to ensure that:
- wetlands of all types are represented throughout the country within their natural range,
- important ecosystem services of wetlands, such as biological production, carbon storage, water conservation, water purification and buffering of water flows, are preserved,
- wetlands are re-established, particularly where activities such as drainage and peat production have resulted in losses and fragmentation of wetlands, and species associated with wetlands have the opportunity to spread to new sites within their natural range,

- habitats and naturally occurring species associated with wetlands have a favourable conservation status and sufficient genetic variation within and between populations,
- threatened wetland species have recovered and habitats have been restored,
- alien species and genotypes do not threaten biodiversity,
- genetically modified organisms that can threaten biodiversity are not introduced,
- the natural and cultural heritage values of wetlands in a landscape perspective are preserved and the conditions for continued preservation and development of these values are in place, and
- the value of wetlands for outdoor recreation is safeguarded and maintained, and the impact of noise is minimised.

Sustainable Forests

Forests cover over half the area of Sweden. The majority of them are coniferous, but in the south there are extensive broadleaved woodlands. The appearance and dominant tree species of these forests are a product of the country's climate and history. Forests offer unique habitats for a variety of animal and plant species. They are also an important source of renewable raw materials and of value for outdoor recreation. The state of the forest environment is affected partly by the intensity of forestry and the methods used, and partly by the cessation or decline of management regimes such as forest grazing, as well as of forest fires and other natural disturbances. Owing to these trends, certain types of forests are contracting, along with the unique habitats they contain. Climate change and deposition of air pollutants are also having adverse effects.

Environmental quality objective 12: *Sustainable Forests*
The value of forests and forest land for biological production must be protected, at the same time as biological diversity and cultural heritage and recreational assets are safeguarded.

The environmental quality objective ***Sustainable Forests*** is specified to mean that the aim is to ensure that:
- the physical, chemical, hydrological and biological qualities and processes of forest land are maintained,
- ecosystem services of forests are preserved,
- the biodiversity of forests is preserved in all natural geographical regions and species have the opportunity to spread within their natural range as a part of a green infrastructure,
- habitats and naturally occurring species associated with forest areas have a favourable conservation status and sufficient genetic variation within and between populations,
- threatened species have recovered and habitats have been restored in valuable forests,
- alien species and genotypes do not threaten the biodiversity of forests,
- genetically modified organisms that can threaten biodiversity are not introduced,
- the natural and cultural heritage values of forests are preserved and the conditions for continued preservation and development of these values are in place, and
- the value of forests for outdoor recreation is safeguarded and maintained.

A Varied Agricultural Landscape

The natural values of today's agricultural landscape are a product of thousands of years of human use. Many of Sweden's plant and animal species are to be found in hay meadows and pastures, field margins and roadside verges, mid-field patches of rocky ground, wetlands and other small-scale habitats. Many of these environments, along with old farm buildings, are also of cultural heritage interest, providing a picture of how our ancestors lived and worked the landscape. The biodiversity and cultural environments of farming areas are dependent on agriculture being maintained, but also on the methods it employs. Grazing livestock, for example, are crucial to preserving species-rich pastures. In some parts of Sweden, agriculture has become increasingly specialised and intensive, while in others land is no longer being cultivated and many farms are being abandoned. Both trends pose a threat to many farmland species and habitats.

Environmental quality objective 13: *A Varied Agricultural Landscape*

The value of the farmed landscape and agricultural land for biological production and food production must be protected, at the same time as biological diversity and cultural heritage assets are preserved and strengthened.

The environmental quality objective ***A Varied Agricultural Landscape*** is specified to mean that the aim is to ensure that:

- the physical, chemical, hydrological and biological qualities and processes of arable land are maintained,
- concentrations of pollutants are so low in agricultural soils that ecosystem functions, biodiversity and human health are not threatened,
- important ecosystem services of the agricultural landscape are preserved,
- the agricultural landscape is open and richly varied with significant elements of managed semi-natural pastures and hay meadows, small-scale habitats and water environments, including as part of a green infrastructure that offers habitats and dispersal pathways for wild plant and animal species,
- habitats and species associated with the agricultural landscape have a favourable conservation status and sufficient genetic variation within and between populations,
- local breeds of domestic animals and the genetic resources of cultivated crops are sustainably preserved,
- threatened species and natural environments have recovered,
- alien species and genotypes do not threaten biodiversity,
- genetically modified organisms that can threaten biodiversity are not introduced,
- biological and cultural heritage values of the agricultural landscape that have emerged through long-term, traditional management are preserved or improved,
- cultural and built environments in the agricultural landscape are preserved and the conditions for continued preservation and development of their values are in place, and
- the value of the agricultural landscape for outdoor recreation is safeguarded and maintained, and accessible to the public.

A Magnificent Mountain Landscape

Sweden's mountain areas, with their distinctive natural environments, are sensitive. At the same time, a wide range of stakeholders wish to make use of them. In southern parts of the mountain range in particular, soil and vegetation may be damaged, for example, by visitors and by off-road driving on ground unprotected by snow, and also by development for wind energy, hydropower, mining and other activities. Large parts of the mountain region are protected so as to preserve their natural and cultural values, but there are still important areas lacking protection from future development. Valuable environments and rich recreational opportunities could be encroached upon by growing numbers of wind farms and increased exploration and extraction of valuable minerals. In addition, more and more snowmobiles are being used in mountain counties, affecting the quality of the environment above all by their unwanted noise.

Environmental quality objective 14: *A Magnificent Mountain Landscape*
The pristine character of the mountain environment must be largely preserved, in terms of biological diversity, recreational value, and natural and cultural assets. Activities in mountain areas must respect these values and assets, with a view to promoting sustainable development. Particularly valuable areas must be protected from encroachment and other disturbance.

The environmental quality objective ***A Magnificent Mountain Landscape*** is specified to mean that the aim is to ensure that:

- the value of mountain areas for reindeer husbandry is preserved and their distinctiveness, with magnificent landscapes characterised by grazing and extensive, continuous areas, is maintained,
- important ecosystem services of mountain landscapes are preserved,
- habitats and naturally occurring species associated with mountain landscapes have a favourable conservation status and sufficient genetic variation within and between populations,
- threatened species have recovered and habitats have been restored in valuable mountain landscapes,
- alien species and genotypes do not threaten biodiversity,
- genetically modified organisms that can threaten biodiversity are not introduced,
- mountain areas with high natural and cultural heritage values are preserved and the conditions for continued preservation and development of these values are in place, and

- the value of mountain landscapes for outdoor recreation is safeguarded and maintained, and the impact of noise is minimised.

A Rich Diversity of Plant and Animal Life

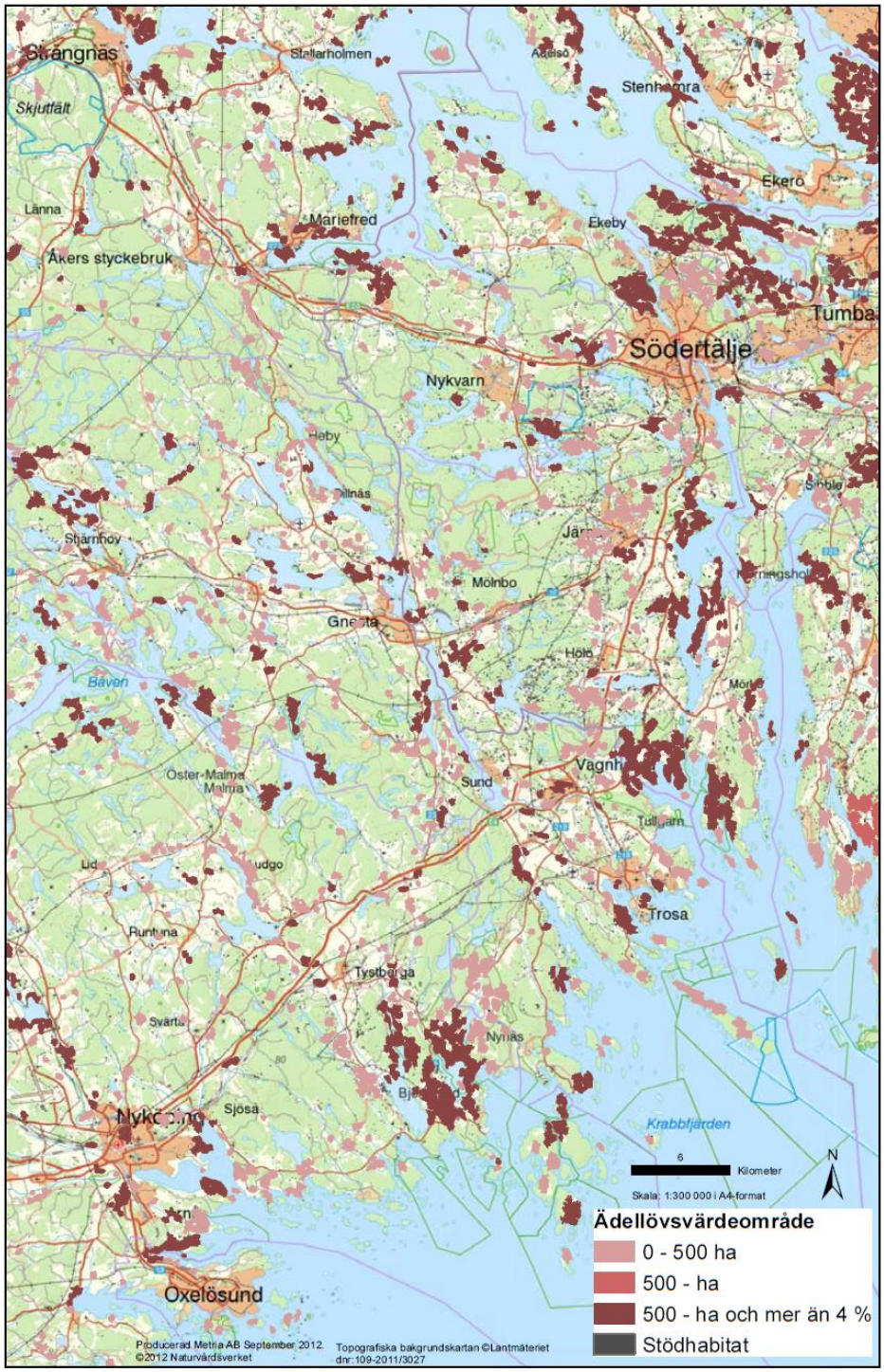
Sweden has a great diversity of plants and animals, inhabiting a mosaic of different environments, from arable land, forests and mountains to wetlands, streams, rivers, lakes and seas. Many species and habitats show negative trends and are in danger of disappearing in the long term. One reason is that traditional methods of farming and forestry, which once benefited many species, are now rarely used. Heavy nutrient loads and commercial fisheries are adversely affecting several marine environments. Preserving biodiversity is crucial if ecosystems are to function and provide benefits such as purifying water and air, storing carbon and pollinating our crops. Without a diversity of species with different functions, there is a considerable risk that use of natural resources, climate change and other pressures could damage the capacity of ecosystems to deliver these services. Biodiversity also promotes public health, as many natural and cultural environments are important sites for outdoor recreation.

Environmental quality objective 16: *A Rich Diversity of Plant and Animal Life*
Biological diversity must be preserved and used sustainably for the benefit of present and future generations. Species, habitats and ecosystems and their functions and processes must be safeguarded. Species must be able to survive in long-term viable populations with sufficient genetic variation. Finally, people must have access to a good natural and cultural environment rich in biological diversity, as a basis for health, quality of life and well-being.

The environmental quality objective ***A Rich Diversity of Plant and Animal Life*** is specified to mean that the aim is to ensure that:

- habitats and species that occur naturally in Sweden have a favourable conservation status and the status of threatened species has improved, and sufficient genetic variation is maintained within and between populations,
- the increased risk of extinction indicated by climate scenarios is reduced regarding species and habitats facing the greatest risk of being affected adversely by climate change,
- ecosystems have the ability to cope with disturbances and adapt to change, such as a changed climate, so that they can continue to provide ecosystem services and contribute to combating climate change and its effects,
- a functioning green infrastructure is in place and is maintained through a combination of protection, restoration and sustainable use within sectors, so that fragmentation of populations and habitats does not occur and the biodiversity of the landscape is preserved,
- genetically modified organisms that can threaten biodiversity are not introduced,
- alien species and genotypes do not threaten biodiversity,
- the biological cultural heritage is managed so that important natural and cultural values are preserved and the conditions for continued preservation and development of these values are in place, and
- natural environments near urban areas that are valuable for outdoor recreation, cultural heritage and biodiversity are safeguarded and maintained, and are accessible to the public.

Supplementary material 2

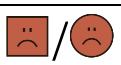


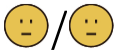
An assessment of existing core areas for natural habitats, in this case valuable broad-leaved forests, that can form the basis of a planned green infrastructure, as expressed in a regional action plan.

Supplementary material 3

Final evaluation of interim targets performed in 2011.
Success in achieving each target is indicated as follows: = the target is very hard to reach on time even with new action taken, = the target is possible to reach on time but only with new action taken, = the target is possible to reach on time given that already decided action is implemented, = the target year has passed and the target was not reached, = the target year has passed and the target was reached. The type of target is classified as expressing action to be taken or status to achieve. The final column indicates whether action has been taken to reach the target: A = action has been taken, but not sufficiently to reach the target, B = action has been taken, but improvement in status takes long time due to natural processes, C = action has been taken nationally, but action in other countries is also needed.

Interim target	Target year	Evaluation in 2011	Type of target	Action taken
Greenhouse gas emissions	2012		Action	Yes
Acidification of lakes and streams	2010		Status	Yes
Acidification of forest soils	2010		Status	Yes – B
Knowledge about the environmental and health properties of chemical substances	2010/2020	/	Action	Yes – AC
Information about hazardous substances in goods and articles	2010		Action	Yes – AC
Phasing out of hazardous substances	2007/2010	/	Action	Yes – AC
Decreasing environmental and health risks due to chemicals	2010		Action	Yes – AC
Determination of safe concentration levels of chemical substances	2010		Action	Yes
Treatment of heavily polluted areas that pose acute risks	2010		Action	Yes
Treatment of all prioritized heavily polluted areas	2010/2050	/	Action	Yes – A
Dioxins in human food	2010		Action	Yes – BC
Human exposure to cadmium	2015		Status	Yes – B
Discharge of phosphorus in water	2010		Action	Yes – A
Discharge of nitrogen in water	2010		Action	Yes – A
Emissions of ammonia	2010		Action	Yes
Nitrogen oxide emissions in air (objective 7)	2010		Action	Yes
Protection of natural and cultural inland water environments	2005/2010	/	Action	Yes – A
Restoration of rivers and streams	2005/2010	/	Action	Yes – A
Water supply plans	2009		Action	Yes – A
Intentional releases of alien animals and plants in inland water environments	2005		Action	Yes
Action programmes for threatened species of inland water adopted and implementation started	2005		Action	Yes
Protection of groundwater supply areas	2010		Action	Yes – A
Groundwater table	2010		Action	Yes – A

Pure drinking water	2010		Action	Yes – AB
Extraction of natural gravel	2010		Action	Yes – A
Protection of marine and coastal environments	2005/2015		Action	Yes – A
Strategy for cultural heritage and agricultural landscapes in marine and coastal environments	2005		Action	Yes
Action programmes for threatened marine species adopted and implementation started	2005		Action	Yes – AC
Bycatches	2010		Action	Yes – A
Catches and recruitment of fish	2008		Action	Yes – AC
Noise and other disturbances in marine and coastal environments	2010		Action	Yes
Discharges of oil and chemicals	2010		Action	Yes
Strategy for wetland protection and management	2005		Action	Yes
Mire protection plan implemented	2010		Action	Yes – A
Hydrological effect of forest roads	2006		Action	Yes – A
Wetlands on agricultural land	2010		Action	Yes – A
Action programmes for threatened species in wetlands adopted and implementation started	2005		Action	Yes
Long-term protection of forest land	2010		Action	Yes
Enhanced biological diversity	2010		Action	Yes
Cultural heritage values of forests protected	2010		Action	Yes – A
Action programmes for threatened species in forests adopted and implementation started	2005		Action	Yes
Meadow and pasture land	2010		Action	Yes – A
Small-scale habitats	2005/continuous		Action	Yes – A
Cultural heritage values of the agricultural landscape	2010		Action	Yes – A
Plant genetic resources and indigenous breeds	2010		Action	Yes – A
Action programmes for threatened species in the agricultural landscape adopted and implementation started	2006		Action	Yes
Cultural heritage buildings in the agricultural landscape	2005		Action	Yes
Damage to soil and vegetation in the high mountains	2010		Action	Yes – A
Ambient noise in the high mountains	2010/2015		Action	Yes – A
Natural and cultural assets in the high mountains	2010		Action	Yes – A
Action programmes for threatened species in the high mountains adopted and implementation started	2005		Action	Yes
Programmes and strategies for planning	2010		Action	Yes – A
Cultural heritage buildings in urban environments	2010		Action	Yes – A

Household waste	2005/2010/2015		Action	Yes – A
Energy consumption in buildings	2020/2050		Action	Yes – A
Halting the loss of biodiversity	2010		Status	Yes – A
Fewer species under threat	2015		Status	Yes – A
Sustainable use	2007/2010		Action	Yes – A

Supplementary material 4

Existing national and regional indicators for monitoring of the environmental quality objectives

1. Abundance of domestic reindeer in the mountain region
2. Abundance of wolverine in the high mountains
3. Acidification of forested land
4. Acidification of lakes
5. Air pollution and number of allergic or asthmatic persons
6. Allergenic chemical compounds
7. Ambient noise in the high mountains
8. Ambient radiation level
9. Ammonia emissions
10. Amount of hard dead wood in forests
11. Amount of road salt used
12. Antiquarian competence
13. Area of arable land
14. Area of arable land under organic production
15. Area of mown meadows supported by agri-environmental payments
16. Area of old growth forest
17. Area of mainly broad-leaved deciduous oldgrowth forest
18. Area of semi-natural pasture supported by agri-environmental payments
19. Benzene in the atmosphere
20. Breeding bird index
21. Breeding bird index: Agricultural landscapes
22. Breeding bird index: Climate change effects
23. Breeding bird index: Forests
24. Breeding bird index: High mountains
25. Breeding bird index: Inland waters
26. Breeding bird index: Wetlands
27. Car usage per person
28. Cesium-137 in milk
29. Chemical plant protection products in inland waters
30. Chloride in groundwater
31. Chlorofluorocarbon emissions
32. Corrosion of archaeological artefacts in soil
33. Culturally significant landscape elements on arable land
34. Discharge of nitrogen from rivers to coastal waters
35. Discharge of phosphorus from rivers to coastal waters
36. Discomfort caused by ambient indoor conditions
37. Discomfort caused by car exhaust emissions
38. Discomfort caused by domestic wood combustion smoke
39. Discomfort caused by traffic noise
40. Emissions of particles in the atmosphere PM2,5
41. Emissions of volatile organic compounds
42. Energy consumption per person
43. Exploitation in the high mountains

44. Exposure to ambient tobacco smoke
45. Extraction of natural gravel
46. Extraction of natural gravel in groundwater supply areas
47. Greenhouse gas emissions
48. Ground level ozone
49. Household waste
50. Human exposure to UV radiation
51. Length of lake ice cover season
52. Limited nutrient leaching – buffer zones
53. Limited nutrient leaching – catch crops
54. Marine oil spills
55. Mileage in public transport
56. Nitrogen dioxide in the atmosphere
57. Nitrogen oxide emissions
58. Number of archaeological sites damaged due to forestry activities
59. Number of building projects on the sea shore
60. Number of building projects on the shore of inland waters
61. Number of cases of skin cancer – malignant melanoma
62. Number of cases of skin cancer – other forms
63. Number of certified well drillers
64. Number of chemical products available on the market
65. Number of classified heritage buildings
66. Number of environmentally certified organisations/companies
67. Number of fishing vessels
68. Number of municipalities that use demolition prohibition to protect heritage buildings
69. Number of municipalities with energy plans
70. Number of municipalities with green infrastructure plans
71. Number of municipalities with plans for environmentally friendly transports
72. Number of municipalities with plans for the cultural environment
73. Number of passengers in public transport
74. Number of professional fishery licenses
75. Number of protected groundwater supply areas
76. Number of protected heritage buildings
77. Number of snowmobiles that meet noise criteria
78. Organic animal production
79. Organic compounds in human breast milk
80. Particles in the atmosphere PM10
81. Phosphorus in inland water
82. Phosphorus in sea water
83. Deposition of nitrogen
84. Deposition of sulphur
85. Production of electricity by wind power
86. Production of organic milk
87. Products consisting of hazardous chemical compounds
88. Proportion of homes with damp or mould problems
89. Proportion of rune stones with legible runes
90. Proportion of the human population with nickel allergy
91. Proportion of the population disturbed by traffic noise during night
92. Protected high mountain areas
93. Protected inland waters
94. Protected wetlands
95. Protection of forests – habitat protection areas
96. Protection of forests – nature conservation agreements
97. Protection of forests – nature reserves
98. Radon in apartment blocks
99. Radon in drinking water
100. Radon in schools
101. Radon in small buildings
102. Recycling - glass
103. Recycling - metal

104. Recycling – paper packages
105. Recycling - plastic
106. Reproduction in the arctic fox
107. Restored wetlands
108. Streams with reproduction of the freshwater pearl mussel
109. Substances in goods, that are carcinogenic, mutagenic, or toxic to reproduction
110. Sulphur dioxide emissions
111. Sulphur dioxide in the atmosphere
112. Treatment of heavily polluted areas
113. Trend in chemical plant protection products risk index
114. UV radiation at ground level
115. Wetland conservation status