



Biodiversity
ESSENTIAL TO LIFE

Saving Nature for People

National action plan for the conservation and
sustainable use of biodiversity
in Finland 2013–2020

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Finland 2013–2020



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Saving nature for people

The national action plan for the conservation and sustainable use of biodiversity 2013-2020

Introduction

In line with the programme of the current Finnish Government, led by Prime Minister Jyrki Katainen, Finland's National Strategy and Action Plan for the Conservation and Sustainable Use of Biodiversity are being updated to correspond to objectives defined under the Convention on Biological Diversity (CBD) and within the European Union. The strategy will be implemented so as to safeguard the ways in which Finland's indigenous Sámi People traditionally utilise nature. On 20 December 2012, the Government made a resolution approving a new Strategy for the Conservation and Sustainable Use of Biodiversity in Finland for the years 2012–2020 (Saving nature for people).

The Strategy for the Conservation and Sustainable Use of Biodiversity in Finland for 2012–2020 is based on all of the issues covered by the CBD. It aims to promote the ecologically, economically, socially and culturally sustainable utilisation and development of biodiversity and natural resources in Finland, while safeguarding biodiversity, the vital needs of future generations, and livelihoods based on natural resources. The Government has defined the following goals as the basis of the strategy:

Vision

By 2020, biodiversity loss in Finland will have been halted. The favourable status of biodiversity and ecosystem services will be ensured by 2050. Finland will protect and sustainably utilise biodiversity for its own intrinsic value and as a source of human well-being, while taking active responsibility for issues related to biodiversity in international contexts. The Government believes that wide-ranging actions, changes in attitudes and processes, and enhanced cooperation will all be needed to achieve the goals described above. These actions must be based on the following principles:

Mission

Finland will urgently undertake effective actions designed to halt the loss of biodiversity by 2020 and ensure that by 2050 the state of the natural environment in Finland is stable and capable of ensuring people's future well-being. To achieve this:

- Issues and values related to biodiversity must become fundamental elements in decision-making.
- The pressures facing biodiversity must be reduced.
- Collaboration between the authorities, citizens, businesses and stakeholders and related participation procedures must be enhanced. New forms of cooperation designed to prevent and minimise any harmful impacts on biodiversity must be realised at a timely point in the preparation of decisions on projects and plans.
- Degraded ecosystems must be restored cost-effectively, or left to revert to their natural state through natural processes.
- Natural resources must be utilised sustainably. Renewable natural resources must be used in economic activities and to increase well-being in ways that ensure they are not depleted, but are renewed for the benefit of future generations. Non-renewable resources must be used as eco-efficiently as possible. In this way the present generation will not endanger the prospects of future generations to enjoy a good life in a sustainable society.
- Actions related to the conservation and sustainable use of biodiversity must be realised effectively with due regard to citizens' constitutional property rights and Finland's traditional everyman's right of access to the land, while also ensuring that all citizens meet their responsibility to preserve biodiversity. The indigenous Sámi community's traditional knowledge related to biodiversity will be respected.
- Decisions related to biodiversity must be based on the best available scientific information, and also apply the precautionary approach.
- Finland will take responsibility for ensuring access to genetic resources and the fair and equitable sharing of benefits arising from their utilisation.

In its resolution on the strategy the Finnish Government approved five strategic goals and 20 more specific related targets as guidelines for the conservation and sustainable use of biodiversity in Finland. These guidelines have been defined with reference to conditions in Finland, in order to comply with the goals defined by the Conference of the Parties (COP) at its 10th meeting and the targets set in the EU's biodiversity strategy. They form a flexible framework capable of responding to Finland's national needs and priorities.

The Government assigned the relevant ministries to implement the strategy by working in broad-based cooperation with civil society, commercial interests and other stakeholders to create a cost-effective and purposeful action plan that contains quantitative and qualitative bases for monitoring. The action plan will implement the goals and targets

defined in this strategy while giving due consideration to national needs and priorities. It will be implemented within spending limits defined in central government budget frameworks. Progress on the implementation of the strategy and action plan will be monitored and assessed, with the findings being reported to the Government in 2015.

The national action plan, which is based on and implements the above strategy, includes 105 measures. These have been introduced alongside specification of the ministries responsible for them and their target schedules. For each measure, the ministry bearing main responsibility is mentioned first, and the other participating ministries are referred to in the order laid down in section 1 of the Government Act (*Laki valtioneuvostosta 175/2003*). Measures are implemented not only by ministries, but also by the agencies and bodies within the ministries' administrative branch (such as sectoral research institutes), stakeholders who contributed to the preparation of the strategy and action plan, as well as non-governmental organisations and stakeholder groups. These play an essential role in integrating the strategy and action plan with Finnish society, the business sector and the everyday lives of citizens.

As part of the action plan, Finland will implement the objectives for Member States included in the EU Biodiversity Strategy to 2020, and the related measures (Appendix 1), all of which support the headline target set by the European Union for 2020¹. This will contribute to halting the loss of biodiversity and the degradation of ecosystem services. EU targets and actions relate to a) the conservation and restoration of biodiversity and ecosystem services (EU Targets 1 and 2); b) increasing the positive contribution of agriculture and forestry and reducing the main pressures on biodiversity in the European Union (EU Targets 3, 4 and 5); and c) enhancing EU measures promoting the protection of global biodiversity (EU Target 6).

The action plan was prepared by a broad-based *working group promoting the implementation and monitoring of the national strategy and action plan 2006–2016 for the conservation and sustainable use of biodiversity in Finland*. The working group included representatives of the relevant key national actors from the public and private sectors, as well as stakeholder groups and non-governmental organisations. Feedback received from citizens through the Webropol survey is included at several points in the action plan. Citizens also put forward innovative proposals, which proved useful in the further development of the action plan. Measures included in the action plan were formulated in cooperation between the members of the working group on implementation and monitoring. They were categorised in line with the strategic goals and targets defined in the Strategy for the Conservation and Sustainable Use of Biodiversity in Finland. Background issues related to challenges and measures are described in Appendix 3, which also contains info boxes providing further information on each topic.

1 Cross-cutting challenges and measures

1.1 Communication and enhancing public awareness

Development challenges

Loss of biodiversity is still overshadowed by other environmental problems, despite the fact that more weight and visibility have been given to biodiversity issues in recent years. Traditional nature conservation issues related to individual species and conservation areas arise more easily as topics of debate. The connections between biodiversity loss to issues such as the degradation of ecosystem services due to climate change have attracted less attention. In order to enhance general awareness and that of communications work, the loss of biodiversity should be more closely linked to other key environmental issues, such as climate change, the services obtained by people from nature, food safety, human well-being and protection of water resources. Biodiversity is also vital to plant breeding and thus to national and global food security. Conservation of genetic resources will secure their availability to meet the needs of farmers, plant and animal breeding and research, and future generations. Finland's international

¹ Halting the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restoring them in so far as feasible, while stepping up the EU contribution to averting global biodiversity loss (European Commission 2011).

responsibility for biodiversity and the related connections between biological resources and poverty should also be highlighted more clearly.

On a European scale, the Finnish people are fairly familiar with biodiversity as a concept (Eurobarometer 2007 and 2010), while being the least concerned of EU citizens about loss of biodiversity. With the help of communications work citizens will become aware of situations causing concern and will be encouraged to take an interest in biodiversity more widely, and support decisions made to safeguard biodiversity.

Measures, responsible bodies and target schedules

The safeguarding of biodiversity and its associated services provided by nature should become a common interest for different groups of citizens and sectors of industry and business, rather than the concern of only certain groups or professions. In communications work, the strategic key aim is to mainstream biodiversity in such a way that an increasing number of groups and actors within society take ownership of the issue. Another goal, parallel to enhancing knowledge and shaping attitudes, is to encourage individuals, authorities and industries to change their activities in a way that favours the safeguarding of biodiversity and the sustainable use of the associated ecosystem services. With the help of communications work citizens will be able to participate better in the national debate on genetically modified organisms (Section 5.2). Another aim is to establish and deepen partnerships with parties outside central government, in order to communicate more effectively and with a sharper focus. Communications work will be specifically aimed at target groups whose actions will have the most impact on the safeguarding of biodiversity and who will be identified in the updated communications programme of the *Saving Nature for People* strategy and action plan (2012-2020). Efforts to promote the mainstreaming of biodiversity are required not only among children and young people, but also in the adult working age population.

- 1) Update the communications programme of the *Saving Nature for People* strategy and action plan (2009–2016) to support the policy definitions of the global biodiversity strategy and action plan 2010-2020, revised in Nagoya, Japan (CBD COP-10, 2010). The communications programme will include information on the Nagoya ABS Protocol, on access to genetic resources and the fair and equitable sharing of benefits arising from their utilisation.
 - Ministry of the Environment, Ministry for Foreign Affairs, Ministry of Defence, Ministry of Education and Culture, Ministry of Agriculture and Forestry, Ministry of Transport and Communications, Sámi Parliament
 - 2013

1.2 Education and training

Development challenges

In line with the programme of the current Government, led by Prime Minister Jyrki Katainen, Finland will aim to lead the way in efforts to protect biodiversity and mitigate climate change. The intention is to develop Finland into the world's most environmentally-conscious nation. This poses a challenge in terms of general and vocational education, as well as the environmental education of citizens. The Government programme also seeks to strengthen the status of environmental education and develop nature schools, while creating opportunities for children and young people to participate and be heard in decision-making relating to their own neighbourhood environment and on environmental policy.

The educational sector will seek to convey the latest research data on biodiversity, alongside the factors influencing such data, to students. To achieve this goal, closer cooperation between environmental researchers, environmental administration and actors engaged in educational development is important. Vocational education, too, requires national data on diversity, information on endangered species, and habitat types. Moreover, it is important to anticipate which practices of business and professions pose risks to biodiversity and ecosystem services, how such risks can be managed and prevented, and which sectors promote the protection of biodiversity.

Sufficient knowledge of species is necessary in order to be able to understand nature and the structure and functioning of ecosystems. In Finland, it has been found that both schoolchildren and pedagogy students have poor knowledge of species. In response, education on plant species has been given more weight in the basic school curriculum. Easy access to materials is vital to the development of education and to educational institutions.

Schools have a growing need for information, particularly concerning their immediate surroundings. The collection of plants, an activity that has now been reinstated in the curriculum, requires that biodiversity monitoring data be accessible to teachers and students, also in digital format.

Visitor centres belonging to Metsähallitus (a state-run forest enterprise), natural history museums of universities and municipalities, botanical gardens, nature schools and zoological gardens promote a general awareness of nature and provide learning environments for teaching and education. Although schools and educational institutions use the services of such establishments for teaching purposes, more extensive use of them and their broad customer base could be made for teaching purposes. In addition, teaching and learning activities could be developed in cooperation with the environmental and educational administrations. Centres for economic development, transport and the environment, the Finnish Forest Centre and municipalities could also play a key role in distributing local and regional information to schools, as could NGOs (e.g. the Finnish scout association Suomen Partiolaiset – Finlands Scouter ry, Finnish Nature League – Luonto-Liitto) and the umbrella organisation of the environmental education sector — Suomen Ympäristökasvatuksen Seura, the Association for Environmental Education in Finland. Likewise, teachers' organisations and pedagogical associations (e.g. the union of biology and geography teachers BMOL and the association of agricultural and forestry teachers MMO), whose work is related to this theme, could be important partners.

Measures, responsible bodies and target schedules

Efforts to promote environmental education related to biodiversity will extend from day care and pre-primary school to higher education; for example, by developing forms of cooperation, enhancing teachers' pedagogical skills and knowledge of species, and promoting sustainable development, including education and training in support of the conservation of biodiversity and the sustainable use of natural resources.

- 2) Continuing education for teachers in species knowledge and pedagogy in biodiversity issues will be developed. With the help of new information technology, species knowledge and sustainable development education will be promoted (e.g. traditional knowledge of and protection and respect for biodiversity will be included in educational programmes for the Sámi people, and in the production of related learning materials).
 - Ministry of Education and Culture, Sámi Parliament
 - 2013–2020
 -
- 3) The position of environmental education will be strengthened in the imminent overhaul of the national curriculum. In addition, in vocational education, professional skill requirements related to restoring and conserving biodiversity will be strengthened.
 - Ministry of Culture and Education
 - 2013–2015
- 4) Cooperation related to multifaceted environmental education on biodiversity will be developed, for instance, between the administration, research institutions, educational institutions, centres for economic development, transport and the environment (ELY Centres), natural history museums, Metsähallitus Visitor Centres and non-governmental organisations. Additional, practical cooperation projects will be implemented and the results gained from them will be monitored. More effective measures for enhancing awareness of biodiversity in various target groups will be jointly identified.
 - Ministry of Education and Culture, Ministry of Agriculture and Forestry, Ministry of the Environment
 - 2013–2020

1.3 Financial instruments and other measures

Development challenges

Extensive practical application of voluntary conservation actions and the development of incentives and advisory services on nature management and conservation, for instance concerning forest environments, are essential prerequisites for safeguarding biodiversity in the current decade. The targeting of agriculture and environmental management in rural areas at locations and for purposes considered key to biodiversity is another important task,

alongside communications work, advisory services and practical guidelines. This goal is promoted by safeguarding the operating conditions of Finnish food production that help to direct environmental management in agriculture towards the conservation of biodiversity and the sustainable use of natural resources.

In accordance with the Government programme of Prime Minister Jyrki Katainen, in order to promote sustainable development, subsidies that are detrimental to the environment will be identified and reallocated, taking social, economic and cultural conditions into account. Simultaneously, ways will be investigated of fulfilling environmental commitments more cost-efficiently, through the development of economic instruments. The aim is to enhance the understanding of how biodiversity and the economy are linked, and to examine appropriate and cost-efficient economic steering methods for promoting the conservation and management of biodiversity and fostering sustainable use. For instance, agri-environmental support will be reformed in order to promote the conservation of bodies of water and biodiversity more efficiently than at present. Agri-environmental aid measures will be focused regionally and on certain farms and parcels in the areas considered most sensitive in terms of water protection and biodiversity.

Another goal in the Government programme is to identify innovative funding sources for the protection of biodiversity, and to investigate the establishment of a protection fund for channelling private and public donations towards nature conservation. In addition, information will be provided regarding the possibility of creating non-compensation-based protected areas.

Another challenge lies in developing sustainable development and well-being indicators² for Finnish society, which would complement GDP data. These new indicators would describe biodiversity and ecosystem services. This would contribute to better decision-making that takes into account biodiversity and the ecosystem services dependent upon it.

Measures, responsible bodies and target schedules

5) Identify subsidies that are detrimental to biodiversity and reallocate them, taking social, economic and cultural conditions into account. Examine how biodiversity commitments can be fulfilled more cost-efficiently, by developing economic instruments such as incentives and taxation.

- Ministry of Finance, Ministry of Agriculture and Forestry, Ministry of Employment and the Economy, Ministry of Transport and Communications, Ministry of the Environment
- 2013–2015

6) Continue to develop a monitoring system for the state of and trends in biodiversity in Finland through a network of experts. Monitoring results will be published on the Luonnontila.fi website in particular, which will be maintained as a national system for communications and reporting on the general monitoring of biodiversity. Monitoring will be expanded through indicators describing the status of and trends in ecosystem services; the indicators will be developed in cooperation with researchers and users of information. These indicators will be added to the Luonnontila.fi website. More efficient use will be made of indicators for biodiversity and ecosystem services, in decision-making and the evaluation of the implementation of the action plan. The role of such indicators will be strengthened in the measurement of sustainable development and well-being in Finland.

- Ministry of the Environment, Prime Minister's Office, Ministry of Finance, Ministry of Education and Culture, Ministry of Agriculture and Forestry, Ministry of Employment and the Economy
- Development of indicators for the fifth national report on the CBD Convention by the end of 2014
- 2013–2015

7) Initiate cooperation with the private and third sector in identifying innovative funding opportunities³ that promote biodiversity.

² The development of a set of indicators for sustainable development and well-being in Finnish society is coordinated by an indicator network, operating in the Prime Minister's Office (Prime Minister's Office 2011). Indicators accepted for the set of indicators will be published in Statistics Finland's Findicator.fi portal, to which all key sets of indicators should be linked.

³ Innovative funding refers to funding from various public and private sources.

- Ministry of the Environment, Ministry of Finance
- 2013–2020

8) Strive to secure funding opportunities for the conservation of biodiversity in national and EU-level preparations for the European Union's next programming period.

- Ministry of Agriculture and Forestry, Ministry of Employment and the Economy, Ministry of the Environment
- 2013–2014

9) Agri-environmental support will be reformed to promote the conservation of bodies of water and biodiversity more efficiently than at present. Agri-environmental support measures will be focused regionally and on certain farms and parcels, in the areas considered most sensitive in terms of water protection and biodiversity.

- Ministry of Agriculture and Forestry, Ministry of the Environment
- 2013–2013

10) In reindeer herding areas, compensation will be given in full for any damage caused by predators to reindeer owners, insofar as possible. Outside the reindeer herding area, the primary aim is to prevent any damage caused by large carnivores to the owners of domestic and pet animals. Attempts will be made to ensure the continuity of the compensation scheme for seal damage and of subsidies for seal-proof traps.

- Ministry of Agriculture and Forestry, Ministry of the Environment
- 2013–2020

1.4 Legislation

Development challenges

Implementation of nature conservation has largely been based on legislative and administrative steering methods. Assessments of threatened species show that legislation on nature conservation, either alone or combined with other environmental protection legislation, has been unable to prevent the decline in biodiversity. Protection methods included in nature conservation legislation are insufficient to prevent losses of diversity related to changes in land use and the economic structure. In land use planning and the legislation that governs it, as well as in decision-making, more attention will be paid to how natural areas are interconnected, the conservation of biodiversity at the landscape level even outside conservation areas, and the maintenance of ecosystem services, while taking into account other land use needs. Measures that support biodiversity may also require economic incentives and the use of compensation.

The resources available to central government, including the nature conservation administration, are diminishing. Attention must be paid not only to biodiversity, but also to the cost efficiency of the available resources, when determining protection measures.

As regards habitat types assessed as threatened, the existing legislation does not provide sufficiently effective methods of safeguarding entities beyond the scope of individual habitats. Some of the habitats assessed as most threatened, and entities beyond the scope of individual habitats, will remain outside the scope of the methods currently available for safeguarding biodiversity. The targeting and effectiveness of species protection, and its coordination with the protection of habitats, should be enhanced. Protection of genetic diversity also requires regulation. Likewise, legislation on alien species is deficient. Some offences and violations against the environment are never detected, while some that are detected are never solved. The difficulty involved in criminal investigations of offences and violations against the environment, and in the related evidence gathering, only serves to complicate the issue further.

Measures, responsible bodies and target schedules

Legislation on nature conservation will be developed to respond to the challenges posed by the degradation of biodiversity, while ensuring the full national implementation of EU regulations on nature conservation. Biodiversity will be taken into account in steering systems governed by other legislation, particularly in the Environmental Protection Act and Forest Act, which are currently under reform. In addition, legislative and administrative measures

will be revised and developed, while the range of steering instruments will be expanded to rely more on various actors taking responsibility and engaging in voluntary action.

- 11) Legislation on the conservation and sustainable use of biodiversity will be developed to respond to the challenges posed by the loss of biodiversity, and to ensure the full-scale national implementation of EU regulations on nature conservation.
 - Enhance the efficiency, functionality and productivity of nature conservation, by assessing the adequacy of the range of goals and measures provided under the Nature Conservation Act, and by preparing the necessary amendments to the Act.
 - Prepare further specifications for nature conservation legislation, to ensure the implementation of EU nature conservation legislation. Expand such a review to cover the protection of genetic resources.
 - Take the conservation of biodiversity into account when preparing and reforming legislation that guides the use of natural resources and land areas.
 - Examine the possibilities for relaxing the exemption procedures related to the protection of species.
 - Ministry of the Environment, other ministries
 - 2013–2020
- 12) Examine the possibilities of improving the operational preconditions of the police and prosecutors, with respect to environmental offences.
 - Ministry of the Interior
 - 2013–2015
- 13) Examine the possibilities for applying ecological compensation⁴ proactively, in legislation on land use planning and in business sector projects.
 - Ministry of the Environment, Ministry of Transport and Communications, Ministry of Employment and the Economy
 - 2013–2014

1.5 Biodiversity in land use planning and land use

Development challenges

At present, it is difficult to take biodiversity perspectives into consideration on a broad scale. For instance, methodologies for taking account of indirect and accumulative impacts on nature are undeveloped and this is often disregarded. The reason is the associated projects are distinct, rendering it impossible to ensure broader-based progress with respect to the same natural area at the landscape level. It is particularly challenging to develop land use planning methods that go beyond the current practice of merely stating conditions towards a more extensive and flexible understanding of biodiversity trends. Correspondingly, in planning, the integration of sustainable use and conservation of biodiversity is a major challenge⁵.

Environmental impact assessment is often solely focused on the occurrence of certain species and habitats in the area under planning. It has not been possible to a sufficient extent to distinguish the structural features of nature, and their natural development, or the significance of observations made on the habitat level, species level and genetic level. On the other hand, biodiversity is highly appreciated by citizens. An interactive approach to impact assessment on the national, regional and local level is necessary in order to include citizens' views, alongside those of experts, in value judgments of nature.

Measures, responsible bodies and target schedules

The aim is to take into account the sustainable use of biodiversity and ecosystem services in land use and project planning. In impact assessment, more attention will be paid to the practical benefits of biodiversity, and to how the project in question influences the realisation of these benefits with respect to different groups of citizens. The

⁴ Ecological compensation measures are measures benefiting the environment, performed to counterbalance detrimental impacts. The natural values thus achieved compensate, in principle, for those that are degraded or destroyed. The aim is 'no environmental net loss' or even 'environmental net benefit'. In terms of definition, ecological compensation is about a *trade-off* or counterbalancing measures (Suvantola 2005, p. 40; cf. Nyrölä et al. 2011).

⁵ For instance, experiences of sustainable land use in biosphere areas (UNESCO) in North Karelia and the Archipelago Sea can be reviewed from the new angles provided by the CBD (e.g. ecosystem services and ecosystem approach).

principle of sustainable use, which takes account of natural systems, will be applied to impact assessment. This will be particularly so in general land use planning, and otherwise on the plan and programme level, which will enable genuine alternatives and broader areas to be examined.

Account will be taken of biodiversity in both land use and traffic route planning. Planning must be based on sufficient and correctly targeted biodiversity impact assessments, extending to the natural environment outside the area covered by the plan, and to the functioning of ecosystems. Simultaneously, detrimental impacts on biodiversity due to the fragmentation of natural areas must be prevented or reduced, by developing so-called green and blue infrastructure. This will also promote adaptation and resilience to climate change.

- 14) Study what is meant by green and blue infrastructure (ecological network) under Finnish conditions. Incorporate the formation of an ecological network into land use planning objectives, in order to prevent the fragmentation of unbroken natural areas.
 - Ministry of the Environment, Ministry of Agriculture and Forestry
 - 2013–2020
- 15) Promote the conservation of biodiversity in the planning of land and marine areas and in environmental impact assessments. Ensure that impact assessments of biodiversity are available for decision-makers at the right time. Increase knowledge of marine ecosystems.
 - Ministry of the Environment, Ministry of Agriculture and Forestry, Ministry of Transport and Communications, Ministry of Employment and the Economy
 - 2013–2020
- 16) Apply the voluntary Akwé: Kon Guidelines⁶, adopted by COP-9 of the Convention, to land use planning and guidance on planning in the Sámi Homeland, and take these instructions into account in legislative reforms regarding guidance on land use.
 - Ministry of the Environment, Ministry of Agriculture and Forestry, Ministry of Transport and Communications, Ministry of Employment and the Economy, the Sámi Parliament
 - 2013–2020

1.6 Conservation of biodiversity

1.6.1 Network of protected areas

Development challenges

COP-10 of the Convention specified the Programme of Work on Protected Areas and requested COPs to invest in the implementation of the programme. In accordance with Decision X/31, by 2015, COPs must integrate protected areas into wider landscapes and seascapes, and with certain livelihoods, in order to prepare for and adapt to climate change, in particular. Key methods of doing so will include the development of ecological networks and corridors, and the restoration and management of degraded habitats. Effective management of protected areas will also be secured by 2012, while ensuring the controlled elimination of alien species from protected areas. The work programme also emphasises the importance of greater, more efficient restoration of protected areas.

The aim of the working programme is to ensure by 2012 the establishment of a representative network of marine protected areas, as well as the launch of appropriate measures for the coordination of the conservation and sustainable use of ecologically important marine areas. Additionally, the coverage, quality, representativeness and connectivity of networks of protected inland waters will be improved.

⁶ The intention is to apply the Akwe: Kon Guidelines in the Sámi Homeland, in the assessment of cultural, environmental and social impacts of such projects and plans that might have an effect on the Sámi culture, livelihoods and cultural heritage. The instructions aim to secure the conservation of biodiversity and to preserve the relationships between the cultures of indigenous people, nature and the related traditional knowledge.

By 2012, COPs have been urged to prepare and implement sufficient economic plans for the implementation and management of protected areas. Moreover, COPs must evaluate the costs and benefits of protected areas (incl. ecosystem services). COPs are invited to improve the administration of protected areas, their regional participation and the fair sharing of benefits.

Measures, responsible bodies and target schedules

The aim is to establish a comprehensive, efficiently managed, ecologically functional and representative network of protected areas, as a buffer against and means of adapting to the impacts of climate change. Such a network must also maintain ecosystem services and include national and regional systems of protected areas. It must also constitute part of the worldwide network of protected areas, promoted by the Convention.

Completing and strengthening the regional network, and the protection of insufficiently protected habitats, are key tasks in the development of a system of protected areas. An important task for the near future is the implementation of protection measures in line with the protection targets for Natura 2000 areas, in order to achieve and maintain a favourable conservation status. Establishment of protected areas, by issuing regulations on areas allocated for this purpose, is a key component of these measures (see Luonnonsuojelualueiden säädövalmistelutyöryhmä 2009 — *Working group for drafting statutes on protected areas* [in Finnish only]). Other required actions include the development of monitoring and planning systems, and the preparation, implementation and maintenance of plans for land management and use. It must also be ensured that account is taken of the measures required in Decision X/31 on protected areas in COP-10 of the Convention, within the implementation of the *Saving Nature for People* action plan.

Development of a network of protected areas in the action plan period 2012–2020 will be largely based on voluntary conservation. As the number of new protected areas and that of the related, necessary tasks increases, additional resources will be required, either by increasing funding or reallocating resources.

- 17) Establish state-owned protected areas, covering approximately 700,000 hectares, related to the implementation of national conservation programmes and other areas reserved for protection, and the Natura 2000 network of protected areas. Update regulations on the present network of protected areas.
 - Ministry of the Environment
 - 2013–2020
- 18) Implement measures in accordance with Decision X/31 on protected areas of the Convention, such as gap analyses and the additional measures required by them.
 - Draw up a national development plan on protected areas, through cooperation between administrative sectors and by taking climate change into account. This plan should include an assessment of the connectivity of the network of protected areas, its ecological representativeness and geographical coverage by classification of habitat type, as well as proposals for measures required for the long-term development of the network of protected areas. The Government will decide separately on any measures necessary for covering cover gaps in the network and developing it.
 - Implement the conservation objectives for Natura 2000 network areas, in accordance with the EU Habitats Directive by 2020, and regularly assess the status of the network. Land use and management plans will be drawn up for areas where it is required to do so according to the conservation objectives, and these will be implemented and maintained in cooperation with various parties.
 - The efficiency and impacts of managing and maintaining the protected area network will be assessed and improved in order to enhance the level of conservation of species and habitat types, and their adaptability to climate change.
 - Establish criteria for calculating the percentage of areas protected through conservation and other effective methods for safeguarding biodiversity of Finland's total land area, and inland waters, coastal and marine areas. Additionally, determine this percentage and monitor the implementation of the Convention on Biological Diversity and the Aichi Targets and Finland's biodiversity strategy objective 11.
 - Ministry of the Environment, Ministry of Agriculture and Forestry, Ministry of Employment and the Economy
 - 2013–2020

- 19) In order to safeguard biodiversity, improve the ecological functioning of the Natura 2000 network and its connectivity as part of more extensive green and blue infrastructure, by means of, for instance, the Nature Conservation Act, land use planning and natural resources planning for state land, and by efficient targeting of agri-environmental support.
- Ministry of the Environment, Ministry of Agriculture and Forestry
 - 2013–2020
- 20) Assess the need for implementation of protected areas that have been designated in regional land use plans and municipalities' master plans, but that have not been included in the conservation programmes under the Natura 2000 network, but have been reserved for implementation by the state (SL, SU1). Additionally, assess the order of priority and need for land use and management planning of these areas. Implement the required protection measures.
- Ministry of the Environment
 - 2013–2020
- 21) Define the international protected area category of current protected areas, in cooperation with the IUCN and other stakeholders. Examine the need for and possibilities of establishing new types of protected areas, and of creating administrative models for them.
- Ministry of the Environment, IUCN WCPA Finland
 - 2013–2020

1.6.2 Threatened habitat types

Development challenges

Changes in habitats constitute a threat to Finnish nature. According to a 2005 estimate by the Finnish Environment Institute (SYKE), coastal areas and forests have seen the most dramatic changes. In the last few years, changes in mires, peatlands and other wetlands have increased, and their importance in adaptation to climate change has grown. Without additional measures, populations of species dependent on these habitats will be reduced and more demanding or specialised species will continue to become threatened.

No full overall picture has been generated of the status and need for conservation of Finland's habitat types, and of the occurrence of several rare types of habitat. Comparability between biodiversity impact assessments created for various purposes is weak, and their quality varies. Moreover, continuous natural development and change, accelerated by climate change, is occurring in the habitats. Biodiversity loss is often related to the human-induced prevention or transformation of natural processes.

Measures for improving the status of threatened habitat types include strengthening current and developing new legislative and administrative procedures, in line with the principle of sectoral responsibility. This will be done by complementing the range of methods available for preserving habitats, nature management and restoration; by developing economic incentive and guidance methods in land use and the use of natural resources; by monitoring trends in the status of threatened habitats and the effectiveness of measures; and by continuing to improve the standard of information on habitat types, and the related information systems.

Particular attention will also be paid to the review and conservation of coherent ecological entities, on the basis of the ecosystem approach. It will therefore be necessary to enhance the effectiveness of landscape-level reviews in land use planning and in planning the use of natural resources, for purposes including the preservation of ecological networks, greater coordination of the identification of threatened habitat types with species protection, utilisation of synergies, and identification of the best possible cost-benefit ratio.

Measures, responsible bodies and target schedules

The objective is to halt the deterioration in the threat status of habitats by 2020, and to use effective measures to improve their status. This requires the preservation and restoration of functional entities related to habitats, even outside protected areas, and the development of guidance methods and incentives for this purpose, through cooperation between various sectors. Achieving a green and blue infrastructure (an ecological network), in order to

maintain the conservation status of habitats, requires broad-based shouldering of responsibilities, not only by various administrative sectors but also municipalities, enterprises and other actors.

- 22) Implement the action plan to improve the status of threatened habitat types, drawn up in cooperation between various administrative sectors and stakeholders.
 - Improve the knowledge base used for targeting the conservation, management, restoration, research and monitoring of habitats.
 - Increase general knowledge of the importance of habitat types to Finland's biodiversity.
 - Add detail to the overall picture of the threatened status of forest habitats.
 - Ministry of the Environment, Ministry of Agriculture and Forestry, Ministry of Employment and the Economy, Ministry of Transport and Communications, Ministry of Education and Culture, the Sámi Parliament
 - 2013–2020

1.6.3 Protection of species

Development challenges

Information on species in Finland and the related changes remains deficient, even if such information is exceptionally comprehensive in international comparisons. The 2010 assessment of threatened species showed that 45–47 per cent of our species were not included in the evaluation processes. Our knowledge continues to be augmented by the research programme for deficiently known and threatened forest species 2009–2016 (PUTTE); well over one half of our species may be included in future evaluations. One of the goals of the *Biodiversity and nature conservation* segment of the HELCOM Baltic Sea Action Plan is to produce a list of threatened Baltic Sea species and to update the list of habitat types, by 2013. Production of identification guides could improve amateur naturalists' prospects of providing support for the monitoring of species changes.

Finland has not drawn up a national action plan for the protection of flora, but this is being promoted as part of the action plan for species protection, applicable to all organism groups. Correct targeting of protection requires the compilation and updating of up-to-date data on the occurrence of vascular plants, bryophytes, fungi and lichens requiring conservation and monitoring, into information systems used by the environmental administration. Effective exchange of information between various actors is also required. Research is required to enable the correct targeting of management and monitoring; the resulting data will be distributed, for example, through species-specific conservation and monitoring programmes, and instructions for the management of habitats. General monitoring of species and habitats remains unorganised. Enhancing communication, and improving the functioning of information systems and the quality of information are also keys to promoting the protection of flora. Similar challenges also apply to our other species.

Protection of species is primarily carried out through the protection and management of habitats. Securing the future of the most threatened species requires individually planned conservation measures in each case. While species-specific conservation programmes are required in approximately 500 cases, for the time being it has proven possible to prepare them for 150 species only. One means of protecting species in need of specific conservation would involve placing them under strict protection, by a decision of the authority in charge of nature conservation, in order to secure the site hosting the species. So far, some 170 such decisions have been made (1998–2000), but more than 1,000 would be necessary. Up-to-date, accurate and more-comprehensive information on the occurrence of threatened species, and advice and instructions on methods of protecting them, are required in order to take account of threatened species in the utilisation of nature outside protected areas. Data contained in the environmental administration's TAXON database, including GIS data on threatened species, remains deficient in many aspects.

Measures, responsible bodies and target schedules

Enhance knowledge and understanding of the status of and trends in species in Finland, and ensure the monitoring of the most threatened species, in particular those placed under protection. At the same time, halt the declining trend in species numbers and counter threats to their habitats, by promoting the protection, management, research and monitoring of species and their habitats, and through communications work in the field. Implement an action plan for

species protection that steers and prioritises current species protection and sustainable use measures, by focusing such measures on key targets. Simultaneously, agree on the division of duties between organisations and prepare a description of the resources required. In addition, research and the compilation of information would enhance knowledge of threatened species, which would facilitate a reliable assessment of the threatened status of most species in our country. Assessing the threat posed to and conservation status of species, during reporting for the Habitats Directive, would serve the monitoring of biodiversity.

- 23) Improve the standard and accessibility of information on threatened species, for example, when assessing threatened status through species inventories. Enhance exchange of information between actors. Implement an overall assessment of the threatened status of species in Finland, so as to have the following assessment ready by 2020.

- Ministry of the Environment, Ministry of Education and Culture, Ministry of Agriculture and Forestry
- 2013–2020

- 24) In cooperation with other actors, prepare and implement an *Action plan for species protection*, with schedules, that defines the focus areas, resource targets and prioritisations of actions, and the division of duties between various actors. Launch species protection activities in the correct order of urgency, and harmonise management of the scope of duties, through recommendations and operating instructions.

- Ministry of the Environment, Ministry of Education and Culture, Ministry of Agriculture and Forestry
- 2013–2015

- 25) In forest management, take note of threatened species as specified in the operating model *Threatened species in forestry* (Uhanalaiset lajit metsätaloudessa 2011). The Finnish Forest Centre and centres for economic development, transport and the environment will introduce the practices described in the operating model. The power to decide on operating methods lies with the forest holder.

- Ministry of Agriculture and Forestry, Ministry of the Environment
- 2013–2020

- 26) Identify key species concentrations in Finland, which would facilitate the safeguarding of viable populations of several species groups at the same time.

- Ministry of the Environment
- 2013–2020

- 27) Ensure the preservation of species, subspecies and populations such as the Saimaa ringed seal, landlocked Atlantic salmon (*Salmo salar* m. *sebago*) and Arctic char (*Salvelinus alpinus*), and plants in the *Primula nutans* group, which are endemic or almost endemic to Finland. Seek to enhance the viability of these species and groups of species through administrative (regulation of fishing, monitoring and communications) and conservation biology measures; for example, by preparing and implementing population management plans for threatened fish and game species.

- Ministry of Agriculture and Forestry, Ministry of the Environment
- 2013–2020

- 28) Implement approved game population management plans for wolves, bears, lynxes, wild forest reindeer (*Rangifer tarandus fennicus*), Baltic grey seals and grey partridges (*Perdix perdix*), and finalise the management plans under preparation (wolverines, elk and forest grouse species).

- Ministry of Agriculture and Forestry, Ministry of the Environment
- 2013–2020

1.7 Climate change

Development challenges

The Convention on Biological Diversity (CBD) views climate change as a major threat to biodiversity. Climate change will reduce the diversity of ecosystems (in particular, coral reefs, wetlands, forests, mountains, Arctic regions) and ecosystem services, as well as livelihoods based on these.

The impacts of climate change on Finnish nature must be studied. In addition, at the earliest possible stage, measures necessary for reducing or adapting to detrimental impacts must be anticipated and initiated as necessary. A preliminary assessment has been carried out of the impacts of climate change on biodiversity. Ecologically functioning and adequate networks of protected areas have been proposed as a key measure in promoting adaptation. In changing conditions, improving ecological connections between protected areas, and the interconnections of the protected area network, are considered particularly important. In order to diminish the detrimental impacts of climate change, areas between protected areas (so-called green and blue infrastructure) should facilitate the movement of species on the landscape level, from one protected area to another.

Ecosystems and land use play a key role in the carbon and water cycles, and thus in emissions and carbon sequestration. Preservation of ecosystems in their natural state and the restoration of degraded ecosystems (Section 3) are important both in terms of preserving biodiversity and ecosystem services, and in curbing climate change and adapting to it. Research, based on intercomparable methods, of various ecosystems in their natural state and of modified ecosystems (drained peatlands, farmlands and pastures) should be further increased to identify those important for use as carbon sinks and for carbon sequestration. In Finland, there are excellent possibilities for this due to the high standard of research and the development of models on the carbon balance.

With regard to the adaptation of biota and habitats, it is vital that the other pressures they face, including, for example, fragmentation of habitats, eutrophication, excessive hunting and fishing, are reduced while, at the same time, the restoration of habitats is intensified and climate change is taken into account. In the future, some measures may have to be applied more frequently than now. These include the *ex situ* conservation and relocation of organisms and their re-introduction to the wild. More study is needed of the benefits and restrictions involved in such methods, and greater preparedness is needed for their implementation.

New research data is required on the impacts of climate change and its progress with regard to the functioning of protected area networks, particularly on waterways, mire ecosystems and wetlands, and the species of northern habitats such as Arctic fells, cold conditions in general, and, for example, dwindling sea ice. We can prepare for change now by carrying out species and ecosystems sensitivity analyses in relation to climate change. The Convention on Biological Diversity has also encouraged the development of rapid assessment methods.

Measures, responsible bodies and target schedules

- 29) Take biodiversity measures into account when revising the National Strategy for Adaptation to Climate Change (2005). Implement decisions of the CBD and UNFCCC on climate change.
 - Ministry of Agriculture and Forestry, Ministry of the Environment, Ministry of Employment and the Economy, Ministry of Finance, other ministries
 - 2013–2020
- 30) Basic data on the sensitivity of species and habitat types to the impacts of climate change will be gathered in support of decision-making on protected areas, their management and monitoring. Assess the functionality of the network of protected areas and the need for management of them, as regards adaptation to climate change.
 - Ministry of the Environment, Ministry of Agriculture and Forestry, Ministry of Education and Culture
 - 2013–2015
- 31) Make preparations for protecting the species most threatened by climate change, outside their natural environments (*ex situ*). Examine the needs for and possibilities of relocating organisms in response to climate change (i.e. assisted migration).
 - Ministry of Education and Culture, Ministry of the Environment, Ministry of Agriculture and Forestry
 - 2013–2020
- 32) In line with the CBD's recommendation, identify protected areas and adjacent ecosystems which have the capacity to be restored because of their importance as carbon sinks and for carbon sequestration. On the basis of this information, assess the management of protected areas and the need for restoring adjacent degraded ecosystems, in terms both of biodiversity conservation and carbon sequestration in ecosystems.

- Ministry of the Environment, Ministry of Agriculture and Forestry
 - 2013–2014
- 33) Study the impacts of the use of bioenergy and wind power on biodiversity, and take them into account when developing regulations, subsidies and guidelines.
- Ministry of the Environment, Ministry of Employment and the Economy, Ministry of Agriculture and Forestry
 - 2013–2015

1.8 Invasive alien species

Development challenges

The Government Programme of Prime Minister Jyrki Katainen's Cabinet defines a policy for preventing the spread of invasive alien species, with the aim of enhancing prevention on the basis of the national strategy for invasive alien species; for example, by improving the possibilities for reporting observations and monitoring. On 15 March 2012, the Government issued a resolution on a national strategy for invasive alien species. The related action plan includes 16 sets of measures for preventing and controlling the impacts of invasive alien species⁷. Such measures include development of legislation on invasive alien species, establishment of an expert and monitoring body, launching communications and training, and establishing a portal on invasive alien species. In addition to these, prevention of invasive alien species requires the creation of advance warning and risk assessment systems in line with the strategy, and the development of research and monitoring. It would also be important to prepare for preventing incursions by new invasive alien species, and for the rapid control of those already introduced. Under the national strategy for invasive alien species, the most extensive project targeting an individual species involves the elimination of hogweed from Finland over the next 10 to 20 years.

Measures, responsible bodies and target schedules

The aim is that by 2020 a system will be in place for controlling problems caused by invasive alien species and preventing any new ones from entering the country. Invasive alien species that have entered Finland can be brought under control and kept at bay through national and international cooperation between authorities. For this purpose, the key routes by which invasive alien species spread must be identified and blocked, and the import of invasive alien species prevented. In addition, possibilities for reporting observations and monitoring must be improved (including the creation of an advance warning system, adequate risk assessment and the establishment of a monitoring and communication system). Implementation of the Government's resolution on a national strategy for invasive alien species (2012) has been initiated. Finland has also signed the International Maritime Organization's (IMO) Convention for the Control and Management of Ships' Ballast Water and Sediments, to prevent the spread of invasive alien species in the ballast waters of vessels. The aim is to ratify the convention in 2012.

- 34) Implement the 16 sets of measures under the national strategy for invasive alien species, and international commitments and other obligations concerning invasive alien species (e.g. IMO, HELCOM, EU).
- Increase research on invasive alien species, on the basis of the national strategy for invasive alien species, particularly by initiating research on the impacts of invasive alien species and the effectiveness and cost-efficiency of the related prevention, so as to enable the correct targeting of measures taken to prevent the detrimental effects of such species.
 - Examine the key routes through which invasive alien species enter the country, and measures required for controlling them.

⁷ Invasive alien species are species that spread in an uncontrolled manner, with economic, ecologic, social or health-related detrimental impacts.

- Ministry of Agriculture and Forestry, Ministry of the Environment, Ministry of Transport and Communications
- 2013–2020

1.9 Nature-based tourism and recreation in natural areas

Development challenges

In Finland too, nature-based tourism is the fastest-growing segment of the tourist industry. The attractiveness of Finnish nature, safety, good transport connections and a high standard of services in national parks combine to provide an excellent basis for the development of nature tourism. However, preservation of natural values and safeguarding the prerequisites of traditional Sámi culture livelihoods are basic conditions for developing nature-based tourism in Finland. The growth of tourism should be based on environmental responsibility, the conservation and promotion of the natural environment and cultural attractiveness and biodiversity. At travel destinations, this objective requires the development of routes and natural areas considered key to recreation. Structures, infrastructure and trails built for recreational use in protected areas must be improved using a demand-based approach, while ensuring sustainability of use. Motorised land and water transport will need to be controlled to prevent off-road traffic from posing problems to biodiversity in protected areas. Growth in nature tourism and the recreational use of natural areas will be promoted in a sustainable manner with regard to biodiversity, traditional Sámi culture and preservation of employment. This will bring a range of benefits to individuals, society and the natural environment. In the best-case scenario, well-executed and planned nature-based tourism and the development of the related partnerships will serve as an excellent tool for mainstreaming the conservation of biodiversity.

Measures, responsible bodies and target schedules

- 35) Promote nature-based tourism and the recreational use of natural areas in ways that are sustainable with regard to conserving biodiversity and the Sámi culture and traditional livelihoods, in line with the Government resolution on recreation in natural areas and nature-based tourism and Finland's Tourism Strategy to 2020.
 - Ministry of the Environment, Ministry of Employment and the Economy, Ministry of Agriculture and Forestry, the Sámi Parliament
 - 2013–2020
- 36) Update the Off-Road Traffic Act and enhance its enforcement to prevent detrimental impacts on biodiversity.
 - Ministry of the Environment, Ministry of Transport and Communications
 - 2013–2015
- 37) Enhance land use planning around tourist resorts that is sustainable with regard to biodiversity, for instance, by centralising tourism services with a view to safeguarding biodiversity.
 - Ministry of the Environment, Ministry of Employment and the Economy, Ministry of Agriculture and Forestry, the Sámi Parliament
 - 2013–2020
- 38) Explore ways to maintain citizens' active relationship with the natural world and how to transfer this to new generations. Strengthen the idea of the outdoor activities and recreation as integral to the Finnish identity, and emphasise the positive health impacts derived from the natural environment and its recreational use.
 - Ministry of the Environment, Ministry of Education and Culture, Ministry of Social Affairs and Health, Ministry of Agriculture and Forestry
 - 2013–2020

1.10 Monitoring, research and data systems

Development challenges

Monitoring

Indicators based on the results of follow-up studies on biodiversity in Finland provide a range of insights into the changes in biodiversity in this country. However, there are gaps in such monitoring. Monitoring of the impacts of climate change on nature and of invasive alien species needs to be planned and implemented without delay. In addition, monitoring of inadequately monitored species (common species) and types of habitat (including Arctic fells, coastal areas, rocks and built environments), and of the most threatened species must be enhanced. Current monitoring of natural resources (such as the national forest inventory) must be developed so as to take account of the status of and changes in biodiversity. Monitoring of farmland biodiversity could be implemented based on a fully developed comprehensive approach in follow-up studies on the impacts of agri-environmental measures (*Maatalouden ympäristötuen vaikuttavuuden seurantatutkimus MYTVAS*). Indicators describing the status of and changes in ecosystem services must also be developed, alongside biodiversity indicators. With the help of such indicators, the usability of monitoring data could be promoted, for instance, in national, EU and global reporting.

Biodiversity monitoring projects that are coordinated and supported by the environmental administration must be prioritised on the basis of international and national monitoring obligations. Coordination of monitoring must also be developed through a cooperation network of research institutions within the Finnish Partnership for Research on Natural Resources and the Environment (LYNET), the prospective Luonnonvaratutkimuskeskus (*Natural Resources Institute Finland*), the Finnish Museum of Natural History and other natural history museums in the country, universities, and Metsähallitus Natural Heritage Services.

Development of monitoring will promote cooperation between various monitoring parties and enhance the usability of monitoring data. Shared databases open to all must be compiled based on monitoring projects, the parties executing them, and the related materials and reports. Simultaneously, more support will be provided for voluntary monitoring work, which plays a key role in Finland in the compiling of observations (up to 70% of labour input). Key issues include coordination and funding of monitoring, prioritisation of subjects, development of methods, motivation of voluntary contributors and securing the continuity of monitoring.

Research

Basic research into conservation ecology and other aspects of biodiversity is scientifically important, as well as being vital to the development of applications in the field. However, the practical application of basic research is challenging, due to fragmented research themes and the preliminary nature of the results. Knowledge of biodiversity in Finland and the factors affecting it must be further increased, while enhancing dialogue, cooperation and information exchange between researchers, authorities, practical actors and users of information. To resolve the comprehensive societal challenges we are facing, we need sociological and multi-disciplinary research into ecosystem services and biodiversity, and the more efficient communication of research data to decision-makers.

Data systems and shared use of data

Recent policy definitions require free access to information generated using public funds. We must ensure not only the high quality of data produced and maintained by various parties, but see to it that key data systems on nature and natural resources are given in a format that allows their joint use and access by everyone in need of information. Access to information should only be restricted insofar as is necessary to protect biodiversity (for instance, the precise locations of threatened species should be kept secret from outsiders, and made accessible only to authorities and the landowner in question). In order to achieve goals for enhancing the national protection of species and cooperation between administrative sectors, the establishment of a virtual Finnish Biodiversity Information Centre is a matter of urgency. The Biodiversity Information Centre would enable integration of the species observation systems of expert amateur naturalist communities into professional systems. This in turn enables the use of species location data collected by amateur naturalists, for example, for purposes of planning the protection of threatened species. Alongside the launch of the Finnish Biodiversity Information Centre, the

development of current data systems, such as the environmental administration's TAXON database, is important since these will form part of the centre.

Sharing of biodiversity-related data already existing in Finland (natural history collections and observation data of research institutions, authorities and amateur naturalists' organisations) through the international Global Biodiversity Information Facility (GBIF) will be challenging. The available material covers only 25 per cent of digital data in Finland. Approximately 80 per cent of data shared by Finland originates in the databases of amateur naturalists. All natural history museums in Finland, and parties implementing ecological monitoring, should become GBIF data sources. They should also make available Finland's 30 million or so data records already in digital format. On the other hand, GBIF activities are poorly organised at the national level and have no national funding allocations. The strategic objective of the Global Facility is to strengthen the activities of local biodiversity information facilities. Many member states (such as Australia, Spain, South Africa) have already achieved this, for example, by developing a national biodiversity information facility (BIF), because these countries find that data distributed through the Global Facility, which is available worldwide in English and which serves the international scientific community in particular, does not, in its current form, meet the needs of national administration and education, for instance. A Finnish Biodiversity Information Centre would enable enhanced participation by Finland in both the international GBIF system and a national BIF system. With such a centre, digital biodiversity data could be compiled and shared, in the Global Facility for international use and via a domestic portal for national use.

Information on biodiversity in Finland must be made easily accessible, regardless of where and by whom the data was collected. The Finnish Clearing-House Mechanism of the Convention on Biological Diversity (LUMONET⁸) must be developed into a jointly used portal for the collection and transmission of ecological data, serving the needs of users extensively at home and abroad. This portal should be developed into a window on Finnish nature, through which different parties can access the required data on biodiversity and any related information on the traditional knowledge of the Sámi people (Article 8(j)) (incl. Biodiversity.fi; Outdoors.fi; and the search portal of the planned Finnish Biodiversity Information Centre). Proposals for the development of the portal are included in the final report of the project group for the monitoring of biodiversity and data management (SETI) in the *Nature conservation productivity project* (Luonnonsuojelun tuottavuushankkeen 2007–2009). The technical implementation of the portal, its financing, location and contents, and its relationship to the corresponding EU system, remain unresolved.

Taxonomy

Finland's biodiversity-related information is underused, due to administrative, financial and technical problems. Most of the extensive material in the collections of natural history museums is difficult to use, because it is not fully saved in electronic data systems. A digitisation strategy for natural history museums and an action plan for 2010–2015 were completed in 2009. In 2009–2011, various materials in collections were digitised in a project covering several museums. This scheme was implemented using earmarked funding from the Ministry of Education and Culture, with the support of the National Digital Library, and by means of international funding by foundations. The aim is to convert taxonomic samples into an easy-to-use format, while safeguarding Finland's taxonomy expertise and enhancing cooperation between parties participating in species knowledge and classification, and other species research. The Finnish Museum of Natural History is also compiling species checklists that contain information necessary, among other things, to assessing threatened species in Finland and their conservation status.

The connection between natural history collections and universities is important for the purposes of, among other things, education of researchers and the joint use of research facilities. In Finland, the lack of trained taxonomists and museum professionals specialised in processing species data complicates issues, such as the monitoring and assessment of changes in species. Taxonomic research of a number of invertebrates, algae and fungi has progressed slowly. On the other hand, knowledge of species in Finland has made significant progress, thanks to funding targeted at research into deficiently known and threatened forest species (PUTTE), carried out under the METSO programme (2003–2012) and constituting the largest appropriation allocated to taxonomic research in Finland (some 1.7 million euros, funding more than 50 studies).

⁸ <http://www.ym.fi/en-US/Nature>

A natural partner of the Finnish Museum of Natural History and other museums of natural history is the Finnish Environment Institute (SYKE). The division of duties between institutions should be developed further, for example, with respect to joint research objectives and the exchange of data materials. In cooperation with various administrative sectors, the University of Helsinki is examining different ways of supporting the Finnish Museum of Natural History, so as to enable it to serve even information and infrastructure needs related to species protection.

Measures, responsible bodies and target schedules

- 39) Identify and assess the status of ecosystems and ecosystem services in Finland, in line with the EU biodiversity strategy.
 - Ministry of the Environment, Ministry of Agriculture and Forestry
 - 2013–2014
- 40) Enhance the joint use of research and monitoring data between parties engaged in biodiversity research and monitoring (e.g. LYNET institutions, the planned Luonnonvaratutkimuskeskus [*Natural Resources Institute Finland*]) and users of data (e.g. authorities, land use planners, landowners). Establish a virtual information system (Finnish Biodiversity Information Centre) for the collection of species data that is now dispersed between various organisations, in order to digitise and facilitate the joint use of such data. Update and implement development proposals concerning the LUMONET portal, in order to develop it into a national channel for collecting and transmitting biodiversity-related data to a broad base of users (incl. researchers, decision-makers, media, landowners, amateur naturalists),⁹ while taking into account the conditions laid down in the Personal Data Act (*Henkilötietolaki*).
 - Ministry of the Environment, Ministry of Agriculture and Forestry, Ministry of Employment and the Economy, Ministry of Education and Culture, the Sámi Parliament
 - 2013–2020
- 41) Initiate the research programme, included in the Government Programme, aimed at assessing the financial impact of biodiversity and ecosystem services, as part of the green economy research entity.
 - Ministry of the Environment, Ministry of Agriculture and Forestry, Ministry of Employment and the Economy, Ministry of Education and Culture
 - 2013–2015
- 42) Clarify cooperation and the division of duties between the Finnish Museum of Natural History and the Finnish Environment Institute in basic taxonomic research, the production and storage of sample material and the monitoring of biodiversity, taking account of the development of state sectoral research institutions and of tasks performed under the regulations governing organisations.
 - Ministry of Education and Culture, Ministry of the Environment
 - 2013–2014
- 43) Continue the digitisation of the Finnish Museum of Natural History's taxonomic data and of key materials of regional museums and collections, and the production of checklists promoting the conservation of species. Operators will agree between themselves on the updating of species checklists, resources and digital exchange. Enhance the joint use of datasets on the Internet, by promoting the implementation of the objectives of the *Global Biodiversity Information Facility* (GBIF) in Finland.
 - Ministry of Education and Culture, Ministry of the Environment
 - 2013–2020
- 44) Continue the *Research Programme of Deficiently Known and Threatened Forest Species* (PUTTE). Compile identification guides on Finland's key groups of species. Engage in cooperation related to species, knowledge of them and their classification with, among others, Sweden's *Svenska artprojektet* project.

⁹ Development of the service must take account of the *Action Programme on eServices and eDemocracy (SADe)* and its objectives (www.vm.fi/sade).

- Ministry of the Environment, Ministry of Education and Culture
- 2013–2020

2 Challenges and measures regarding habitats and natural resources

2.1 Forests

Development challenges

The objective of Finland's National Forest Programme (*Kansallisen metsäohjelman* 2015), which was revised in 2010 and adopted in a Government Resolution, is to develop the forest sector into a biocluster that also produces materials and services on an extensive basis for various sectors. The aim is to boost well-being through diverse utilisation of forests and forest management. The goals of the programme include strengthening forest-based businesses, increasing production value, improving the profitability of forestry, and increasing forest biodiversity, while enhancing environmental benefits and the effects on well-being. In terms of biodiversity, the aim is to halt the decline in forest species and habitats, and to establish favourable trends in forest biodiversity.

To safeguard forest biodiversity in Southern Finland, the Government adopted (in 2008) the Forest Biodiversity Programme for Southern Finland (METSO). This programme aims to halt the decline in forest species and habitats, and to establish favourable trends in forest biodiversity by 2016. The Government Programme of Prime Minister Katainen's Cabinet (2011) includes the decision to continue the METSO programme until 2020. The Ministry of the Environment and the Ministry of Agriculture and Forestry are responsible for the implementation of METSO.

METSO is an action plan comprising 14 points. The measures listed can be divided into four themes:

- Improving Finland's network of protected areas
- Nature management in commercially managed forests
- Developing impact assessment and the measuring of results
- Collaboration between forest and environmental organisations, advice to forest owners, training of professional foresters, and communication

Although forest biodiversity is no longer declining as rapidly as before, there has been no halt in the overall trend. When assessed on the basis of genuine changes in species conservation status (excl. increasing knowledge, changes in criteria), forest species are still subject to more negative than positive changes. However, the status of forests is the best among all habitat types. Enhanced protection of forests and the application of nature management methods in commercially managed forests have achieved positive results. It should also be mentioned that some species have adapted to the changes resulting from forestry, while others have even benefited from them.

Measures, responsible bodies and target schedules

To achieve and maintain a favourable conservation status for forest species and habitats, long-term systematic development efforts and cooperation between various parties are required. The network of protected areas also needs to be developed, in order to enhance the representativeness and connectivity of protected forests in Southern Finland. The aim is to halt the declining trend in forest species and the mounting threat posed to habitat types, by combining methods, such as a regionally comprehensive network of protected areas and the application of nature management methods, in commercially managed forests.

According to Prime Minister Jyrki Katainen's Government Programme, the economic base of forestry and the forest industry will be reformed through the overhaul of forest legislation. In this way, biodiversity and its multiple use, and the interests of the national economy, wood users and forest holders will all be safeguarded.

- 45) Implement the measures included in the Forest Biodiversity Programme for Southern Finland (METSO) and secure funding for the METSO programme, in accordance with the Government Programme. Finalise the interim assessment of METSO and revise the METSO programme insofar as necessary.
 - Ministry of the Environment, Ministry of Agriculture and Forestry
 - 2013–2020
- 46) Implement measures included in the National Forest Programme (NFP), and evaluate and revise the programme insofar as necessary.
 - In order to support the multiple use of forests, their management should be diversified by modifying the following: regulations, forest management recommendations, forest planning and the related advisory services and training.
 - Develop the application of nature management methods in commercially managed forests, through a number of measures such as revising the funding system and forest management recommendations, overhauling guidelines, and training forest owners and forest-sector operators.
 - Allocate environmental subsidies to forestry effectively with respect to safeguarding biodiversity.
 - Ministry of Agriculture and Forestry, Ministry of the Environment
 - 2013–2020
- 47) Develop and test regional cooperation models suitable for privately-owned forests, for instance, through METSO cooperation network projects. Take the special characteristics of private forests into account in planning.
 - Ministry of Agriculture and Forestry
 - 2015–2020
- 48) Safeguard and take biodiversity and ecosystem services into account in state-owned, commercially managed forests, in accordance with the environmental guide of Metsähallitus.
 - Ministry of Agriculture and Forestry
 - 2013–2020
- 49) Pay attention to biodiversity values and the ecosystem services of state-owned recreational areas and research forests, for instance, in connection with the METSO action plan.
 - Ministry of Agriculture and Forestry, Ministry of the Environment
 - 2013–2015

2.2 Mires Development challenges

Although the loss of the mire habitat area has slowed since new drainage become less common, many land use pressures still threaten the natural state of the remaining mires. Peat extraction is among the most severe of these threats. At present, environmental permit procedures on peat extraction are pending for dozens of mires, primarily ones where no artificial drainage ditches are in place. With regard to these, the Ministry of the Environment and peat producers are negotiating on bringing mires (purchased for peat production purposes, but involving significant natural values) under state ownership for nature conservation reasons. Future threats to mires also include the digging of drainage ditches to make mires more productive for forestry purposes. In such cases, the drainage impact may extend to mires with no artificial drainage ditches. Among other factors, the felling of timber in mires with no artificial drainage ditches, and the preparation of soil, clearance of agricultural land, groundwater abstraction and construction of roads may still affect biodiversity in mire ecosystems. Climate change endangers palusa mires in particular, because ground frost-related phenomena are crucial to their preservation.

The Government passed a resolution on 30 August 2012 on the sustainable and responsible use and conservation of mires and peatlands (Valtioneuvosto 2012a). Policy definitions in the resolution are based on the proposal for a national strategy for the sustainable and responsible use and conservation of mires and peatlands, submitted to the Ministry of Agriculture and Forestry on 16 February 2011. The policy definitions of this resolution reconcile the use and conservation of mires and peatlands by directing activities which would cause considerable change to the mires towards sites which have been drained, or whose natural state has otherwise already undergone significant changes. This is done by implementing sector-specific strategies and measures relating to sustainable and responsible use, and by enhancing the representativeness and ecological functionality of the network of protected mires.

There is a need for an overall assessment of how various measures might contribute to enhancing the preservation of the ecological network of mires and improving the state of mires, and to promoting the sustainable use of natural resources located in mires. One of the key objectives of the proposal for a national strategy for the sustainable and responsible use of mires and peatlands (Valtioneuvosto 2012b) is to halt biodiversity loss in mires, to improve the state of mire ecosystems (mire complex types, mire types, species) and to establish a trend aiming at favourable conservation status. Measures undertaken to achieve this include, on the one hand, enhancing the representativeness and state of the network of protected mires, and, on the other, planning the allocation of uses that involve changes. The strategy includes a large number of proposals for enhancing the sustainable use of mires. A substantial proportion involve measures and projects or methods already in use. Enhancing their efficiency is considered vital. Means must be found for focusing new land use, which would entail considerable changes to mires, in mires and peatlands which have already been drained or whose natural state has otherwise been significantly changed. A key role in this respect is played by the selection of locations for peat extraction, digging of drainage ditches to make mires more productive for forestry purposes, and clearance of agricultural land in particular.

Measures to ensure the water balance of protected mires include restoration of drained mires, inspection of boundary lines and improving the water balance of the protected area, even in the planning and implementation of land use outside the protected area (such as digging of drainage ditches to render mires more productive for forestry purposes). To the south of Forest Lapland in Finland, protection of mire ecosystems is hampered by regional shortcomings and deficiencies in mire categorisation. The Ministry of the Environment has appointed a working group to prepare a conservation programme in line with the Nature Conservation Act (Complementary mire protection programme). By the end of 2014, this group will seek to define mires with natural values of national importance, and to prepare a proposal for the selection and definition of targets. A conservation programme in line with the Nature Conservation Act is achieving part of the Government resolution's objective of improving the state of mire ecosystems. Other measures aimed at the same goal include enhancing the efficiency of the METSO programme in the conservation of forested mires, and the development of voluntary conservation methods in line with the METSO model for open mires. Promoting the statutory conservation of habitat types and efficiently implementing land use planning and national land use guidelines also number among such measures.

Account should also be taken of the impacts of obligations and measures compliant with various laws on the use of mires and conservation of mire ecosystems. This issue is related in particular to legislative reform of the Nature Conservation Act, Forest Act and Environmental Protection Act, and to the implementation of water resources management legislation, the Water Act and water resources management action plans. In addition, account should be taken of the implementation of forest management instructions or recommendations, the implementation of forest planning and certification (incl. the directing of new land use, which involves considerable changes in mire ecosystems, to mires which have been drained, or whose natural state has been otherwise significantly changed) in both private- and state-owned areas.

Restoration of mires where the natural state has been considerably degraded, but which are still considered most valuable in terms of nature conservation, is vital in terms of safeguarding the biodiversity of mire ecosystems. Although restoration has so far only been carried out in protected areas, restoration of drained mire areas that are unprofitable to forestry, but which are linked to areas of natural mire habitat with no artificial drainage ditches of major natural value, would improve the natural state, overall ecology and functioning of these mire areas. This would also help to stabilise the state of mire species, while safeguarding the role of peat in mires as carbon sinks, and in the long term, would improve the quality of runoff waters. Experimentation and reinforcement of the knowledge base is still required for planning and implementation of the restoration of wooded mires and fens, few of which are protected. Adequate monitoring of the cost-efficient technical implementation of restoration, and the related ecological effectiveness and impacts, is also proving to be a challenge.

Measures, responsible bodies and target schedules

The aim is to safeguard the biodiversity and ecosystems of mire habitats and species, and to foster the stabilisation and strengthening of populations of threatened species.

- 50) Implement the Government resolution on the sustainable and responsible use and conservation of mires and peatlands. By the end of 2014, assess the impacts of the resolution and any further measures required.
 - Ministry of Agriculture and Forestry, Ministry of the Environment, Ministry of Employment and the Economy
 - 2013–2020
- 51) In order to sustain the natural water balance that maintains mire ecosystems which are already protected, revise the ecological definitions of such ecosystems, for instance, by applying voluntary conservation methods such as the METSO programme.
 - Ministry of the Environment, Ministry of Agriculture and Forestry
 - 2013–2020
- 52) Direct new land use, which would cause considerable changes to mires, to mires and peatlands that have already been drained or whose natural state has otherwise been significantly changed.
 - Ministry of the Environment, Ministry of Agriculture and Forestry, Ministry of Employment and the Economy
 - 2013–2020

2.3 Wetlands

Development challenges

Wetlands face various pressures.¹⁰ In eutrophic waterfowl habitats, invasion by aquatic plants is the major factor causing changes. This process reduces the area of open water and the mosaic of tuft and water surfaces in flood meadows — flood meadows dry up and willow thickets and birch stands become increasingly dense. In sea bays that are rich in nutrients, algae blooms occur, turning waters increasingly turbid and reducing the volumes of floating-leaf water plants and submerged plants. In most sea bays and along shallow shores, the dominant species is the common reed, driving out other vegetation from the areas. Water-level fluctuations, ice and currents keep water areas open and curb vegetation, but in most cases, more elevated flood meadows are overgrown with reeds and bushes. These changes have led to both the qualitative and quantitative impoverishment of wetland species. Eutrophication of waterbodies has produced and continues to produce new wetlands. Here, the challenge lies in monitoring this situation while also pursuing the completion of the Waterfowl Habitats Conservation Programme.

The state of wetlands has clearly declined in the last 30 years. The 2008 assessment of threatened habitat types in Finland revealed that 80 per cent of semi-natural wetland biotopes, and approximately one half of wetland habitats of the Baltic Sea coast and inland areas, are threatened. Correspondingly, the latest assessment of endangered species (2010) indicates that one quarter of wetland bird species are threatened. Recently, populations of common waterfowl nesting in wetlands, such as the wigeon (*Anas penelope*), the northern pintail (*Anas acuta*), the garganey (*Anas querquedula*), the tufted duck (*Aythya fuligula*) and the pochard (*Aythya ferina*), have been in intense decline. This has been particularly true in eutrophic, rather than oligotrophic, waters. In our internationally valuable wetlands (IBA areas), the conservation point value of avifauna has declined by 1.9 per cent a year since the 1960s. Basic remedial action in localities has succeeded in slowing the decline in conservation value, to 0.6 per cent a year only, whereas unmaintained or low maintenance localities have seen a decline of 2.2 per cent a year.

According to an estimate by the Finnish Environment Institute (SYKE), 163 areas listed in the Waterfowl Habitats Conservation Programme require urgent remedial action. In 2007, the remediation plan had been, or was being, implemented in 62 areas out of the aforementioned 163. Moreover, a remediation plan was completed or being planned for 30 areas, whereas 71 areas still lacked a plan. In addition, 32 conservation plans are being prepared for the management of the habitats of the southern dunlin (*Calidris alpina schinzii*) and for the remediation of areas

¹⁰ In this context, wetlands refer to waterfowl habitats and artificially created wetlands. Separate sections cover mires, inland waters and shallow sea areas. Wetland areas designated in Finland under the Ramsar Convention (1971) consist of mires, lakes, sea bays and archipelago areas significant to waterfowl.

suitable for this species. The areas included in the Waterfowl Habitats Conservation Programme cover only a few shore areas with herb-rich forest, typical of waterfowl wetlands, among the wooded mires and wooded flood meadows considered integral to the ecotones of vegetation in wetlands. In many cases, narrow definitions of protected areas impede remedial and management action.

The State is the major source of funding for remedial action in waterbodies. Every year, 2-3 million euros are channelled into remedial action via the Ministry of the Environment and Ministry of Agriculture and Forestry. Remediation is also carried out, for example, by the centres for economic development, transport and the environment, with employment funds. However, wetlands are still conceived too sector-specifically. Wetlands built to reduce discharges from agriculture and forestry into water also provide benefits for birds and other biodiversity conservation. It would be important to enhance cooperation between various parties, and to prioritise targets of remedial action on the basis of nature conservation and biodiversity values, in order to facilitate the conservation of wetlands. Extensive areas should be selected as targets of remedial action, and such action must take account of the entire catchment basin.

Although the conservation of wetlands has progressed in recent years, conservation targets remain partly unspecified. Wetlands are also important to hunting. Studies indicate that the use of wetlands could be improved by regulating hunting according to game management considerations, both regionally and time-wise in particularly important conservation areas for wild birds. It is vital to safeguard the natural dynamics of wetland bird populations and the autumn staging areas of migratory waterfowl much more widely than today, by reducing disturbances. Such restrictions would not be executed through unilateral decisions by authorities, but implemented in important hunting areas by reconciling the objectives of the various interested parties.

A new challenge lies in the objective of Finland's game husbandry wetland strategy (2011) to manage existing wetlands and establish new ones. This strategy emphasises hunters' and landowners' possibilities of enriching wetland ecosystems through voluntary measures. Effective communications are the key to implementing such projects, because they systematically guide active voluntary work by hunters and landowners, and their practical game management expertise, towards the remediation of small-scale wetland habitats. This would particularly benefit the habitats of game birds dependent on wetlands, which, in turn, would benefit biodiversity on a broader scale. To enhance the diversity of wetland ecosystems, former peat production areas could be restored into wetlands.

An action plan will be drawn up for halting the degradation of and improving the conservation value of wetlands. Its measures can be divided into four interlinking themes:

- Improving Finland's network of protected areas.
- Continuing and enhancing the application of nature management methods in wetlands.
- Improving the knowledge base, in order to facilitate the assessment and development of measures.
- Cooperation between agricultural, game and environmental organisations, the provision of advisory services to landowners, the training of water resource management professionals and communication with all of these parties.

Measures, responsible bodies and target schedules

The aim is to safeguard the biodiversity of wetlands and waterfowl habitats and species, and to stabilise and strengthen populations of threatened species.

53) Develop and implement an action plan for wetlands in Finland.

- Prepare an extensive wetland Life project 2014–2019.
- Restore other areas included in the Waterfowl Habitats Conservation Programme, in accordance with the agreed order of priority, maintain the results achieved and monitor the impacts of remedial action. Restore former peat fields into wetlands, restore former wetlands and create new ones.
- Implement the decisions of Ramsar, the international Convention on Wetlands of International Importance, especially with respect to waterfowl habitats and the objectives of the strategic plan (2009–2015). This will be done by establishing a national working group for wetlands, completing the list of Ramsar sites, updating the required inventory data, enhancing surveys of ecosystem services and the guidance on the

management and use of such services, and enhancing communications (Ramsar Convention's Communication, Education, Participation and Awareness Programm [CEPA]).

- Examine the possibility of phasing in the start of hunting seasons, by time and location in ways that benefit both game management and biodiversity.
- In cooperation with landowners, specify methods of waterfowl habitat conservation so as to enable landowners to promote the conservation of waterfowl habitats based on the greatest possible ecological diversity, and to enhance the sustainable use of game waterfowl populations.
- Ministry of the Environment, Ministry of Employment and the Economy, Ministry of Agriculture and Forestry
- 2013–2020

54) Implement a national wetland strategy for game husbandry for Finland. Continue systems providing subsidies for wetlands.

- Ministry of Agriculture and Forestry, Ministry of the Environment
- 2013–2020

2.4 Agricultural environments and semi-natural habitats

Development challenges

In the last decade, the number of farms has declined drastically in Finland, while their size has correspondingly increased. In particular, while the number of livestock farms has declined, livestock numbers on farms where production is continuing have increased and the number of grazing animals has fallen. Farms have specialised their production, and production has been specialised regionally and geographically. In turn, this has resulted in less-diverse habitats and landscapes. Economic changes in product prices and the terms of agricultural subsidies have decreased the significance of crop yield volumes to farmers' income. Agricultural subsidies are falling, with a declining trend in prospect. Land in good growth condition is a prerequisite for cost-efficient food production that makes sparing use of agricultural land, resulting in the freeing up of land, such as wide verges, for biodiversity purposes. Investments in good harvests are also important to curbing climate change: these enable farmers to focus on food production, while the forests they own can continue serving as carbon sinks.

Many species of flora, insects, birds and mammals are directly dependent on habitats formed by agriculture. Declining numbers of grazing animals, overgrowth of uncultivated fields, the declining area of verges and regression in the management of agricultural heritage habitats, have undermined the previously rich biodiversity of these environments. Increasing underground drainage has resulted in fewer open ditches and verges in farmland habitats since the 1950s. Verges are important routes for many animal species. Alongside buffer zones, more than 65,000 kilometres of verges have been established with the help of agri-environmental support.

Overgrowth of meadows and eutrophication are the reasons behind the declining numbers of key pollinating insects, such as butterflies and bees. The most valuable habitats for birds include green fallows, pastures, meadows and grasslands. Traditional farm habitats and wooded pastures also provide nesting sites and places of refuge, as well as sources of nutrition, for birds.

Management of semi-natural habitats in farmland has benefited from the agri-environmental scheme. However, since this system is primarily targeted at active farmers, certain semi-natural habitats have been excluded and are not being managed. Agri-environmental support in the programming period 2007–2013 expanded the range of beneficiaries in the management of semi-natural habitats and establishment of wetlands, by creating multiple functions, from farmers to registered associations, and thereby offering new opportunities for safeguarding biodiversity.

The preservation of semi-natural habitats requires either grazing or other active management. But the number of such habitats covered by management agreements will not suffice to preserve the species, ecological variation or regional special features characteristic of these agricultural environments. Another factor impeding the remediation and management of semi-natural habitats on farms lies in the declining presence of grazing animals on farms, while farms engaged in expanding production and enhancing their efficiency cannot spare the time to

manage such sites. Furthermore, changes in land use are rapidly rendering information on valuable natural sites obsolete.

Measures, responsible bodies and target schedules

Conservation and management of biodiversity in agricultural environments remain among the focus areas of diversified agriculture. Attention will also be paid to securing continuity in the management of semi-natural habitats and the species of fauna and flora dependent on them. Alongside this, the declining trend in the biodiversity of ordinary agricultural environments will be halted and such action will be prioritised as a goal. The significance of agricultural environments to other ecosystems will be taken into account in the planning of cultivation. Economic incentives, including agri-environmental subsidies, must be reformed in order to better enable them to secure sufficiently wide-ranging management of valuable semi-natural habitats. In addition, sites suitable for remediation and restoration are required. Their purposeful management may help restore original natural values. Up-to-date information on the preservation of sites is also needed, to facilitate the targeting of management efforts.

- 55) Policies and strategies promoting biodiversity, and measures promoting and conserving biodiversity, will be further developed in agricultural practices, for example, through targeting of the agricultural subsidy scheme. The need for food and biomaterials will be safeguarded through management of productive agricultural land. This will free up land for managing biodiversity and water resources protection in fringe areas. Simultaneously, contract models will be developed in order to safeguard ecosystem services, for example, for the maintenance of landscape and water resources.
 - Ministry of Agriculture and Forestry, Ministry of the Environment
 - 2013–2014
- 56) Update information on valuable semi-natural habitats and their management requirements.
 - Ministry of the Environment, Ministry of Agriculture and Forestry
 - 2013–2018
- 57) Promote the management of landscape and biodiversity in connection with active agriculture, by enhancing advisory services, education, training and research and cooperation between various actors. Support the preparation of general plans for wetlands, buffer zones and biodiversity.
 - Ministry of Agriculture and Forestry, Ministry of the Environment
 - 2013–2020
- 58) Safeguard the conservation of habitats and protection of routes of species dependent on agricultural environments, through environmental measures in agriculture.
 - Ministry of Agriculture and Forestry, Ministry of the Environment
 - 2013–2020
- 59) Secure continuity in the management of semi-natural habitats and other agricultural areas of high natural value, by reforming agri-environmental support for the programming period 2014–2020 and by increasing the number of semi-natural habitats being managed. In addition, develop other support measures outside agricultural policy, in order to maintain and boost the effective management of semi-natural habitats in protected areas and other areas outside farms.
 - Ministry of Agriculture and Forestry, Ministry of the Environment
 - 2013–2020

2.5 Substitute habitats

Development challenges

In naturally open habitats and in semi-natural habitats, natural values cannot be safeguarded through conservation alone, unless continuity of management can be ensured. In terms of management, sites outside farms in so-called substitute habitats are most problematic, as no system has been established to ensure their remediation and management in every respect. These substitute habitats have appeared as a consequence of anthropogenic activity — the parties responsible for their management and maintenance are not always aware of their significance to maintaining biodiversity. Such sites are therefore often destroyed inadvertently. On the other hand, regular management (mowing) of roadsides has shaped them into substitute habitats, where even

threatened species may occur. Separate measures, and knowledge of measures suitable for the restoration of these habitats, as well as the restoration or imitation of natural processes, are required in the management of substitute habitats.

Measures, responsible bodies and target schedules

The aim is to halt the decline of threatened open habitat types and the habitats that partly replace them, and of substitute habitats and their species. We must also improve the status of species and intervene in the causes of the decline. Through the management and remediation of semi-natural habitats, and other open habitat types and supplementary substitute habitats, a functional regional network will be created that facilitates the movement of species from one area to another and their expansion into new areas, as the measures to manage or restore such areas make them suitable for the species in question. The safeguarding of natural values along transport routes, such as roadsides (regional management contracts), will be reconciled with ensuring the safety and flow of traffic, and with other prevailing conditions.

- 60) Identify the existing substitute habitats considered valuable in terms of biodiversity (e.g. road verges, railway lines and sidings, open areas around power lines and waste land), and determine the number of substitute habitats that are becoming more common (e.g. green roofs) and their significance to biodiversity. Investigate the possibilities of managing and funding such habitats at regional and local levels.
 - Ministry of Transport and Communications, Ministry of Employment and the Economy, Ministry of Agriculture and Forestry, Ministry of the Environment
 - 2013–2020
- 61) Convert decommissioned mineral extraction sites into substitute habitats that are key to conserving biodiversity. For instance, species of sunlit habitats may thrive in such sites.
 - Ministry of Transport and Communications, Ministry of Employment and the Economy, Ministry of the Environment
 - 2013–2020

2.6 Geological formations and biodiversity

Development challenges

Finland's Land Extraction Act aims at the extraction of mineral resources in a manner that supports environmentally sustainable development. Meeting this objective requires information on the natural values of geological formations, groundwater conditions, and on the quantity, quality and consumption of exploitable mineral aggregate.

Gravel and sand have become less readily available, particularly in the environs of large growth centres. Correspondingly, the volume of rock aggregate used has increased. The need to reconcile mineral aggregate supply with other forms of land use, such as infrastructure construction and protection (incl. the protection of groundwater areas) is increasingly emphasised in the utilisation of mineral aggregate. In order to safeguard biodiversity, permit procedures in accordance with the Land Extraction Act, and enhancing the efficiency of regional planning in support of the terms of the Act, are required in order to reconcile the use of mineral aggregate and other forms of land use. In doing so, account must be taken of the utilisation of gravel and sand resources in sea areas.

Business activity in the mining sector has picked up dramatically in Finland, due to a variety of factors. These include increasing demand for basic metals, liberalisation of markets, and more efficient ore prospecting. Other contributing factors include Finland's diverse and well-known mineral resources, and high ore potential. Supranational mining companies seek to establish business in areas with the best estimated possibilities for success, evaluated on the basis of geological and various socio-economical factors. International evaluations rank Finland as one of the foremost target countries for mining operations. At present, mining is intensively focused on Eastern and Northern Finland.

The Mining Act of 1965 has been completely revised. The new Mining Act, which entered into force on 1 July 2011, transferred the mining duties of the Ministry of Employment and the Economy to the Finnish Safety and Chemicals Agency (Tukes), with certain exceptions. The objective of the new Act is to safeguard mining and ore prospecting in a socially, economically and ecologically sustainable manner. Under the Act, permit consideration is based on a comprehensive survey, taking account not only of the requirements of ore prospecting and mining, but also other factors such as the environmental impacts of operations, impacts on the landscape, land use and safety (incl. sparing use of natural resources, nature conservation and the reconciliation of the different needs for use of areas). Additionally, possible restrictions in other legislation, such as the Nature Conservation Act, should be taken into account when granting permits. Environmental permits for mining are determined under a permit procedure in accordance with the Environmental Protection Act.

Measures, responsible bodies and target schedules

The need to reconcile infrastructure construction with conservation is emphasised in the conservation of geological formations valuable to biodiversity. Extraction of mineral resources in a manner that supports sustainable development and biodiversity requires basic knowledge of the quantity, quality and consumption of groundwater and mineral aggregates, alongside environmental conditions and natural values. Ecologically sustainable use of mineral resources is aimed at reducing the use of virgin mineral aggregate resources. The effectiveness of permit procedures implemented in line with the Land Extraction Act in the conservation of biodiversity depends on how well the natural and landscape values of areas are known.

The new Mining Act established the Finnish Safety and Chemicals Agency (Tukes) as Finland's new mining authority. Tukes decides on permits for ore prospecting, mining and gold panning; grants mining safety permits; supervises ore prospecting, mining and gold panning; manages the permit-related information service and maintains the mining information register. In the initial stages, there have been severe delays in the consideration of permits by the new mining authority. For Tukes, the key near-term challenge lies in building trust and partnerships with stakeholders, and in recruiting new human resources.

- 62) Develop legislation governing the use of land and sea areas, and planning and research, in support of the sustainable use of mineral resources. In line with Finland's Baltic Sea Action Plan, prepare a plan on the extraction of sea sand and mineral resources covering Finland's coastal areas, in order to limit any harm caused by such activity. Examine the relation between the Land Extraction Act and Mining Act with respect to threatened rocky habitats.

- Ministry of the Environment
- 2013–2020

- 63) Finalise inventories of geological formations and ensure the easy availability of inventory data for use by authorities, planners and parties extracting materials. Complete and maintain the mineral resource accounting system, in line with the objectives for the sustainable use of materials. Complete and update the material of the project for the reconciliation of groundwater conservation and mineral material supply (POSKI) as regards natural values, to assist in land use planning.

- Ministry of the Environment, Ministry of Employment and the Economy
- 2013–2020

2.7 Lakes, rivers and other inland waters

Development challenges

Relatively little is known about the biodiversity of inland aquatic environments, both as regards species and habitat types. The gaps in our knowledge are particularly huge with regard to underwater environments. Very few small water bodies remain in their natural state. Although attention has been paid to their conservation, for example, in the Water Act and Forest Act, as well as in forest management instructions and recommendations, they are often in a poor state. Further measures should be taken to protect them.

Most rivers are in a satisfactory or poor state. In many localities, old dam structures present obstacles in rivers and streams to the passage of fish and transfer of sludge. Poor water quality in coastal rivers and the prevention of fish migration by power plants and other obstructions are the factors most detrimental to migrant fish. Acidification and metals still constitute a major regional problem in rivers and streams in Ostrobothnia. These can result in fish deaths and can cause changes in the structures of biotic communities.

Restoration of rivers and streams, and remediation of habitats, bring ecosystems in rivers and streams closer to their natural state, while reintroducing threatened species to river and stream habitats that have been changed. This revives threatened and declining migrant fish stocks and other ecosystems in rivers and streams.

Point-source pollution in inland waters has decreased. However, a decrease in the volumes of diffuse pollution, particularly from agriculture and forestry, is still a difficult challenge because of the increase in winter precipitation due to climate change. Loads caused by peat production on inland waters also lead to oxygen depletion, eutrophication and changes in water ecosystems. In many lake regions, prime shores for secondary residences are already built up. New coastal properties are located on shores less suitable for recreational use, thus increasing the need for dredging.

There is a great need for information on the environmental impacts of livelihoods that utilise natural resources. Investments should be made in the objective assessment of environmental impacts, particularly as concerns inland waters, in order to guide economic activity to generate the expected environmental impacts, and to justify the introduction of new technologies and restrictions.

Measures, responsible bodies and target schedules

The implementation of regional water resources management and action plans, and of the water resources management implementation plan 2010–2015, will also promote the conservation of biodiversity and the pursuit of sustainable use objectives. During the revision of water resources management and action plans, particular attention will be paid to the objectives of conserving biodiversity and sustainable use. Water resources management measures will reduce the pressures on waters, in particular, nutrient and detrimental substance loads. The indirect and direct impacts of measures on the aquatic environment will be minimised during hydrogological engineering and in regulation of waterways. The biodiversity of the aquatic environment will be restored through remediation and restoration actions, and by preventing the spread of invasive alien species and their detrimental impacts in aquatic ecosystems. At the same time, the biodiversity of wetland habitats, the aquatic environment and underwater habitats and species will be safeguarded, while actions will be taken to promote the establishment and strengthening of threatened species populations.

- 64) The starting point for reforming the agri-environmental scheme will be the national and EU-level objectives for the conservation of aquatic environments and other biodiversity. Subsidies will be allocated to the most efficient measures and to the areas with the highest loads.

- Ministry of Agriculture and Forestry, Ministry of the Environment
- 2013–2014

- 65) Continue to reduce the detrimental impacts from the regulation of water and developing practices for the release of water in cooperation with permit holders, municipalities and other key actors. Continue the removal of fish to reduce nutrient loads in aquatic ecosystems and to prevent eutrophication.

- Ministry of Agriculture and Forestry, Ministry of the Environment
- 2013–2020

- 66) Implement regional water resources management plans and action plans, and the National Programme for the Implementation of River Basin Management Plans for inland and coastal waters, including quantitative objectives.

- In connection with the revision of water resources management plans and action plans for the following water resources management period, particular attention will be paid to the objectives of conserving biodiversity and sustainable use.

- Initiate restoration projects to promote biodiversity in water bodies, in accordance with the water resources restoration strategy.
 - Prepare and initiate a restoration strategy and programme for small water bodies, as part of the national plan for the implementation of water resources management.
 - Assess the biodiversity of inland water ecosystems, particularly as concerns underwater habitats and species.
 - Improve cooperation between water resources and nature conservation sectors, and enhance research into water resources management, with emphasis on the catchment basin as a whole.
 - Ministry of the Environment, Ministry of Agriculture and Forestry
 - 2013–2020
- 67) Reduce the degradation of ecosystem services due to business operations, such as peat production and mining, for example, by reducing environmental impacts detrimental to nature and recreational use, and to traditional Sámi livelihoods, particularly where discharges into water and other emissions are involved, by enhancing the effectiveness of the sector's own environmental protection measures, implemented using the best available technology.
- Ministry of Employment and the Economy, Ministry of the Environment
 - 2013–2020

2.8 Baltic Sea and shores

Development challenges

The programme of work on marine and coastal biodiversity (2004) under the Convention on Biological Diversity seeks to promote the integrated management and use of habitats, the sustainable use of marine and coastal natural resources, and the management of protected areas. The programme of work also includes objectives related to alien species, food production and genotypes.

In accordance with its international conventions and commitments, and alongside the other Baltic Sea states, Finland was to establish an ecologically uniform, well-administered network of protected marine areas by 2012. In its territorial waters, Finland has achieved the area-related objectives (see Appendix 3) of the Baltic Sea Protected Areas (BSPA) network, based on the Convention on the Protection of the Marine Environment of the Baltic Sea Area (HELCOM). In addition, on 1 March 2012 the Government decided to expand the Natura 2000 network with five new high sea areas (totalling 30,000 hectares), situated both in Finland's territorial waters and in the exclusive economic zone (EEZ) outside its territorial waters. Because of the expansion of the Natura network with the addition of the high seas areas, the percentage of BSPA areas will also increase in the EEZ, since the intention is to designate these areas as BSPAs. Although the objective set for the Baltic Sea is achieved in terms of sea area, additional efforts are required to ensure that management and use plans covering protected sea areas are ready and function properly.

The key challenge for the sustainable use of the Baltic Sea and the coastal areas is posed by lack of information on the biodiversity of underwater habitats, and the lack of detailed information on areas that are regionally, locally and species-specifically significant in ecological terms. Broad-based and reliable information on underwater habitats is also required for planning in accordance with the sustainable development of coastal zones, in line with the European Union's recommendation *Integrated Coastal Zone Management* (ICZM), and for the future planning of marine areas. Information is also required as a basis for establishing a favourable conservation level of underwater habitats and species, and the assessment of possible conservation measures. To facilitate the production of knowledge on marine and coastal ecosystems, the Ministry of the Environment has established the Finnish Inventory Programme for the Underwater Marine Environment (VELMU) in 2004, implemented through cooperation between the environmental administration, several ministries, Metsähallitus, universities, research institutions, NGOs and stakeholder groups.

Under the leadership of the Ministry of Agriculture and Forestry, Finland has prepared a national strategy for invasive alien species, which also deals with the issue of invasive alien species in the Baltic Sea. Finland lacks an assessment of the measures that the CBD's programme of work on marine and coastal biodiversity requires in addition to those already implemented and projects already planned.

Measures, responsible bodies and target schedules

Finland aims to achieve a regionally and biologically representative standard of conservation for marine and coastal ecosystems, in line with marine management planning, the Programme for the Protection of the Baltic Sea (2004) and other international conventions and commitments. The Act on the Management of Water Resources and the Marine Environment (272/2011) and the Government Decree on the Management of the Marine Environment (980/2011) define the objectives and measures determined for achieving a good status for the marine environment by 2020. A total of 11 qualitative indicators are applied in defining good status. One of these involves biodiversity, whereby the quality and occurrence of habitat types and the distribution and abundance of species correspond to prevailing physiographic, geographic and climate conditions. Simultaneously, the parties responsible for implementing measures included in the act and decree are being identified. In accordance with the plan, by mid-2012, a preliminary assessment must be prepared on the current status of marine areas, a definition must be arrived at of what constitutes a good status for the Baltic Sea, and environmental objectives and indicators must be defined. By mid-2014, a monitoring plan must be drawn up, and the related implementation and action plan must be completed by 2015. The deadline for achieving the environmental objectives of the water resources management plans and implementation plans may, under certain conditions, be extended to 2021 or 2027. Although the status of coastal waters shows slower improvement than that of inland waters, the aim is to achieve a good status for them too, no later than by 2027.

As the detrimental impacts of activities altering marine ecosystems, such as construction, dredging and eutrophication of waters, are reduced, the natural state of habitat types will improve – even outside protected areas.

- 68) Implement the Government's resolution on Finland's Baltic Sea protection programme and substantially reduce nutrient loads into the Baltic Sea, through international cooperation. Implement HELCOM's Baltic Sea Action Plan (BSAP), alongside HELCOM's recommendations.
 - Ministry of the Environment, Ministry for Foreign Affairs, Ministry of Education and Culture, Ministry of Agriculture and Forestry, Ministry of Transport and Communications, Ministry of Employment and the Economy
 - 2013–2020
- 69) Evaluate the biodiversity of Finland's coastal ecosystems by completing the Finnish Inventory Programme for the Underwater Marine Environment (VELMU). Evaluate the need for increasing the number of marine protected areas, or the need to expand the area of current protected areas.
 - Ministry of the Environment, Ministry of the Interior, Ministry of Defence, Ministry of Education and Culture, Ministry of Agriculture and Forestry, Ministry of Transport and Communications, Ministry of Employment and the Economy, Ministry of Finance
 - 2013–2015

2.9 Fish stocks and fishing

Development challenges

The state of threatened and degraded fish stocks can primarily be improved through measures that support natural reproduction. These include restoration of potential spawning and nursery areas, construction of fishways and natural by-pass channels, removal of obstacles preventing fish migration up and down rivers, decreasing loads, and the use of natural hydrological engineering methods. The impacts of these measures will be enhanced by regulating fishing and fish introductions (Section 5.1, measure 95) and by providing guidance on, among others, the sustainable use of migrating fish populations.

Fish diseases are characteristically hard to predict and the disease scene changes rapidly. Disease in fish is caused by bacteria, viruses, fungi, parasites and stress-associated factors from production. Fish diseases may result in a high-number of deaths, often affecting one species in particular. More widespread epidemics may often be connected to changes in water quality and temperature, which causes the general condition and resistance of fish to weaken.

Crayfish plague is the most common cause of death in Finland's crayfish populations. This is a water mould that is widespread, and it has destroyed the population in many parts of the country. The signal crayfish, which is more resistant to the plague than Finland's native crayfish population, is partly accountable for spreading this disease.

The most significant threats include the spread of disease into new areas, and into Finland. The risks of new viral diseases and virus strains entering the country are growing alongside the import of live and slaughtered fish. The fact that not all actors in the business are aware of the consequences of disease, or familiar with instructions and regulations on disease prevention, is elevating the risk of the spread of diseases.

Measures, responsible bodies and target schedules

- 70) Organise fishing and fish resource management sustainably, by overhauling the Fishing Act, based on the best available information, so as to secure the sustainable and diverse output of fish resources, their conservation and that of fishing traditions based on sustainable use, as well as safeguarding the natural lifecycles of fish stocks and biodiversity of fish resources and other aquatic ecosystems.
 - Ministry of Agriculture and Forestry
 - 2014–2020
- 71) Implement a national fishway strategy to strengthen the natural reproduction of threatened populations of migrant fish, and enhance their vitality through the elimination of obstacles to migration, the development of regulation and other measures. Strengthen depleted natural fish stocks through the introduction of spawn and fry if necessary, wherever this does not involve genetic risks.
 - Ministry of Agriculture and Forestry
 - 2014–2020
- 72) Implement the European Union's multiannual plan for the management of the Baltic salmon stock.
 - Ministry of Agriculture and Forestry
 - 2014–2020

2.10 Game animals, game resources and hunting

Development challenges

Changes in agriculture, forestry and land use have altered habitats. Places of refuge for animals in field areas have almost disappeared and their numbers in forest areas have been reduced. This poses a significant threat to gallinaceous birds in particular.

Invasive alien species may also affect the biodiversity of wildlife species. Factors such as interbreeding with invasive populations may weaken the existing population or impede the success of native animal species. For instance, North American (Canadian) beaver may slow down growth in the numbers of European beaver. Invasive alien species may also influence the occurrence of diseases and parasites. Game animals may catch many diseases and parasites, such as avian influenza, rabies, tapeworm or echinococcus, and tularemia. Climate change can also pose a threat to game animal populations, such as willow ptarmigan (*Lagopus lagopus*), rock ptarmigan (*Lagopus mutus*) and mountain hare that have white winter plumage or pelage and therefore encounter problems as snowless periods become increasingly common.

Higher numbers of large carnivores and seals, and their social-behavioural impacts, including the damage caused by conflicts, pose further challenges to reconciling hunting and the conservation of species. Finland's policy concerning large carnivores and seals relies on the use of management plans as tools for reconciling various interests. Implementation of the EU's Habitats Directive in Finland's circumstances has proven somewhat problematic as concerns large carnivores. They cause damage to domestic animals and reindeer husbandry, while deer pose the same threat to forestry, transport, gardens and agriculture, and Baltic grey seals to commercial fishing and aquaculture. The damage incurred must be put into perspective in relation to population management.

Measures, responsible bodies and target schedules

Hunting will be based on principles of sustainable use. As such, it will not endanger game populations or disturb the behavioural habits or natural dynamics of game species. The vitality of game species will be preserved while ensuring that damage caused by game animals (e.g. elk damage) is kept to an acceptable level, by means of regulating the population and preventive measures. Populations of large carnivores must be maintained on sustainable levels, while acknowledging the safety requirements of people and production animals, and biodiversity. Effective measures must be taken against poaching. This is particularly necessary with respect to large carnivores, because hunting offences against them renders the implementation of systematic large predator policies more difficult. The habitats of game animals will be developed further and safeguarded in forests, and agricultural and aquatic environments.

- 73) Game population management will ensure the conservation of game species habitats, their natural patterns of behaviour and annual cycles. Hunting will adhere to principles of sustainable use. Monitoring of game populations will be enhanced and, with the information gained, the sustainable use and management of game populations will be secured.
 - Ministry of Agriculture and Forestry, Ministry of the Environment
 - 2013–2020
- 74) Prepare and implement population management plans for threatened game species of significance to nature conservation or other social or economic aspects.
 - Ministry of Agriculture and Forestry, Ministry of the Environment
 - 2013–2020
- 75) Restrict damage to forestry, agriculture and transport caused by game animals, not only by planning bag limits for hunting but also through preventive measures such as fencing, repellents, game bridges, subway tunnels and salt blocks.
 - Ministry of Agriculture and Forestry, Ministry of Transport and Communications
 - 2013–2020
- 76) Apply game management methods to limit the detrimental impacts of invasive alien species on native game animal populations and other aspects of nature. Prevent the introduction of new game species and populations of alien origin to Finland, and their release into the natural environment.
 - Ministry of Agriculture and Forestry, Ministry of the Environment
 - 2013–2020
- 77) Apply efficient measures in order to prevent poaching. Strengthen wildlife surveillance by Metsähallitus, enhance advisory services of the Finnish Wildlife Agency and improve the ability of the police to intervene in hunting offences.
 - Ministry of Agriculture and Forestry, Ministry of the Interior
 - 2013–2014

2.11 Nature in northern regions and reindeer herding

Development challenges

According to estimates, climate change will be the most dramatic in northern regions. Rising temperatures will cause the tree line to shift gradually higher, reducing the area of bare fjeld region above the treeline. Invasive alien species and the movement of the tree line further and further north will lead to changes in vegetation and biota in the region, affecting the traditional use of nature in the area.

Climate change, with the associated changes in temperature, precipitation and wind conditions, is difficult to predict, and its impacts on species and various habitat types can vary greatly. It may also modify biological interaction, thereby undermining the predictability of the resulting changes. Warm winters may boost the occurrence of mycoses and pest insects (such as the damage caused by autumnal moths and European winter moths), and aggravate extreme weather phenomena, which may also slow down or prevent afforestation. Melting of palsa mires is one example of the impacts of climatic warming. Climate change poses an extremely severe threat to arctic fell environments, and adapting to it is a challenge not only for biodiversity, but also for traditional livelihoods. Climate

change threatens the conservation of the Sámi people's traditional knowledge and customary use of nature, such as reindeer husbandry. The detrimental impacts of climate change on reindeer husbandry could be minimised by taking the right measures, thus safeguarding the continuity of the reindeer husbandry culture¹¹.

In the Sámi Homeland, beautiful scenery, national parks and a rich natural environment attract tourists, which is extremely significant to the regional and local economy. Improperly planned land use, tourism and transport solutions over the next few years, and activities such as mechanical gold mining and gold panning, may lead to the local weakening of biodiversity and conditions for the traditional use of nature.

In the Sámi Homeland, reindeer husbandry is of special cultural significance; guaranteeing its continuance requires attention to the special nature of the region in other forms of land use. Different forms of land use influence the reindeer pasture environment and reindeer husbandry in various ways, affecting the condition of pastures and status of habitat types. The condition of pastures has also suffered due to grazing pressure by reindeer and elk, and intensive forestry. The latest pasture inventories (Kumpula et al. 2009, also Mattila & Mikkola 2009) indicate that lichen pastures are highly eroded in most parts of the reindeer-herding co-operatives in the northern part of the reindeer-herding area, while reductions in the amount of lichen in pastures and the surface vegetation biomass have occurred from the mid-1990s until the period between 2005 and 2008. Fifteen percent of fell area habitats have been classified as endangered. These include habitats in both the mountain birch region and in the bare fjeld region above the treeline. The most significant factor in the mounting threat faced by several habitat types is intense reindeer grazing. On the other hand, grazing may also have positive impacts on some habitat types by maintaining them.

As a consequence of global warming, snow has begun to melt earlier in the spring over the last few decades. Earlier melting of snow has a major impact on the terrestrial reflection coefficient, or albedo. The albedo of snow is considerably higher than that of bare ground. Ground with no snow cover is much darker, and absorbs the majority of sunlight energy. Rich vegetation accelerates the melting of snow. Intensive reindeer grazing slows down the melting of snow in springtime, which may have a dampening effect on global warming.¹²

Comprehensive land use planning is a prerequisite for ecologically, economically and socially sustainable reindeer husbandry. In addition to improving the ecological state of reindeer lichen, and, for example, safeguarding the regeneration of mountain birch and regulating the numbers of reindeer and elk, more attention will be paid to developing and implementing well-functioning pasture rotation schemes. New research data is also needed as a basis for planning and providing guidance in order to meet the needs of administration, business and reindeer breeders. Simultaneously, within the framework of national legislation, the voluntary *Akwé: Kon* Guidelines, adopted by COP 7, will be taken into account in safeguarding Sámi traditional knowledge and reindeer husbandry, and in promoting the sustainable use of nature. Metsähallitus is already experimenting with the *Akwé: Kon* Guidelines in practice.

Measures, responsible bodies and target schedules

Prepare for the consequences of climate change in northern ecosystems by enhancing research and monitoring, and establishing adaptation strategies for livelihoods. Improve the condition of pastures by reducing the pressures causing change and by adapting reindeer husbandry, as well as possible, to prevailing pasture and environmental conditions (incl. the number of reindeer and development of annual pasture rotation and grazing). Reindeer husbandry based, insofar as possible, on the sustainable use of natural pastures and their safe ecological limits would also contribute to improving the state of arctic fell environments and ecosystems, and to safeguarding the prerequisites for reindeer husbandry. In forest areas, felling practices must be improved to facilitate better preservation of winter fodder for reindeer, such as horsehair lichen in forest stands, from one generation of trees to another.

- 78) Guide land use in the northern wilderness and protected areas, and business based on nature tourism and biodiversity, so as to provide incentives for safeguarding biodiversity, while reconciling various

¹¹ In Finland, the reindeer herding area and the Sámi Homeland are not the same. The reindeer herding area is considerably larger than the Sámi Homeland.

¹² Juval Cohen (Finnish Meteorological Institute).

interests. Promote comprehensive land use planning in arctic fell areas, utilising the Akwé: Kon Guidelines, in order to reduce conflicts between reindeer husbandry and other forms of land use, and to alleviate detrimental impacts on arctic fell environments.

- Ministry of the Environment, Ministry of Agriculture and Forestry, Ministry of Employment and the Economy, the Sámi Parliament
- 2013–2020

79) Develop pasture rotation in reindeer husbandry and pasture inventories in order to safeguard the carrying capacity of pastures, in cooperation with reindeer owners' associations, taking into account research data on the subject, traditional Sámi knowledge of biodiversity, and other knowledge related to reindeer husbandry. Encourage reindeer owners' associations to draw up reindeer husbandry plans with multiple goals. Continue monitoring the condition of reindeer pastures and develop pasture inventory methods.

- Ministry of Agriculture and Forestry, Ministry of the Environment, the Sámi Parliament
- 2013–2020

2.12 Urban and built areas

Development challenges

Finland's current legislation includes tools for slowing down the loss of biodiversity in urban environments. However, not enough is known about the special characteristics of urban environments and mechanisms influencing their biodiversity. This, in turn, hampers value judgments of urban environments, formulated in pursuit of biodiversity conservation. On the other hand, research on urban environments has developed in leaps and bounds in recent years, and research results are already being applied in practice.

The national urban park model is one of the tools available for the planning of sustainable cities. The aim of this model is to preserve both the natural and cultural heritage in comprehensive, intact entities while enabling effective construction of areas undergoing change. On the other hand, it should not be forgotten that in cities even small-scale natural areas are vital to the production of ecosystem services. Although extensive areas are important both to biodiversity and ecosystem services, they cannot replace the oft-used and easily available local natural areas in cities as, say, a source of recreation and health. Since urban green spaces are linked to the natural environments of the surrounding rural areas, development challenges also extend to the countryside and the management of rural cultural landscapes. In the implementation of the associated aims, it is extremely important that rural areas remain populated.

Measures, responsible bodies and target schedules

The aim is to improve the level of knowledge of the biodiversity of urban environments and to promote the accessibility of information on nature, as a basis for land use planning and decision-making and to meet the need to monitor changes. All of this will be done in order to develop land use and other planning processes in a way that takes into account the conservation of biodiversity in urban nature and nature in built up areas; to safeguard biodiversity in urban nature and nature in built up areas, thus supporting the sustainable production of ecosystem services; to slow down the fragmentation and isolation of natural areas, through land use planning and measures for the consolidation of green infrastructure; to expand the network of national urban parks and use it as an area for testing best practices; and to increase environmental education on urban nature and nature in built up areas, and its significance to people and nature.

80) Slow down the loss of biodiversity in urban and built up areas by increasing knowledge of the subject and developing the related land use planning, so as to take into account the conservation of biodiversity.

- Encourage municipalities to evaluate unbuilt areas — significant in terms of biodiversity in urban and built up environments — and the threats they face, and to develop methods of measuring changes in them.

- Promote the protection and restoration of areas important to conserving biodiversity and the corridors between them in urban environments, and in connection with the surrounding populated and viable rural areas.
 - Develop the principles and methods of planning and managing urban and built up environments, from the perspective of biodiversity conservation.
 - Promote catchment basin-specific storm water programmes in urban and built up areas in order to reduce storm water volumes and enable their natural management (e.g. storm water wetlands) and to promote biodiversity. Ensure continuity of research related to storm water.
 - Ministry of the Environment, Ministry of Education and Culture, Ministry of Social Affairs and Health
 - 2013–2020
- 81) Complete the network of national urban parks in Finland.
- Ministry of the Environment
 - 2013–2020

3 Restoration of habitats and nature management

Development challenges

Protection of ecosystems that are in their natural state and the restoration of degraded ecosystems are important both in terms of conserving biodiversity and ecosystem services, and for mitigating and adapting to climate change (Section 1.7). According to a decision under COP-10 (Nagoya 2010), and the European Union's Biodiversity Strategy 2020, at least 15 per cent of degraded ecosystems must be restored by 2020 as part of the global target.

It is estimated that current protected areas owned by the state and private landowners include more than 20,000 hectares of mires requiring restoration. The equivalent figure in forest restoration and nature management amounts to approximately 10,000 hectares. New needs assessments will be completed, in accordance with the METSO programme update, by the end of 2012. According to an assessment, wetland restoration and management measures are required in a total of 162 Natura 2000 sites, but work has only begun in 55 areas. Because of the METSO action plan, the number of protected areas requiring restoration is continuously growing.

The area of privately owned commercially managed forests in which nature management and restoration measures are implemented should, in accordance with the objectives of the METSO programme, be considerably increased from the current level. This will require the reorganisation of implementation and funding for nature management projects, as well as the adoption of other development measures.

Measures, responsible bodies and target schedules

Finland's aim is to plan and implement restoration and nature management measures locally and regionally, in order to increase the nature conservation value of target sites and support the development of an ecologically functioning network of protected areas. The effectiveness of restoration and nature management will be monitored by continuing the monitoring of protected areas and expanding it to cover habitats and categories of measures that are inadequately covered at the moment. The connectivity between protected areas and surrounding areas will be improved by developing nature management in commercially managed forests. A future aim is to invest more in the restoration of open habitats not covered by the METSO programme, such as waterfowl habitats and other wetlands, so as to safeguard species and habitats typical of wetlands and populations of threatened species.

- 82) Restore degraded ecosystems and maintain and improve the production of ecosystem services.
- Criteria for the effective focusing of restoration will be developed in order to better select sites for restoration. Restoration of sites meeting the criteria will contribute towards achieving the global restoration target of 15 per cent.
 - An expert working group will consider the needs and methods for the targeting of restoration, and the time span required for restoring degraded ecosystems.
 - Develop restoration and remediation methods and their cost-efficient targeting, and methods for assessing the impacts of measures and monitoring their effectiveness.

- Expand measures more comprehensively to cover open habitats.
 - Link restoration methods so as to better promote the improvement of conservation levels of threatened species and habitat types, and to enhance the ecological quality of the network of protected areas, and its functionality and connectivity, so as to provide buffering as regards climate change. The ecosystem approach should be applied in the planning of restoration measures.
 - Identify possible legislative obstacles to the restoration of habitats.
 - Ministry of the Environment, Ministry of Agriculture and Forestry
 - 2013–2020
- 83) Increase knowledge of the carbon balance of different types of mires, for example, the carbon-sink capacity of mires and methane emissions into the atmosphere.
- Ministry of Agriculture and Forestry, Ministry of the Environment
 - 2013–2020

4 The Sámi indigenous people and biodiversity

Development challenges

The Government Programme of Prime Minister Jyrki Katainen's cabinet includes an undertaking to safeguard the cultural customs and traditions of the Sámi people's use of nature, in the implementation of the national biodiversity strategy. Finland has not yet ratified the International Labour Organisation's Convention 169 concerning Indigenous and Tribal Peoples, because Finnish legislation cannot be construed as corresponding to the regulations of the ILO Convention on Sámi rights concerning land. The Government Programme states the intention of ratifying the aforementioned ILO Convention during the current term of office. Negotiations on a Nordic Convention on the Sámi were initiated between Finland, Sweden and Norway in March 2011, with the aim of concluding them within five years.

The final report of the national working group on Article 8(j)¹³ lists 28 proposals for measures that take account of traditional Sámi knowledge on biodiversity, in legislative and administrative development projects and training. The working group proposes that resources be allocated for the preservation, research on and restoration of traditional knowledge. Using the appropriate accounts and reports, Finland must also prepare to introduce indicators approved in the CBD for describing the status and development of various aspects, including traditional Sámi knowledge, innovations and practices.

Collecting traditional knowledge will not suffice as such to preserve knowledge, customs and innovations in the manner required by the CBD, since threatened traditional knowledge should also be restored to the Sámi community. The collection, storage and use of traditional knowledge also have ethical and proprietary rights implications. The Sámi's traditional knowledge of biodiversity forms an integral part of their cultural heritage, property, traditional livelihoods and languages. Preserving such traditional knowledge must not lead to its exploitation against the will of the Sámi and traditional knowledge must be maintained within the Sámi community. On the other hand, databases that include traditional knowledge may be useful to preserving, reviving and restoring such knowledge.

Measures, responsible bodies and target schedules

Finland aims to promote the maintenance and preservation of the traditional Sámi way of life and culture, and the northern biodiversity supporting it, within the Sámi Homeland. The objective is to halt the decline in the Sámi's traditional knowledge, land use practices and customary laws related to biodiversity, while ensuring that the original northern biodiversity of the Sámi Homeland region is conserved in culturally sustainable ways for future generations.

When developing legislation, steering and administration regarding land use and the management, use and protection of natural resources, the prerequisites for Sámi culture and traditional knowledge related to biodiversity

¹³ Article 8(j), text, see Ministry of the Environment 2013.

will be safeguarded, while taking account of the voluntary Akwé: Kon Guidelines of the CBD. In order to safeguard Sámi traditional knowledge, practices and innovations, Sámi traditions of reindeer husbandry, fishing, hunting and handicraft will be revived to preserve traditional knowledge for future generations. Finland must also commit itself to developing the operational capabilities of the Sámi, including the status of women in particular, while securing the opportunities of the Sámi to take part in such activities at all necessary levels. The Ministry of the Environment will appoint a new Article 8(j) working group in the spring of 2013.

84) With respect to taking into account traditional Sámi knowledge on biodiversity, efforts to examine the conditions for ratifying the ILO's Indigenous and Tribal Peoples Convention will be continued in accordance with the objective included in the Government Programme, bringing to a conclusion negotiations on a Nordic Convention on the Sámi. The implementation of measures presented in the final report of the Article 8(j) working group will continue. For justified reasons, these measures will be revised and completed in the new Article 8(j) working group, and proposals for measures will be submitted to the monitoring working group for approval.

- Ministry of Justice, Ministry for Foreign Affairs, Ministry of Education and Culture, Ministry of Agriculture and Forestry, Ministry of the Environment, the Sámi Parliament
- 2013–2015

85) Prepare to implement the indicators adopted by the meeting of the Conference of the Parties to the Convention concerning linguistic diversity, the status and development of land use and traditional livelihoods in the Sámi Homeland, and the status and development of traditional knowledge, innovations and practices.

- Ministry of the Environment, Ministry of Justice, Ministry of Education and Culture, Ministry of Agriculture and Forestry, Ministry of Employment and the Economy
- 2013–2015

5 Challenges and measures related to genetic diversity

5.1 Conservation of genetic resources for agriculture, forestry and fisheries

Development challenges

National programmes, based on international conventions and action plans related to the protection of genetic resources, guide work on genetic resources. The implementation of such programmes has proceeded to the extent permitted by the resources available. In order to achieve a sustainable basis for the resources required for such work, in 2010 the Advisory Body for Genetic Resources decided to appoint a working group to examine the securing of long-term protection for genetic resources. The working group's assignment covered agricultural and horticultural plants, forest trees and domestic animals. The working group found it necessary to examine whether the protection of genetic resources should be made statutory in order to secure a sustainable resource base for work with genetic resources. On the basis of this proposal, a report that was jointly commissioned by the Ministry of Agriculture and Forestry and the Ministry of the Environment was completed in 2012. This report serves as a basis for actual legislative work. The project also examined the measures required from Finland in order to ratify the Nagoya Protocol of the Convention on Biological Diversity.

To safeguard native varieties, rapid measures and notification of the need to find seeds are required to save landraces of field crops, because these varieties are disappearing. Landraces can be registered as varieties of native plant species, in accordance with the decree on varieties of native plant species that entered into force in 2009 and which was extended to cover vegetables. The decree is based on the relevant EU directives. By registering a variety of native plant species, the applicant is entitled to propagate and market the variety within the restrictions provided in the decree, such as a limited quantity of seed marketed each year. The main effect of maintaining a register of native plant species lies in preserving crop genetic diversity under cultivation conditions. As yet, there is no clear insight into how the decree on varieties of native plant species is functioning, but at present it covers 13 varieties and growers (2011). Monitoring and assessment are therefore required with regard to the implementation of the decree. Agri-environmental subsidies should be extended so as to apply to the cultivation and conservation of native plant species, including horticultural plants (*on-farm* and *in garden* conservation), in the same way as to native breeds of domestic animals.

Permanent and adequate resources for the conservation of plant genetic resources requires additional resource allocations to MTT Agrifood Research Finland, particularly for the maintenance of collections. According to a proposal by a sub-group of the National Advisory Body for Genetic Resources, MTT Agrifood Research Finland has an annual need for human resources amounting to 9.95 man-years, and for consumption expenditure of €333,000. Without resources and training, the involvement of various parties in conservation activities will be challenging. The extensive use of plant genetic resources (as such, for research and plant breeding purposes), and the development of products and marketing measures are among the key measures contributing to the sustainable use of genetic resources. Conditions for their implementation include diverse project activities and expert knowledge, and support for these.

Special support contracts for maintaining the cultivation of native plant species, based on the agri-environmental scheme, have proven insufficient to promoting *in situ* conservation on farms — only ten farmers have concluded a contract on maintaining the farming of an old landrace variety. The conditions of agri-environmental support for native plant species are considered to be too complicated and therefore farmers are not willing to cultivate such varieties. A special support scheme should also be prepared for the landrace varieties of horticultural plants. At present, they do not have any support scheme at all. So far, within agri-environmental support, we have not succeeded in drawing up support measures of this kind that the European Commission would be prepared to accept.

The form of support included in agri-environmental support and represented by breeding contracts and conservation programmes for native breeds has had a positive impact on the conservation of these breeds. In fact, it has facilitated a delay in, or has even prevented, the reduction in the population of certain breeds. In recent years,

the population numbers of the Finnish Landrace chicken, Åland sheep, Kainuu grey Sheep, eastern and northern Finncattle and Finnish Landrace goat have actually increased, while those of the Finnhorse and western Finncattle have remained unchanged and the numbers of the Finnsheep have decreased. The main reasons for the decrease in populations of native breeds have been output levels below those of dominant breeds, and changing agricultural practices.

Domestic forest trees grow on the northern fringes of their range. Experimental transfers have proven that tree origins and varieties transferred here from elsewhere cannot thrive in most cases. Forest trees are long-lived plants that have to endure high temperature variations in our current climate. In addition, climate change requires greater capacity to adapt than before. Conservation of the genetic diversity of tree species is also vital to preparing for climate change. A sound legislative basis, so far lacking, must therefore be established to facilitate this.

The occurrence of sea trout (*Salmo trutta*) populations in headwater regions and their vicinity, and the possibilities for protection and use of these species (e.g. through pisciculture), should be assessed. Attention should also be paid to the conservation of brackish-water stocks of grayling (*Thymallus thymallus*) through pisciculture. If the volume of breeding fish stocks is reduced substantially, genetic diversity will suffer. As a consequence, the number of genetic forms maintained will decrease. The Finnish Game and Fisheries Research Institute maintains a live gene bank (brood fish stock) of 16 fish species or varieties and 54 different stocks, and a milt bank, storing male specimens of 12 fish species or varieties, and 42 different stocks. The majority of fish species bred are threatened. Conservation of threatened fish species is promoted through the Protection Strategy for the Saimaa salmon (2003) and management programme (2012), and the Protection Strategy for the Saimaa arctic char (2006). Management programmes are being prepared for the Vuoksi River lake brown trout and Vuoksi River grayling populations.

Measures, responsible bodies and target schedules

The aim is to ensure the conservation of diversity in crops and horticultural plants (landrace varieties in particular, and modified populations of old cultivars), and to secure resources for conservation activities. Conservation activities will be developed, both by enhancing conservation methods and by expanding the conservation network. In addition, the coverage of high security storage will be increased. In order to promote conservation on farms, the possibilities for extending agri-environmental support to cover the protection of native plant species in farming too, will be examined, or other forms of support developed. In addition, an *in situ* conservation programme for naturally occurring relatives of crops will be launched. In the long term, the sustainable use of agricultural plants and horticultural plants will be promoted by enhancing their availability and communication work on them, and by launching project activities to promote their utilisation.

It must be ensured that the landrace breeds of domestic animals do not become extinct, and that their genetic variation is preserved as extensively as possible. Efforts will be made to ensure a gene bank for cattle breeds. Breeding subsidies for landrace breeds will hopefully continue. In order to maintain the genetic diversity of domestic animal breeds, taking into account the significance of each breed would be important to determining the amount of subsidy paid in each case. Breeding programmes should pay attention to the adaptation of landrace breeds to Finnish conditions. In addition, related competencies in domestic animal genetics, breeding and safeguarding the genetic resources of domestic animals, will be maintained and strengthened. Long-term conservation of genetic resources in forest trees and the sustainable use of these trees will be secured. The genetic diversity of Finland's fish stock will be maintained.

- 86) The need for statutory regulation of the conservation and use of genetic resources in Finland will be examined and necessary measures will be taken according to such an analysis. With the help of the Rural Development Programme, the conservation of native varieties and breeds will be secured alongside the further processing of products based upon them.

- Ministry of Agriculture and Forestry, Ministry of the Environment
- 2013–2016

- 87) An *in situ* conservation programme for naturally occurring relatives of crops will be launched.

- Ministry of Agriculture and Forestry, Ministry of the Environment
- 2013–2014

88) Ensure the conservation of genetic diversity in forest trees in line with the national programme on plant genetic resources, taking into account the obligations listed in the international EUFORGEN programme and guidance from the National Advisory Body for Genetic Resources.

- Ministry of Agriculture and Forestry
- 2013–2020

89) Ensure the conservation of threatened native fish species and populations, while also conserving genetic diversity. Continue the maintenance of brood fish stocks (i.e. living gene bank) and frozen milt, with the aim of maintaining the broadest possible genetic diversity of brood fish stocks producing roe for stocking. Maintain the genetic diversity of economically significant fish stocks through a variety of measures, including regulation of fishing, restoration of water bodies, improvement of water quality and safeguarding the possibilities for fish migration between breeding and growing areas, while maintaining, and if necessary, increasing the numbers of brood fish stocks and the size of the milt bank.

- Ministry of Agriculture and Forestry, Ministry of the Environment
- 2013–2020

90) Enhance the monitoring of genetic diversity of fish stocks and their sub-stocks. Reduce unwanted adaptations of populations that are raised at fish farms, through new farming methods and by renewing brood fish stocks. Include measures for reducing the genetic erosion of fish stocks caused by fishing and stocking activity, as part of management plans for fish stocks.

- Ministry of Agriculture and Forestry
- 2013–2020

Genetically modified organisms

Development challenges

Possible environmental risks posed by genetically modified organisms may be realised both through natural interaction and that caused by human activity. Such risks may extend to the biodiversity of wild species and agricultural plants and animals. Climate change is the major challenge facing agricultural ecosystems, particularly the diversity of crop plant varieties. If the climate changes as predicted, many plant varieties cultivated in Finland will probably have to be rebred on a tight schedule, in order to enable their adaptation to changing climate conditions. Resistance of plant varieties to environmental stress factors (e.g. drought and diseases) is a key feature in terms of breeding.

In comparison with traditional plant breeding, breeding that utilises gene technology is faster, and in certain respects, more specific. Combined with new genome information, it may therefore facilitate better utilisation of native varieties of crops well adapted to different conditions, and of native species and relatives of wild species, as breeding material. Expanding the use of native species and relatives of crop plants also promotes their conservation. If plant cultivation cannot be adapted to changing conditions, a substantial loss in the diversity of cultivated varieties may well be the result. On the other hand, it may be possible to replace the narrower range of domestic varieties with non-native cultivated plant varieties and species.

When examining the impact of genetically modified varieties of cultivated plants on the biodiversity of wild species, special attention must be paid to the resistance of cultivated plants to non-selective herbicides (such as glyphosate, the globally most commonly used genetically modified application). Use of a non-selective herbicide can lead to the almost complete destruction of the natural weed species in a field, and the biota dependent on such flora, at least locally. In the case of large-scale cultivation in particular, this may affect valuable ecosystem services (e.g. pollination of cultivated plants and biological control of pest insects). Varieties resistant to insect attacks may also have an effect on other parts of the ecosystem in the field. On the other hand, if resistance to insect attacks only applies to a certain pest insect, the need to use insecticides could decrease, which may have a favourable impact on the insect fauna and ecosystem services of the field.

Genetically modified mammals used as production animals involve a minor probable direct environmental risk. Although research is being conducted on genetically modified production animals with a positive impact on the environment (e.g. a genetically modified pig able to better utilise phosphates in feed), it is unlikely that commercial applications will become available in the near future, due to ethical issues related to genetically modified animals.

Transgenic insects and fish constitute the highest environmental risk. The use of aquaculture as a source of human nutrition will increase in the days to come. Transgenic fish are interesting due to in-bred characteristics, which improve their resistance to disease or enhance their metabolism of feed and raise their ecoefficiency. Because new characteristics can improve the competitiveness of cultivated transgenic fish in natural waters, for the time being they have not been approved for commercial production in the United States, among other countries. In other parts of the world, transgenic ornamental fish and pets are also on the market. In an attempt to solve the problem of gene contamination, certain organisms, such as transgenic insects and fish used in food production, have been modified to render them infertile. However, because complete and permanent infertility has not been achieved, this approach has yet to be accepted on the markets.

In Finland, scientific assessment and monitoring of the environmental impacts of the use of genetically modified organisms is reliable and of a high standard.

In 2010, the European Commission proposed that EU Member States be given more authority to decide on restricting or banning the cultivation of genetically modified plants. Finland is in favour of Member States having the right, for justified reasons included in the Commission's regulatory proposal on the matter, to restrict or ban the cultivation of a certain genetically modified plant or group of plants, or all genetically modified plants in their territories. Grounds for such a ban or restriction could include national environmental policy objectives and/or local conditions that are not taken into account in the EU's centralised risk assessment. Such environmental grounds could include objectives related to the conservation of certain natural or landscape features, habitats and ecosystems, and specific ecosystem functions and ecosystem services.

According to the Government Programme of Prime Minister Katainen's cabinet (2011), it is important that EU Member States have the right to declare their territory free of GMO cultivation.

5.2.1 Cartagena Protocol on Biosafety

Development challenges

The increasing use worldwide of GMOs has led to the need to regulate their international transfers from one country to another. The Cartagena Protocol on Biosafety is an international environmental treaty attached to the Convention on Biological Diversity (CBD). It was also supplemented by the Nagoya–Kuala Lumpur Supplementary Protocol on Liability and Redress, adopted at the COP 10 meeting in Nagoya on 15 October 2010. The Protocol on Biosafety that entered into force internationally on 11 September 2003 (in Finland, 17 October 2004), has been ratified by 162 states and the European Union. The Supplementary Protocol, signed by 35 states and the European Union, will enter into force 90 days after 40 states, all parties to the Protocol, have submitted a ratification or acceptance document, or an accession document. Finland signed the Supplementary Protocol on 11 May 2011.

The aim of the Cartagena Protocol on Biosafety is to ensure, in advance, that living modified organisms¹⁴ are transferred, handled and used (particularly in cross-border movements) in a manner that has no adverse effects on the conservation and sustainable use of biological diversity, while taking into account impacts on human health. The Protocol may also contribute to developing and supporting administration, legislation and research related to biosafety in developing countries and countries in transition. Requirements on documents and identification applicable to international transfers, and comprehensive risk assessment and control, play a key role in terms of the supervision of imports. The Nagoya–Kuala Lumpur Supplementary Protocol includes provisions on liability and procedures related to redress for damage caused to biodiversity as a result of the transboundary transfer of GMOs.

¹⁴ Living modified organism (LMO) means a living genetically modified organism (GMO).

The requirements of the Cartagena Protocol on biotechnology are taken into account in EU legislation¹⁵ on genetic , and are included in Finland's national legislation.

Measures, responsible bodies and target schedules

The aim is that transfers of living genetically modified organisms (LMOs) comply with the instructions and regulations of the Cartagena Protocol on Biosafety to the Convention on Biological Diversity, and the Nagoya–Kuala Lumpur Supplementary Protocol on the handling, transport, packaging and identification of LMOs, as well as risk assessment and control, liability for damages, and redress. Finland actively participates in the development and implementation of the Cartagena Protocol on Biosafety, and is seeking the entry into force of the Nagoya–Kuala Lumpur Supplementary Protocol in 2013.

- 91) Develop multidisciplinary research to identify the impacts on biodiversity of GMOs, and support research into risk assessment and the control of GMO applications developed in Finland, in particular as concerns ecological impacts related to transferred characteristics.
 - Ministry of the Environment, Ministry of Education and Culture, Ministry of Agriculture and Forestry, Ministry of Social Affairs and Health
 - 2013–2020
- 92) Analyse the indicators used in existing monitoring systems and their suitability for monitoring the functioning of GMOs and impacts on biodiversity. If necessary, new indicators suitable for monitoring will be developed.
 - Ministry of the Environment, Ministry of Agriculture and Forestry, Ministry of Social Affairs and Health
 - 2013–2020
- 93) Promote research and development of GMO applications, considered safe in terms of biodiversity, which improve the state of the environment. Develop scientific and administrative assessment and decision-making procedures regarding GMOs, to cover impacts on biodiversity on a broad scale. Seek to identify, and if necessary, ban at the permit application stage, any GMOs whose use may have an adverse impact on biodiversity.
 - Ministry of the Environment, Ministry of Education and Culture, Ministry of Agriculture and Forestry, Ministry of Social Affairs and Health, Ministry of Employment and the Economy
 - 2013–2020
- 94) Finland will continue to pursue the right of EU Member States to ban or restrict, for justified reasons, the cultivation in their territory of GMO plants approved for cultivation in the European Union.
 - Ministry of Social Affairs and Health, Ministry of Agriculture and Forestry, Ministry of the Environment
 - 2013–2020
- 95) Finland will see to it that the provisions of the Nagoya–Kuala Lumpur Supplementary Protocol on biosafety, subordinate to the CBD, enter into force nationally in 2013.
 - Ministry of Social Affairs and Health, Ministry of Agriculture and Forestry, Ministry of the Environment
 - 2013

5.3 Access to genetic resources and the equitable sharing of benefits

Development challenges

Prior to ratifying the Nagoya ABS (*Access and Benefit-Sharing*) Protocol, Finland will examine the national legislative measures, new legislation, if any, and the implementation system required for the ratification of the protocol. The system to be devised, and its implementation tools, will be harmonised with other national, international and EU legislation on genetic resources. The starting point for the system controlling access to genetic resources and sharing of benefits is the basic principle of the Convention, establishing the full rights of states to their own natural resources. Hence, states can themselves determine the tools they use for achieving the Convention's goals.

¹⁵ EU legislation applies at least to handling, identification, risk assessment and risk management. The EU Environmental Liability Directive lays down provisions on liability for environmental damage and the remedying of damage.

Measures, responsible bodies and target schedules

Finland wishes the benefits gained from the commercial or other utilisation of genetic resources to be shared between the states providing them, in accordance with procedures jointly approved in international agreements governing the field, and sustainable in terms of the environment and biodiversity. Finland also intends to implement the provisions of the Nagoya ABS Protocol, on the transfer of genetic resources and sharing of benefits, in such a way that Finland is ready to ratify the protocol simultaneously with the European Union and other Member States.

96) Identify the necessary legislation and provisions required by the Nagoya ABS Protocol for the implementation of national ABS legislation on the transfer of genetic resources, as well as benefit sharing and the development of administrative procedures, in accordance with Article 15 of the Convention, taking into account the obligations of other international agreements. The National Advisory Body for Genetic Resources in charge of agricultural genetic resources will examine the national obligations required for the implementation of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)¹⁶.

- Ministry of the Environment, Ministry of Justice, Ministry of Agriculture and Forestry
- 2013–2020

6 International measures in support of the implementation of the Convention on Biological Diversity

6.1 Resource mobilisation strategy

Development challenges

The aim of the global strategic plan 2011–2020 (Aichi targets, in Nagoya, 2010), approved by the Parties to the Convention, is to halt the loss of biodiversity by 2020, obtain the required resources and establish the required financial and administrative tools (incl. green accounting, incentives and tax policies and new resources). Among other measures, the strategy includes objectives for the protection of habitat types, in the achievement of which eliminating poverty among the population groups dependent on such habitats will play a key role. Another aim is to mainstream the conservation and sustainable use of biodiversity within the public administration and various activities undertaken within society, while alleviating pressures on biodiversity and promoting the sustainable use of biodiversity. It would also be important to secure fair access to genetic resources and the fair distribution of benefits gained from them, between indigenous peoples and the local population, for instance, when developing medicines derived from natural sources.

As a party to the Convention, Finland is committed to considerably strengthening economic, intellectual and technical resources that promote the conservation of biodiversity and its sustainable use. Without additional resources from all possible sources of funding, greater operational efficiency, private sector participation and, among other measures, setting the appropriate incentives and eliminating subsidies detrimental to biodiversity, the goals set cannot be achieved in Finland, let alone developing countries. Key elements in this process include the financial assessment of ecosystem services and payments received for producing ecosystem services (*Payments for Ecosystem Services* (PES)). In multilateral funding, funding targeted at the *Global Environment Facility* (GEF) is a key issue. More than one quarter of the total funding for GEF has been allocated to measures supporting the Convention. The *Innovative Funding Mechanisms* (IFM) negotiated within the framework of the CBD, and jointly agreed on, assist in enhancing the efficiency of measures. A prerequisite for obtaining international support under the CBD is that participant developing countries commit themselves to the objectives of the Convention and manage their contractual obligations.

Measures, responsible bodies and target schedules

Finland will examine its possibilities for increasing its economic, intellectual and technical resources in implementing the COP-10 Strategic Plan 2011–2020, seeking to identify resources from all suitable sources in accordance with

¹⁶ The *FAO International Treaty on Plant Genetic Resources for Food and Agriculture* (ITPGRFA), which entered into force in 2004, defines a global, legally binding framework for the conservation of genetic resources. The treaty established a multilateral system between contracting parties based on access to plant genetic resources and the sharing of benefits gained from their commercial and other use.

the process adopted by COP-10. National implementation of the commitment depends on the availability of resources within spending limits set out in central government budget frameworks. This work will be steered in line with the needs assessments developed and reported by all Parties to the CBD. Bearing in mind the difficult situation in the public economy, resulting from the Europe-wide financial crisis, it is clear that funding for the work cannot be solely based on public funding by industrial countries. For instance, after the adaptation measures taken by the Finnish government, it is unlikely that any substantial additional funds can be allocated to implementation of the CBD.

However, Finland finds it important that conservation of biodiversity and its sustainable use be integrated in all measures taken within society. Simultaneously, among other measures, any subsidies with a detrimental and distorting effect on biodiversity must be identified. As stated in *Economic incentives and other incentive measures* (Section 1.3), the aim is to utilise biodiversity indicators and indicators for ecosystem services (under development) in decision-making, and to develop their role in measuring sustainable development and well-being to complement GDP data.

97) In national and international activities (incl. development cooperation), Finland is seeking to implement the global strategy of the Convention on Biological Diversity and its objectives and goals (2011–2020) for halting the loss of biodiversity. For this purpose, by 2015, Finland will prepare a national strategy for mobilising resources, in accordance with decision X/3 of the Convention, and the related financial indicators.

- Ministry of the Environment, Ministry for Foreign Affairs, Ministry of Finance, Ministry of Agriculture and Forestry
- 2013–2015–2020

6.2 Cooperation in multilateral environmental agreements and processes (e.g. IPBES)

Development challenges

Ecosystem services based on biodiversity are integral to the well-being of humankind. Finland's aim is to promote the conservation of biodiversity through international agreements, processes, funding and political influence. This requires active participation in international negotiations on environmental agreements, in which Finland takes account of the position, obligations and special needs of developing countries when implementing the agreements, which include the IPBES panel (Section 6.3). The aim is to take into account such needs and obligations even when negotiating new agreements. In addition to the reconciliation of multilateral environmental agreements and processes, there is the objective of developing cooperation on foreign policy measures, particularly tasks that support developing countries (Section 6.4). Likewise, Finland is seeking to strengthen cooperation between the European Commission and Member States in the conservation of biodiversity, particularly in eastern Central Europe, which is a key area for Finland, and in developing countries.

Through more-efficient and better decision-making, the intergovernmental scientific body for biodiversity and ecosystem services (*Intergovernmental Science–Policy Platform on Biodiversity and Ecosystem Services* (IPBES)), aims to strengthen the dialogue between science and decision-making in biodiversity and ecosystem services issues, and to prevent global loss of biodiversity. The objective of IPBES, which covers marine, inland water and terrestrial ecosystems, is to promote the conservation and sustainable use of biodiversity and to safeguard human well-being and sustainable development in the long term.

IPBES is independent and scientific. It regularly prepares global, regional and, if necessary, sector-specific high-level authoritative scientific assessments on the state of biodiversity and ecosystems, and threats, particularly from the perspective of human well-being. It also produces thematic reports on new topics identified by researchers. IPBES serves the information needs of the Convention on Biological Diversity, as well as those of other biodiversity agreements. It is hoped that IPBES will also serve other UN bodies, intergovernmental organisations, international and regional scientific organisations, environmental funds, NGOs and the private sector. IPBES is expected to increase public knowledge of the significance of biodiversity. Another aim is to link knowledge on biodiversity more closely to various political sectors.

Measures, responsible bodies and target schedules

- 98) Through the United Nations Environment Programme (UNEP) and the Global Environment Facility (GEF) Finland will actively support measures that promote the conservation and sustainable use of biodiversity.
- Ministry for Foreign Affairs, Ministry of the Environment
 - 2013–2020

- 99) Finland will actively participate in international contractual negotiations related to biodiversity and negotiations promoting their synergies, taking into account the position and special needs of developing countries in implementing agreements and negotiating agreements. A network of contact persons for biodiversity agreements will be established to support the implementation of the action plan and international efforts to harmonise functions under the agreements.

Finland will participate in the activities of the Intergovernmental Science–Policy Platform on Biodiversity and Ecosystem Services (IPBES). Finland will examine national needs and measures related to IPBES, the organisation of work at home, and Finland's support for the international IPBES.

- Ministry of the Environment, Ministry for Foreign Affairs, Ministry of Agriculture and Forestry
- 2013–2020

6.3 Development cooperation and transfer of technology

Development challenges

Ecosystem services maintained by biodiversity are a key factor in almost all of the UN's Millennium Development Goals. Ecosystem services provide livelihoods, maintain and safeguard health, and provide food security and shelter from natural disasters. Biodiversity is thus very broadly linked to development as a whole, not only the environmental aspect of sustainable development. Biodiversity is an essential aspect of sustainable development, because it produces ecosystem services vital to humankind, and contains future opportunities for utilising genetic resources. At the same time, the significance of biodiversity is emphasised in preventing global socio-economic threat factors, such as the poverty issues facing developing countries.

The conservation of biodiversity and its sustainable use in developing countries, particularly by safeguarding the functioning of ecosystem services, is an extremely important objective. This is especially true with regard to the livelihoods of the poorest population groups. Ecosystem services play a key role, for instance, in regulating floods, preventing droughts, maintaining food security and health, and providing potable water.

Ecosystem services, whose functioning depends on biodiversity, constitute substantial capital, even in monetary terms. Such capital needs to be managed carefully. This applies to developing countries in particular, because a substantial part of the range of biodiversity is found in developing countries, whose research and development capacity in this field is lacking. It is important that research capacity in biodiversity be enhanced in developing countries, in order to ensure the availability of high standard scientific information, from both industrial and developing countries (Section 6.3).

The economic consequences of biodiversity loss are severe: according to expert estimates, a reduction in biodiversity could have a negative impact of up to seven per cent per year on global GDP. The world's poorest people and indigenous peoples suffer the most, as their living conditions are based on local biodiversity. Regarding the conservation of biodiversity and the sustainable management and use of natural resources, improving the position of women is also crucial.

Measures, responsible bodies and target schedules

In addition to the primary objective of Finland's Government-approved Development Policy Programme (2012) — the elimination of poverty — development policy also assists in finding solutions to other global challenges, such as the unsustainable use of natural resources and climate change. One of the four priorities of the programme is the sustainable management of natural resources and the achievement of environmental protection. In this context, the programme states, for instance, that the implementation of the Rio conventions on biodiversity, climate change and desertification has clear development impacts and interlinkages, of which use must be made.

Finland's development cooperation also takes into account the objectives and obligations of environmental conventions. Finland's development cooperation in the environmental sector must promote the objectives and measures of biodiversity protection, its management and sustainable use, in ways that are systematic and cost-efficient and by supporting the capabilities of developing countries. Aspects related to biodiversity and ecosystem services will also be highlighted in bilateral relations with developing countries.

100) As part of the implementation of the Development Policy Programme and by taking the equality perspective into account, Finland seeks to support development cooperation projects aimed at reducing poverty in developing countries, through the conservation and sustainable use of biodiversity, and with the objective of safeguarding and strengthening ecosystem services. In addition, Finland seeks to promote opportunities for young experts to participate in development cooperation projects and programmes under this theme.

- Ministry for Foreign Affairs
- 2013–2020

101) In development cooperation, Finland takes into account the goals and obligations of the Convention on Biological Diversity and other international biodiversity agreements. Viewpoints concerning biodiversity and ecosystem services will be highlighted in bilateral relations with developing countries, encompassing development cooperation projects and political influence.

- Ministry for Foreign Affairs
- 2013–2020

6.4 Regional cooperation

Finland is obliged to contribute to maintaining biodiversity in the northern coniferous forest belt, that is, boreal ecosystems. For Finland, changes in boreal ecosystems in our neighbouring regions are important. Finland has engaged in active nature conservation cooperation with Russia, whose territory covers up to 60 per cent of the world's boreal forests. The volume of forest resources in Russia is exceptional and the special characteristics of the forest ecosystems are unique. For instance, these natural old-growth forests have extremely high biodiversity.

Some of Russia's extensive old-growth forest sites are located in northwest Russia, a region close to Finland, where the pressure for utilisation of forest resources is increasing. Finland's participation and indirect responsibility for the sustainable use of forest resources in Russia are emphasised by the fact that the Finnish forest industry is the largest importer of timber from northwest Russia. National and international measures must therefore be employed in order to achieve a balance that, on the one hand, secures the conservation of biodiversity in boreal ecosystems in Finland's neighbouring regions, and on the other, safeguards the sustainable use of natural resources. Promotion of the conservation of the Fennoscandian Green Belt, that is, the zone along the border between Finland and Russia, is the key to cooperation aimed at the conservation of biodiversity in our neighbouring regions.

Development challenges

Safeguarding the viability of species' populations in Finland will require not only national measures, but also the conservation of interconnected areas that allow for the movement of species, particularly those areas adjacent to Russian, in order to supplement our own species populations. Northwest Russia is home to old-growth forests and natural sites that are unique within Europe, and their preservation should be secured. In addition, the objective of maintaining biodiversity in the marine environment of the Gulf of Finland is common to Finland, Russia and Estonia. Cooperation and exchange of experiences is necessary, for instance, for the preparation of the marine Natura 2000 sites of Finland and Estonia. In the next few years, this perspective should receive greater emphasis, alongside other important themes related to the Gulf of Finland. With regard to marine ecosystems in the Gulf of Finland, bilateral nature conservation efforts between Finland and Estonia, and also Finland and Russia, are being expanded into tripartite cooperation. Finland, Russia and Estonia are also planning a joint Gulf of Finland Year in 2014, with five key research topics as its main themes: maritime safety in winter conditions, bio- and geodiversity, ecosystem health, fish and fishing, and maritime spatial planning. These focal themes are also linked to the implementation of the action plan of the Baltic Marine Environment Commission (HELCOM) and the EU's Marine Strategy Directive. Close cooperation with Estonia and Sweden is underway in the preparation of management measures for the marine environment.

Measures, responsible bodies and target schedules

In cooperation with Russia, Finland is seeking to promote the establishment of an internationally comparable network of protected areas in northwest Russia, to complete the network of protected areas in the Fennoscandian Green Belt, to develop the activities of the green belt and enhance its international significance, and to safeguard biodiversity in the commercial utilisation of forests in the area. Simultaneously, measures in accordance with the Memorandum of Understanding on cooperation on the development of the Green Belt of Fennoscandia, signed between the governments of Finland, Russia and Norway in 2010, will continue nationally and in cooperation with Russia and Norway. The intention is to make the Fennoscandian Green Belt a model tool for cross-border cooperation in nature conservation, and to give it a higher international profile.

The tools for seeking to achieve nature conservation objectives related to regional cooperation and cooperation with neighbouring regions are the programme of work on marine and coastal biodiversity under the Convention on Biological Diversity, and implementation of the EU's Habitats Directive in the Gulf of Finland together with other EU countries. In addition, the aim is to gain up-to-date information on the biodiversity status of the northern parts of Fennoscandia and development forecasts through the Arctic Council's CAFF working group's CBMP monitoring programme and the ABA assessment report. In line with the implementation of Finland's Arctic Strategy, the aim is to promote the conservation of biodiversity in northern regions, to highlight the special characteristics of the Arctic region and its risks, and to utilise the Arctic Council's assessments and recommendations as a basis for decision-making. Arctic research, and the development of regional climate models and long-term monitoring of the state of the environment, will also be developed as a basis for decision-making, while strengthening the national coordination of Arctic research and monitoring.

102) In cooperation with Russia and Norway, Finland will promote the formation of the cross-border Fennoscandian Green Belt.

- Initiate conservation biology research and development projects related to the formation of the Fennoscandian Green Belt, including climate change and the related changes in habitats and species, and the spread of invasive alien species. Continue active international cooperation in research and between experts in preparing adaptation strategies for the northern boreal coniferous forest belt and possible regional strategies for the Baltic Sea area.
- Establish the Kalevala park on the Finnish side and prepare a plan for the protected areas of the Fennoscandian Green Belt in Finland, as part of legislative drafting. Continue and strengthen park twinning cooperation and apply for funding, for example, from the European Union, for implementing these projects.
- Establish a national working group to promote the Fennoscandian Green Belt and its activities.
 - Initiate a joint expert cooperation working group and network for Finland, Norway and Russia to coordinate initiatives and cooperation related to the Fennoscandian Green Belt, and to maintain contacts with the European Green Belt.
- Encourage regional councils and local actors to participate in the enhancement of cooperation related to the Fennoscandian Green Belt. Encourage local actors to initiate regional development and nature tourism projects related to the Green Belt.
 - Ministry of the Environment, Ministry of Agriculture and Forestry
 - 2013–2020

103) Implement the project for the Barents Region protected area network (BPAN; 2011–2013), in order to establish a functioning network of protected areas in the region and to implement the CBD's Programme of Work on Protected Areas. Information produced in the project will also support research into the impacts of climate change.

- Ministry of the Environment
- 2013

104) Continue and develop European and Nordic cooperation to promote the conservation of biodiversity within boreal ecosystems, and the same level of cooperation between Finland and the Baltic countries (Estonia, Latvia, Lithuania).

- Ministry of the Environment
- 2032–2020

7 Monitoring of the national strategy and action plan

Development challenges

The National Strategy and Action Plan for the Conservation and Sustainable use of Biodiversity 2013–2020 was prepared by the broad-based *working group promoting the implementation and monitoring of the national strategy and action plan 2006–2016 for the conservation and sustainable use of biodiversity in Finland*, including representatives of the relevant key national actors from the public and private sector, alongside stakeholder groups and non-governmental organisations.

The intent of the working group is to gain joint insight into how the implementation of the strategy and action plan should be organised within administration, and how stakeholders who have contributed to programme preparation might participate in this activity, upholding citizens' constitutional rights to own and possess land, and complying with every citizen's responsibility for the conservation of biodiversity.

The working group's task description covers not only the monitoring of the implementation of the strategy and action plan, but also assessment of trends in the state of biodiversity, assessment of the need for refocusing the strategy and action plan, and the development of constructive interaction between administrative sectors and other actors.

Measures, responsible bodies and target schedules

In many ways, the objectives of the Convention on Biological Diversity are connected to the decisions of the Johannesburg (2002) and Rio+20 (2012) conferences on sustainable development. The aim is to reconcile and implement the Strategic Plan of the Convention, and the 2020 biodiversity targets, with the other Rio conventions (climate change and desertification) and international agreements on biodiversity (see Section 6.2). Collaboration between these processes must be ensured.

In connection with the interim assessment (2015/2016) of the National Strategy and Action Plan for the Conservation and Sustainable use of Biodiversity, an assessment must be made and account taken of the conformity and joint effectiveness of policy definitions agreed on in relation to other processes. The interim assessment should also support national reporting required by the Convention on Biological Diversity. Implementation of the National Strategy and Action Plan should anticipate priorities under national reporting (Appendix 2) that require more broad-based preparation, such as reports. The European Union intends to implement its interim assessment in early 2014.

Correspondingly, when reforming Finland's sustainable development strategy, its ecological sustainability objectives, indicators and monitoring programme must take into account the policy definitions of the National Strategy and Action Plan for the Conservation and Sustainable use of Biodiversity 2012–2020 and the EU's Biodiversity Strategy (Appendix 1).

105) Monitor and assess the implementation and effectiveness of Finland's National Strategy and Action Plan for the Conservation and Sustainable use of Biodiversity 2012–2020.

- Monitoring and assessment will be implemented cost-efficiently in cooperation with ministries, stakeholders, business and industry, while employing the indicator-based approach recommended in the Convention on Biological Diversity.
- Develop indicators for monitoring and assessing the implementation of the strategy and action plan.
- By the end of March 2014, the working group will compile the fifth national report on the state of biodiversity and implementation of the Convention's obligations in Finland, for the Convention on Biological Diversity (Appendix 2).
- A national interim assessment of the strategy and action plan will be carried out in 2015/2016.
 - Ministry of the Environment, all ministries
 - 2013–2020

TARGET 1: FULLY IMPLEMENT THE BIRDS AND HABITATS DIRECTIVES

To halt the deterioration in the status of all species and habitats covered by EU nature legislation and achieve a significant and measurable improvement in their status so that, by 2020, compared to current assessments: (i) 100% more habitat assessments and 50% more species assessments under the Habitats Directive show an improved conservation status; and (ii) 50% more species assessments under the Birds Directive show a secure or improved status.

Action 1: Complete the establishment of the Natura 2000 network and ensure good management

1a) Member States and the Commission will ensure that the phase to establish Natura 2000, including in the marine environment, is largely complete by 2012.

1b) Member States and the Commission will further integrate species and habitats protection and management requirements into key land and water use policies, both within and beyond Natura 2000 areas.

1c) Member States will ensure that management plans or equivalent instruments which set out conservation and restoration measures are developed and implemented in a timely manner for all Natura 2000 sites.

1d) The Commission, together with Member States, will establish by 2012 a process to promote the sharing of experience, good practice and cross-border collaboration on the management of Natura 2000, within the biogeographical frameworks set out in the Habitats Directive.

Action 2: Ensure adequate financing of Natura 2000 sites

2) The Commission and Member States will provide the necessary funds and incentives for Natura 2000, including through EU funding instruments, under the next multiannual financial framework. The Commission will set out its views in 2011 on how Natura 2000 will be financed under the next multi-annual financial framework.

Action 3: Increase stakeholder awareness and involvement and improve enforcement

3a) The Commission, together with Member States, will develop and launch a major communication campaign on Natura 2000 by 2013.

3b) The Commission and Member States will improve cooperation with key sectors and continue to develop guidance documents to improve their understanding of the requirements of EU nature legislation and its value in promoting economic development.

3c) The Commission and Member States will facilitate enforcement of the nature directives by providing specific training programmes on Natura 2000 for judges and public prosecutors, and by developing better compliance promotion capacities.

Action 4: Improve and streamline monitoring and reporting

4a) The Commission, together with Member States, will develop by 2012 a new EU bird reporting system, further develop the reporting system under Article 17 of the Habitats Directive and improve the flow, accessibility and relevance of Natura 2000 data.

4b) The Commission will create a dedicated ICT tool as part of the Biodiversity Information System for Europe to improve the availability and use of data by 2012.

TARGET 2: MAINTAIN AND RESTORE ECOSYSTEMS AND THEIR SERVICES

By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems.

¹⁷ European Commission 2011. Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions. Our life insurance, our natural capital: an EU biodiversity strategy to 2020. COM(2011) 244 final. 17p. Brussels 3.5.2011.

Action 5: Improve knowledge of ecosystems and their services in the EU

5) Member States, with the assistance of the Commission, will map and assess the state of ecosystems and their services in their national territory by 2014, assess the economic value of such services and promote the integration of these values into accounting and reporting systems at EU and national level by 2020.

Action 6: Set priorities to restore and promote the use of green infrastructure

6a) By 2014, Member States, with the assistance of the Commission, will develop a strategic framework to set priorities for ecosystem restoration at sub-national, national and EU level.

6b) The Commission will develop a Green Infrastructure Strategy by 2012 to promote the deployment of green infrastructure in the EU in urban and rural areas, including through incentives to encourage up-front investments in green infrastructure projects and the maintenance of ecosystem services, for example through better targeted use of EU funding streams and Public Private Partnerships.

Action 7: Ensure no net loss of biodiversity and ecosystem services

7a) In collaboration with the Member States, the Commission will develop a methodology for assessing the impact of EU funded projects, plans and programmes on biodiversity by 2014.

7b) The Commission will carry out further work with a view to proposing by 2015 an initiative to ensure there is no net loss of ecosystems and their services (e.g. through compensation or offsetting schemes).

TARGET 3: INCREASE THE CONTRIBUTION OF AGRICULTURE AND FORESTRY TO MAINTAINING AND ENHANCING BIODIVERSITY

3A) *Agriculture: By 2020, maximise areas under agriculture across grasslands, arable land and permanent crops that are covered by biodiversity-related measures under the CAP so as to ensure the conservation of biodiversity and to bring about a measurable improvement(*) in the conservation status of species and habitats that depend on or are affected by agriculture and in the provision of ecosystem services as compared to the EU2010 Baseline, thus contributing to enhance sustainable management.*

B) *Forests: By 2020, Forest Management Plans or equivalent instruments, in line with Sustainable Forest Management (SFM)¹⁸, are in place for all forests that are publicly owned and for forest holdings above a certain size** (to be defined by the Member States or regions and communicated in their Rural Development Programmes) that receive funding under the EU Rural Development Policy so as to bring about a measurable improvement(*) in the conservation status of species and habitats that depend on or are affected by forestry and in the provision of related ecosystem services as compared to the EU 2010 Baseline.*

(*) For both targets, improvement is to be measured against the quantified enhancement targets for the conservation status of species and habitats of EU interest in Target 1 and the restoration of degraded ecosystems under target 2.

(**) For smaller forest holdings, Member States may provide additional incentives to encourage the adoption of Management Plans or equivalent instruments that are in line with SFM.

Action 8: Enhance direct payments for environmental public goods in the EU Common Agricultural Policy

8a) The Commission will propose that CAP direct payments will reward the delivery of environmental public goods that go beyond cross-compliance (e.g. permanent pasture, green cover, crop rotation, ecological set-aside, Natura 2000).

8b) The Commission will propose to improve and simplify the GAEC (Good Agricultural and Environmental Conditions) cross-compliance standards and consider including the Water Framework Directive within the scope

¹⁸ As defined in the document SEC (2006) 748.

of cross-compliance once the Directive has been implemented and the operational obligations for farmers have been identified in order to improve the state of aquatic ecosystems in rural areas.

Action 9: Better target Rural Development to biodiversity conservation

9a) The Commission and Member States will integrate quantified biodiversity targets into Rural Development strategies and programmes, tailoring action to regional and local needs.

9b) The Commission and Member States will establish mechanisms to facilitate collaboration among farmers and foresters to achieve continuity of landscape features, protection of genetic resources and other cooperation mechanisms to protect biodiversity.

Action 10: Conserve Europe's agricultural genetic diversity

10) The Commission and Member States will encourage the uptake of agri-environmental measures to support genetic diversity in agriculture and explore the scope for developing a strategy for the conservation of genetic diversity.

Action 11: Encourage forest holders to protect and enhance forest biodiversity

11a) Member States and the Commission will encourage the adoption of Management Plans¹⁹, inter alia through use of rural development measures²⁰ and the LIFE+ programme.

11b) Member States and the Commission will foster innovative mechanisms (e.g. Payments for Ecosystem Services) to finance the maintenance and restoration of ecosystem services provided by multifunctional forests.

Action 12: Integrate biodiversity measures in forest management plans

12) Member States will ensure that forest management plans or equivalent instruments include as many of the following measures as possible:

- maintain optimal levels of deadwood, taking into account regional variations such as fire risk or potential insect outbreaks
- preserve wilderness areas
- ecosystem-based measures to increase the resilience of forests against fires as part of forest fire prevention schemes, in line with activities carried out in the European Forest Fire Information System (EFFIS)
- specific measures developed for Natura 2000 forest sites
- ensuring that afforestation is carried out in accordance with the Pan-European Operational Level Guidelines for SFM²¹, in particular as regards the diversity of species, and climate change adaptation needs.

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TARGET 4: ENSURE THE SUSTAINABLE USE OF FISHERIES RESOURCES

Achieve Maximum Sustainable Yield (MSY) by 2015.

Achieve a population age and size distribution indicative of a healthy stock, through fisheries management with no significant adverse impacts on other stocks, species and ecosystems, in support of achieving Good Environmental Status by 2020, as required under the Marine Strategy Framework Directive.

Action 13: Improve the management of fished stocks

13a) The Commission and Member States will maintain and restore fish stocks to levels that can produce MSY in all areas in which EU fish fleets operate, including areas regulated by Regional Fisheries Management Organisations, and the waters of third countries with which the EU has concluded Fisheries Partnership Agreements.

¹⁹ Sustainable use and management of forests requires more extensive application of management plans, or of corresponding instruments. In

²³ Member States, more than 60% of the forest areas falls with the scope of the plans.

²⁰ As set out in Council Regulation 1698 (2005).

²¹ <http://www.foresteurope.org/>.

13b) The Commission and Member States will develop and implement under the CFP long-term management plans with harvest control rules based on the MSY approach. These plans should be designed to respond to specific time-related targets and be based on scientific advice and sustainability principles.

13c) The Commission and Member States will significantly step up their work to collect data to support implementation of MSY. Once this objective is attained, scientific advice will be sought to incorporate ecological considerations in the definition of MSY by 2020.

Action 14: Eliminate adverse impacts on fish stocks, species, habitats and ecosystems

14a) The EU will design measures to gradually eliminate discards, to avoid the by-catch of unwanted species and to preserve vulnerable marine ecosystems in accordance with EU legislation and international obligations.

14b) The Commission and Member States will support the implementation of the Marine Strategy Framework Directive, including through providing financial incentives through the future financial instruments for fisheries and maritime policy for marine protected areas (including Natura 2000 areas and those established by international or regional agreements). This could include restoring marine ecosystems, adapting fishing activities and promoting the involvement of the sector in alternative activities, such as eco-tourism, monitoring and managing marine biodiversity, and combating marine litter.

TARGET 5: COMBAT INVASIVE ALIEN SPECIES

By 2020, Invasive Alien Species (IAS) and their pathways are identified and prioritised, priority species are controlled or eradicated, and pathways are managed to prevent the introduction and establishment of new IAS.

Action 15: Strengthen the EU Plant and Animal Health Regimes

15) The Commission will integrate additional biodiversity concerns into the Plant and Animal Health regimes by 2012.

Action 16: Establish a dedicated instrument on Invasive Alien Species

16) The Commission will fill policy gaps in combating IAS by developing a dedicated legislative instrument by 2012.

TARGET 6: HELP AVERT GLOBAL BIODIVERSITY LOSS

By 2020, the EU has stepped up its contribution to averting global biodiversity loss.

Action 17: Reduce indirect drivers of biodiversity loss

17a) Under the EU flagship initiative on resource efficiency, the EU will take measures (which may include demand and/or supply side measures) to reduce the biodiversity impacts of EU consumption patterns, particularly for resources that have significant negative effects on biodiversity.

17b) The Commission will enhance the contribution of trade policy to conserving biodiversity and address potential negative impacts by systematically including it as part of trade negotiations and dialogues with third countries, by identifying and evaluating potential impacts on biodiversity resulting from the liberalisation of trade and investment through ex-ante Trade Sustainability Impact Assessments and ex-post evaluations, and seek to include in all new trade agreements a chapter on sustainable development providing for substantial environmental provisions of importance in the trade context including on biodiversity goals.

17c) The Commission will work with Member States and key stakeholders to provide the right market signals for biodiversity conservation, including work to reform, phase out and eliminate harmful subsidies at both EU and Member State level, and to provide positive incentives for biodiversity conservation and sustainable use.

Action 18: Mobilise additional resources for global biodiversity conservation

18a) The Commission and Member States will contribute their fair share to international efforts to significantly increase resources for global biodiversity as part of the international process aimed at estimating biodiversity funding needs and adopting resource mobilisation targets for biodiversity at CBD CoP11 in 2012²².

18b) The Commission will improve the effectiveness of EU funding for global biodiversity inter alia by supporting natural capital assessments in recipient countries and the development and/or updating of National Biodiversity Strategies and Action Plans, and by improving coordination within the EU and with key non-EU donors in implementing biodiversity assistance/projects.

Action 19: 'Biodiversity proof' EU development cooperation

19) The Commission will continue to systematically screen its development cooperation action to minimise any negative impact on biodiversity, and undertake Strategic Environmental Assessments and/or Environmental Impact Assessments for actions likely to have significant effects on biodiversity.

Action 20: Regulate access to genetic resources and the fair and equitable sharing of benefits arising from their use

20) The Commission will propose legislation to implement the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilisation in the European Union so that the EU can ratify the Protocol as soon as possible and by 2015 at the latest, as required by the global target.

²² As set out in COP10 Decision X/3.

Appendix 2. The relationship of the National Strategy and Action Plan for the Conservation and Sustainable Use of Biodiversity 2012–2020 to the Fifth National Report to the Convention on Biological Diversity 2014.

In accordance with Decision X/10 of CBD CoP-10 (Aichi Targets, Nagoya, 2010), the Conference of the Parties requested Parties to submit their fifth national report describing the national implementation of the Convention and the state of biodiversity to the CBD Secretariat by 31 March 2014. Preliminary guidelines for reporting were submitted to the Parties in 2011.

The focus of the fifth national report lies on measures within the national action plans, which are of particular national importance, as well as contributing to the fulfilment of the Aichi 2020 targets. Twelve key questions for reporting are grouped in three parts (*Guidelines for the 5th National Report* [on the implementation of the CBD]):

Part I: An update on biodiversity status, trends, threats and implications for human well-being

1. Why is biodiversity important to your country? Describe the contributions of biodiversity and the related ecosystem services to human well-being, based on estimates of the economic, social and cultural values of biodiversity.
2. What major changes have taken place in the status and trends of biodiversity in your country since the previous report in 2009? The report should focus on actions that have contributed to changes (there is no need to repeat the detailed descriptions of the state of biodiversity that were provided in the previous national report).
3. What are the main threats to biodiversity and the factors contributing to changes?
4. What are the impacts of the changes in biodiversity for ecosystem services and what are the socio-economic and cultural implications of these impacts on human well-being and livelihoods?

Optional question: What are the possible future scenarios for biodiversity in terms of pressures, changes in status, socioeconomic impacts, and opportunities for influencing policies?

Part II: The national biodiversity strategy and action plan, its implementation, and the mainstreaming of biodiversity

5. What are the measurable biodiversity targets set by your country for 2020, developed in line with the Aichi Biodiversity Targets 2020?
6. How has your national biodiversity strategy and action plan been updated to incorporate the international CBD targets, and to serve as an effective instrument for mainstreaming biodiversity? How will national targets (see question 5) be achieved and international targets supported? How will pressures (see question 3) be influenced? In what way is the programme influencing the mainstreaming of biodiversity issues in national programmes, in administrative sectors, and on the various levels of the programme?
7. What actions has your country taken to implement the Convention and what outcomes have these actions had since the previous national report in 2009 (2010–2013 legislation, policies, funding, etc.)? Which issues have impeded implementation?
8. How effectively have biodiversity issues been mainstreamed? How is this evident in the programme and what kinds of synergies have been achieved?

9. How have the national biodiversity strategy and action plan been implemented? What challenges remain?

Part III: Progress towards the 2020 Aichi Biodiversity Targets and contributions to the relevant 2015 Targets of the Millennium Development Goals

10. What progress has been made by your country towards the implementation of the Aichi 2020 Biodiversity Targets, in light of indicators (international and national levels)?
11. What has been the contribution of actions to implement the Convention towards achievement of the relevant 2015 targets of the Millennium Development Goals in your country?
12. What lessons have been learned from the implementation of the Convention in your country? — successful and less successful experiences, challenges?

Appendix 3. Indicative indicators for monitoring the implementation of the Strategic Plan for Biodiversity 2011–2020 of the Convention on Biological Diversity. Proposal prepared by the *Ad Hoc Technical Expert Group on Indicators for the Strategic Plan for Biodiversity 2011–2020* (SBSTTA-15 (7.-11.11.2011)). (UNEP/CBD/COP/11/2, Annex I).

Annex I.

INDICATIVE LIST OF INDICATORS PROPOSED BY THE AD HOC TECHNICAL EXPERT GROUP ON INDICATORS FOR THE STRATEGIC PLAN FOR BIODIVERSITY 2011-2020

The Ad Hoc Technical Expert Group on Indicators for the Strategic Plan for Biodiversity 2011-2020 identified three categories of operational indicators. Indicators which are ready for use at the global level are denoted by the letter (A). Indicators which could be used at the global level but which require further development to be ready for use are denoted by the letter (B). Additional indicators for consideration for use at the national or other sub-global level are denoted by the letter (C) and formatted in italics. The set of (A) and (B) indicators are those which should be used to assess progress at the global level while the (C) indicators are illustrative of some of the additional indicators available to Parties to use at the national level according to their national priorities and circumstances.

Aichi Target	Headline indicators (in bold) and most relevant operational indicators
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.	Trends in awareness, attitudes and public engagement in support of biological diversity and ecosystem services <ul style="list-style-type: none"> <i>Trends in awareness and attitudes to biodiversity (C)</i> <i>Trends in public engagement with biodiversity (C)</i> <i>Trends in communication programmes and actions promoting social corporate responsibility (C)</i>
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 reporting systems.	Trends in integration of biodiversity, ecosystem services and benefits sharing into planning, policy formulation and implementation and incentives <ul style="list-style-type: none"> <i>Trends in number of countries incorporating natural resource, biodiversity, and ecosystem service values into national accounting systems (B)</i> <i>Trends in number of countries that have assessed values of biodiversity, in accordance with the Convention (C)</i> <i>Trends in guidelines and applications of economic appraisal tools (C)</i> <i>Trends in integration of biodiversity and ecosystem service values into sectoral and development policies (C)</i> <i>Trends in policies considering biodiversity and ecosystem service in</i>

	<i>environmental impact assessment and strategic environmental assessment (C)</i>
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.	<p>Trends in integration of biodiversity, ecosystem services and benefits sharing into planning, policy formulation and implementation and incentives</p> <ul style="list-style-type: none"> • Trends in the number and value of incentives, including subsidies, harmful to biodiversity, removed, reformed or phased out (B) • <i>Trends in identification, assessment and establishment and strengthening of incentives that reward positive contribution to biodiversity and ecosystem services penalize adverse impacts (C)</i>
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.	<p>Trends in pressures from unsustainable agriculture, forestry, fisheries and aquaculture</p> <ul style="list-style-type: none"> • Trends in Ecological Footprint and/or related concepts (A) (decisions VII/30 and VIII/15) • Trends in population and extinction risk of utilized species, including species in trade (A) (also used by CITES) • <i>Ecological limits assessed in terms of sustainable production and consumption (C)</i>
	<p>Trends in pressures from habitat conversion, pollution, invasive species, climate change, overexploitation and underlying drivers</p> <ul style="list-style-type: none"> • <i>Trends in biodiversity of cities (C) (decision X/22)</i>
	<p>Trends in integration of biodiversity, ecosystem services and benefits sharing into planning, policy formulation and implementation and incentives</p> <ul style="list-style-type: none"> • Trends in extent to which biodiversity and ecosystem service values are incorporated into organizational accounting and reporting (B)
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.	<p>Trends in extent, condition and vulnerability of ecosystems, biomes and habitats</p> <ul style="list-style-type: none"> • Extinction risk trends of habitat dependent species in each major habitat type (A) • Trends in extent of selected biomes, ecosystems and habitats (A) (decision VII/30 and VIII/15) • Trends in proportion of degraded/threatened habitats (B) • Trends in fragmentation of natural habitats (B) (decision VII/30 and VIII/15) • <i>Trends in condition and vulnerability of ecosystems (C)</i> • <i>Trends in the proportion of natural habitats converted (C)</i>
	<p>Trends in pressures from unsustainable agriculture, forestry, fisheries and aquaculture</p> <ul style="list-style-type: none"> • <i>Trends in primary productivity (C)</i> • <i>Trends in proportion of land affected by desertification (C) (also used by UNCCD)</i>
	<p>Trends in pressures from habitat conversion, pollution, invasive species, climate change, overexploitation and underlying drivers</p> <ul style="list-style-type: none"> • Population trends of habitat dependent species in each major

	habitat type (A)
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.	Trends in pressures from unsustainable agriculture, forestry, fisheries and aquaculture <ul style="list-style-type: none"> • Trends in extinction risk of target and bycatch aquatic species (A) • Trends in population of target and bycatch aquatic species (A) • Trends in proportion of utilized stocks outside safe biological limits (A) (MDG indicator 7.4) • <i>Trends in catch per unit effort (C)</i> • <i>Trends in fishing effort capacity (C)</i> • <i>Trends in area, frequency, and/or intensity of destructive fishing practices (C)</i>
	Trends in integration of biodiversity, ecosystem services and benefits sharing into planning, policy formulation and implementation and incentives <ul style="list-style-type: none"> • Trends in proportion of depleted target and bycatch species with recovery plans (B)
Target 7 - By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.	Trends in pressures from unsustainable agriculture, forestry, fisheries and aquaculture <ul style="list-style-type: none"> • Trends in population of forest and agriculture dependent species in production systems (B) • Trends in production per input (B) • <i>Trends in proportion of products derived from sustainable sources (C) (decision VII/30 and VIII/15)</i>
	Trends in integration of biodiversity, ecosystem services and benefits sharing into planning, policy formulation and implementation and incentives <ul style="list-style-type: none"> • Trends in area of forest, agricultural and aquaculture ecosystems under sustainable management (B) (decision VII/30 and VIII/15)
Target 8 - By 2020, pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.	Trends in pressures from habitat conversion, pollution, invasive species, climate change, overexploitation and underlying drivers <ul style="list-style-type: none"> • Trends in incidence of hypoxic zones and algal blooms (A) • Trends in water quality in aquatic ecosystems (A) (decision VII/30 and VIII/15) • Impact of pollution on extinction risk trends (B) • Trends in pollution deposition rate (B) (decision VII/30 and VIII/15) • Trends in sediment transfer rates (B) • <i>Trend in emission to the environment of pollutants relevant for biodiversity (C)</i> • <i>Trend in levels of contaminants in wildlife (C)</i> • <i>Trends in nitrogen footprint of consumption activities (C)</i> • <i>Trends in ozone levels in natural ecosystems (C)</i> • <i>Trends in proportion of wastewater discharged after treatment (C)</i> • <i>Trends in UV-radiation levels (C)</i>
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	Trends in pressures from habitat conversion, pollution, invasive species, climate change, overexploitation and underlying drivers <ul style="list-style-type: none"> • Trends in the impact of invasive alien species on extinction risk trends (A)

pathways to prevent their introduction and establishment.	<ul style="list-style-type: none"> • Trends in the economic impacts of selected invasive alien species (B) • Trends in number of invasive alien species (B) (decision VII/30 and VIII/15) • <i>Trends in incidence of wildlife diseases caused by invasive alien species (C)</i>
<p>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.</p>	<p>Trends in integration of biodiversity, ecosystem services and benefits sharing into planning, policy formulation and implementation and incentives</p> <ul style="list-style-type: none"> • Trends in policy responses, legislation and management plans to control and prevent spread of invasive alien species (B) • <i>Trends in invasive alien species pathways management (C)</i>
<p>Target 11 - By 2020, at least 17 per cent of terrestrial and inland water, 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.</p>	<p>Trends in pressures from habitat conversion, pollution, invasive species, climate change, overexploitation and underlying drivers</p> <ul style="list-style-type: none"> • Extinction risk trends of coral and reef fish (A) • Trends in climate change impacts on extinction risk (B) • Trends in coral reef condition (B) • Trends in extent, and rate of shifts of boundaries, of vulnerable ecosystems (B) • <i>Trends in climatic impacts on community composition (C)</i> • <i>Trends in climatic impacts on population trends (C)</i>
<p>Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity</p>	
<p>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.</p>	<p>Trends in coverage, condition, representativeness and effectiveness of protected areas and other area-based approaches</p> <ul style="list-style-type: none"> • Trends in extent of marine protected areas, coverage of key biodiversity areas and management effectiveness (A) • Trends in protected area condition and/or management effectiveness including more equitable management (A) (decision X/31) • Trends in representative coverage of protected areas and other area based approaches, including sites of particular importance for biodiversity, and of terrestrial, marine and inland water systems (A) (decision VII/30 and VIII/15) • Trends in the connectivity of protected areas and other area based approaches integrated into landscapes and seascapes (B) (decision VII/30 and VIII/15) • <i>Trends in the delivery of ecosystem services and equitable benefits from protected areas (C)</i>
<p>Target 13 - By 2020, the genetic diversity of</p>	<p>Trends in abundance, distribution and extinction risk of species</p> <ul style="list-style-type: none"> • Trends in abundance of selected species (A) (decision VII/30 and VIII/15) (UNCCD indicator) • Trends in extinction risk of species (A) (decision VII/30 and VIII/15) (MDG indicator 7.7) (also used by CMS) • Trends in distribution of selected species (B) (decision VII/30 and VIII/15) (also used by UNCCD)
	<p>Trends in genetic diversity of species</p>

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.	<ul style="list-style-type: none"> • Trends in genetic diversity of cultivated plants, and farmed and domesticated animals and their wild relatives (B) (decision VII/30 and VIII/15) • <i>Trends in genetic diversity of selected species (C)</i>
	Trends in integration of biodiversity, ecosystem services and benefits sharing into planning, policy formulation and implementation and incentives <ul style="list-style-type: none"> • Trends in number of effective policy mechanisms implemented to reduce genetic erosion and safeguard genetic diversity related to plant and animal genetic resources (B)
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.	Trends in distribution, condition and sustainability of ecosystem services for equitable human well-being <ul style="list-style-type: none"> • Trends in proportion of total freshwater resources used (A) (MDG indicator 7.5) • Trends in proportion of the population using improved water services (A) (MDG indicator 7.8 and 7.9) • Trends in benefits that humans derive from selected ecosystem services (A) • Population trends and extinction risk trends of species that provide ecosystem services (A) • Trends in delivery of multiple ecosystem services (B) • Trends in economic and non-economic values of selected ecosystem services (B) • Trends in health and wellbeing of communities who depend directly on local ecosystem goods and services (B) (decision VII/30 and VIII/15) • Trends in human and economic losses due to water or natural resource related disasters (B) • Trends in nutritional contribution of biodiversity: Food composition (B) (decision VII/30 and VIII/15) • <i>Trends in incidence of emerging zoonotic diseases (C)</i> • <i>Trends in inclusive wealth (C)</i> • <i>Trends in nutritional contribution of biodiversity: Food consumption (C) (decision VII/30 and VIII/15)</i> • <i>Trends in prevalence of underweight children under-five years of age (C) (MDG indicator 1.8)</i> • <i>Trends in natural resource conflicts (C)</i> • <i>Trends in the condition of selected ecosystem services (C)</i> • <i>Trends in biocapacity (C)</i> Trends in coverage, condition, representativeness and effectiveness of protected areas and other area-based approaches <ul style="list-style-type: none"> • Trends in area of degraded ecosystems restored or being restored (B)
Target 15 - By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through	Trends in distribution, condition and sustainability of ecosystem services for equitable human well-being <ul style="list-style-type: none"> • Status and trends in extent and condition of habitats that provide

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.	carbon storage (A)
	Trends in coverage, condition, representativeness and effectiveness of protected areas and other area-based approaches <ul style="list-style-type: none"> Population trends of forest-dependent species in forests under restoration (C)
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.	Trends in access and equity of benefit-sharing of genetic resources <ul style="list-style-type: none"> ABS indicator to be specified through the ABS process (B)
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.	Trends in integration of biodiversity, ecosystem services and benefit-sharing into planning, policy formulation and implementation and incentives <ul style="list-style-type: none"> Trends in implementation of national biodiversity strategies and action plans, including development, comprehensiveness, adoption and implementation (B)
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.	Trends in integration of biodiversity, ecosystem services and benefit-sharing into planning, policy formulation and implementation and incentives <ul style="list-style-type: none"> Trends in land-use change and land tenure in the traditional territories of indigenous and local communities (B) (decision X/43) Trends in the practice of traditional occupations (B) (decision X/43)
	Trends in accessibility of scientific/technical/traditional knowledge and its application <ul style="list-style-type: none"> Trends in which traditional knowledge and practices are respected through their full integration, safeguards and the full and effective participation of indigenous and local communities in the national implementation of the Strategic Plan (B)
	Trends in accessibility of scientific/technical/traditional knowledge and its application <ul style="list-style-type: none"> Trends of linguistic diversity and numbers of speakers of indigenous languages (B) (decision VII/30 and VIII/15)
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.	Trends in accessibility of scientific/technical/traditional knowledge and its application <ul style="list-style-type: none"> Trends in coverage of comprehensive policy-relevant sub-global assessments including related capacity-building and knowledge transfer, plus trends in uptake into policy (B) Number of maintained species inventories being used to implement the Convention (C)
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	Trends in mobilization of financial resources <ul style="list-style-type: none"> Indicators agreed in decision X/3 (B)

target will be subject to changes contingent to resource needs assessments to be developed and reported by Parties.	
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Appendix 4. National Action Plan for the Conservation and Sustainable use of Biodiversity 2012–2020 — background to the development challenges, objectives and measures

Cross-cutting challenges and measures

Communications work and enhancing public awareness

In recent years, biodiversity has become a prominent topic of public debate in Finland. The long-term cooperation between the ministries and different stakeholders, particularly the work concerning the international biodiversity year 2010, has contributed to this. The communications work has largely been based on the *Communication Programme for the 'Saving nature for people strategy and action plan (2009–2016)'*, prepared by these parties in collaboration.

However, biodiversity loss continues, but visible changes rarely appear suddenly and dramatically, which means that biodiversity loss is not newsworthy. COP-10 of the Convention on Biological Diversity (CBD), held in 2010 in Nagoya, Aichi Prefecture, Japan, found that communications play a key role in achieving the strategic targets and objectives of the Convention. To support communications work, a proposal for a United Nations Decade on Biodiversity (2011–2020) has been prepared. This was approved by the United Nations General Assembly (UNGA) in December 2010. Work related to the Convention and the EU's strategic biodiversity objectives supports, and adds an international dimension to, communications on biodiversity in Finland.

Education and training

Sustainable development and safeguarding biodiversity are included as a common goal in the national core curricula of all sectors of vocational education. Key lifelong learning skills are included in all basic qualifications. One of these relates to working in a profession in line with the ecological, economic, social and cultural principles of sustainable development. A number of national qualification requirements for natural resources and the environmental sector include the competence goals of sustainable use of natural resources, safeguarding of biodiversity, and knowledge of species.

For instance, sustainable forestry is promoted in accordance with the policy definitions of Finland's National Forest Programme (NFP), and through communications work with young people, by various actors, including the National Board of Education. The forest education projects *Metsän oppimispolku (Learning Path for Forests)* and *Metsissä mahdollisuus (Opportunities Lie in Forests)*, implemented in collaboration with the Finnish Forest Association and the Finnish 4H Organisation, have achieved excellent results in enhancing forest knowledge among young people in various parts of the country. Moreover, the National Board of Education has participated in the *Baltic Sea Learning Path* portal, implemented through a collaborative network of several organisations, which contains environmental education material on the Baltic Sea theme for teachers and schools. The project *Northern Forest Ecosystems and Education*, the GLOBE programme and the *Environment and School Initiatives (ENSI)* project have sought to promote education in sustainable development, with the help of new information technology.

Economic incentives and other incentive measures

Economic incentives encourage voluntary nature conservation actions, advisory services, other forms of guidance, and the development and application of favourable land use planning principles in various sectors. Such actions are also becoming more important as policy instruments, alongside legislative measures. Economic steering methods promoting biodiversity have already been applied in Finland, but their use has, to a certain extent, been sporadic and limited. As already discovered on an international scale, for instance, in development work within the OECD, there is a clear need to enhance and expand economic incentives.

The basic reference report *Biodiversity as an economic issue*, which was commissioned by the Ministry of the Environment and completed in 2006, is based on the decisions and recommendations of the expert OECD Working Group on the Economic Aspects of Biodiversity and of the Convention on Biological Diversity. This report includes concrete options and recommendations (research, creation of markets, direct incentives, steering methods, administration and infrastructure) for the application of economic incentives and measures promoting the conservation and sustainable use of biodiversity in Finland.

The establishment of private protected areas by application of landowners is a long-standing tradition in Finland and the number of them in the implementation of protection programmes has increased in recent years. Safeguarding biodiversity emerged as a principle in forestry in Finland as early as the 1990s. METSO, the *Forest Biodiversity Programme for Southern Finland*, has strengthened this trend. Environmental issues have also become substantially more prominent in agriculture.

Agri-environmental support and the Act on the Financing of Sustainable Forestry have considerably increased the possibilities of receiving financial support for maintaining biodiversity. Another example of a well-functioning economic incentive is the compensation scheme applied to damage caused by golden eagles to reindeer husbandry, involving financial compensation to reindeer owners' associations on the basis of the size of the nesting population producing offspring. This is also regarded as an exemplary solution of international interest, in resolving the conflict of interests between the protection and use of biodiversity.

Legislation

The safeguarding of biodiversity requires long-term efforts, in which legislative and administrative steering methods have traditionally played a key role. Legislative steering related to biodiversity is mainly based on the Nature Conservation Act (*Luonnonsuojelulaki* 1096/1996). The Wilderness Act is vital to guiding land use in the northernmost parts of Finland. The Act on the Protection of Rapids and certain special provisions protect key sites in rivers and streams. The Land Extraction Act also protects the natural values of living resources. The Forest Act, the Water Act and the Land Use and Building Act include provisions for safeguarding biodiversity. In 2011, the obligations of the EU Marine Strategy Directive were included in the Act on Water Resources Management, and the name of the act was changed to the Act on the Management of Water Resources and the Marine Environment. The decree on management of the marine environment entered into force in the autumn of 2011. The revised Water Act entered into force in early 2012. Reforms of the Environmental Protection Act and Forest Act were initiated in 2011, as was the assessment of how the Land Use and Building Act is functioning.

The Nature Conservation Act (1096/1996), in force since 1997, has been revised several times. An overall evaluation of nature conservation legislation was conducted in 2010, with the aim of assessing the practical functioning of the Nature Conservation Act and Decree, and the Wilderness Act, and the fulfilment of objectives set for legislation. Among other issues, the assessment was based on recent assessments of the threatened status of species (2010) and habitat types (2008).

Biodiversity in land use planning and land use

Infill building, transport routes and other forms of land use reduce the number of natural environments and cause remaining habitats to become fragmented. Unbroken habitat patches become smaller, the remaining patches become more isolated from others, and the relative number of fringe areas, unfavourable for a number of species, grows. Fragmentation further intensifies the adverse impacts on biodiversity because the total habitat area becomes smaller.

The Convention on Biological Diversity (Article 14) requires an assessment of the environmental impacts of any projects, plans and programmes likely to have considerable adverse impacts on biodiversity. The aim is to reduce or minimise such effects. Under the auspices of the Convention, principles and operating instructions have been drawn up for an Ecosystem Approach (Decision V/6; see SCBD 2004, 2011), whose application in Finland has been examined on a preliminary basis by the Ministry of the Environment (2004), among others.

Impacts on biodiversity are assessed as part of land use planning, as part of assessing the environmental impacts of plans and programmes, when evaluating individual projects, and as part of Natura assessments in accordance with section 65 of the Nature Conservation Act. Key principles guiding the assessment of impacts on nature include avoiding the loss of biodiversity and adherence to the precautionary principle. Participation and interaction by the general public in biodiversity issues is also vital, for example, to facilitating the use of local knowledge and ensuring consultation and inclusion.

In southern Finland, because of compact urban areas, other forms of construction and busy transport routes, the possibilities for wild animals to find suitable habitats have been severely restricted, as have their migration patterns. Various sectors and authorities have prepared instructions on taking species, habitat types or biodiversity into account in planning. To a certain extent, land use planning has also accommodated well-functioning ecological corridors. The principle of sustainable use that takes natural systems into account has been implemented in several projects in Finland, due to a variety of factors including established planning practices, comprehensive legislation, a working group culture that connects stakeholders, and inclusive and interactive planning.

Conservation of biodiversity

Network of protected areas

The Natura 2000 network includes 1,857 sites in Finland, covering an area of some 4.9 million hectares, of which land areas account for around three quarters (about 3.6 million hectares). Areas in accordance with the Habitats Directive, selected for the protection of certain habitat types and species habitats, total 1,713 (of some 4.8 million hectares). Areas assigned for the protection of bird species under the Birds Directive, partly overlapping with the aforementioned sites, total 468 (some 3.1 million hectares). The European Commission has granted final approval for all of Finland's proposals for Natura 2000 sites. Minor additions, such as marine areas, will be made to the proposed network.

After the implementation in Finland of the network of protected areas, of prepared protection programmes, and of the Natura 2000 network, most of the more extensive natural areas or threatened sites described in the Convention's programme of work on protected areas will be protected. Finland's network of protected areas is representative, in terms of conservation biology, in the northern and eastern parts of the country. The protection requirements of migratory species are taken into account under the provisions of the Habitats Directive and Birds Directive, particularly through the implementation of the Natura 2000 network.

Metsähallitus Natural Heritage Services manages areas under its control, in accordance with the principles of use and management of protected areas. Since 1995, Natural Heritage Services has also managed public water areas in Finland. The effectiveness of the management of protected areas in Finland was subjected to an international assessment in 1994 and 2004. According to the latest assessment, large protected areas under state ownership are well managed, by and large, and usually fulfil the biodiversity conservation objectives set for them. The first report on the *State of Parks* was published in 2007. The aim is that reporting will be repeated at around five-year intervals, in order to facilitate long-term monitoring of trends in the state of parks. Along with the work of Natural Heritage Services itself, this report provides a basis for working with stakeholders and for the next international assessment.

Metsähallitus's natural resource planning is a well-functioning system with regard to the objectives of the Convention's programme of work on protected areas, in terms of linking protected areas to land and natural resource use in areas surrounding terrestrial ecosystems, particularly in northern Finland. Nature conservation is promoted through agreements and cooperation across the borders of protected areas and countries. Finland's active cross-border cooperation on protected areas has been internationally recognised in recent years.

Protected areas are important not only for the conservation of biodiversity, but also as sources of recreation for citizens and as natural attractions. The number of visitors to national parks has grown rapidly (in 2000: 832,000; in 2005: 1,410,000; in 2008: 1,755,500 and in 2010: 1,955,000), while the importance of parks to the tourist industry

has been emphasised locally and regionally. The estimated number of visitors to Metsähallitus's recreational sites amounts to 4.8 million (2010). According to surveys by Metsähallitus and the Finnish Forest Research Institute (Metla), national parks and state-owned recreational areas are highly important to the regional economy and employment. In the most popular areas, the multiplier effect for each euro invested by the state results in the generation of over 20 euros in the local economy.

Threatened habitat types

Habitats play a key role in biodiversity. Not only do they have intrinsic value, but they are also extremely important as species habitats. Many habitats have declined, placing their species under threat of extinction. Legislation and international conventions and agreements require Finland to protect and monitor habitat types.

The first assessment of threatened habitat types in Finland was completed in 2008. Seven groups of national experts (amounting to more than 80 individual experts) examined some 400 habitat types and combinations of them, using information on habitat types collected over the years. As a result, an extensive report and descriptions of Finland's threatened, near threatened, least concern and data-deficient habitats were published.

In Finland as a whole, it is estimated that 51 per cent of all habitat types (368) are threatened. In southern Finland, the number of threatened habitat types is clearly higher (66%) than in northern Finland (29%). Of all threatened habitat types, semi-natural habitats are the most threatened, or up to 93 per cent of them. Moreover, more than half of forest, Baltic Sea and coastal and mire habitats are threatened. The types of habitat that have lowest proportion under threat are Arctic fell and rocky habitats.

An action plan for improving the state of threatened habitat types was completed in 2011. In the next few years, it will be implemented in line with the principle of broad-based social responsibility, particularly through legislative development, the implementation of the national mire and peatland strategy, the implementation of protection plans for waters and the sea, and agricultural policy reforms.

Protection of species

Finland is one of the world's leading countries with respect to its activities in assessing the threatened status of species, but the standards of information collected vary greatly between various groups of organisms. For instance, birds and vascular plants are well known, whereas algae and certain invertebrate groups are poorly understood. The less that is known about a group of organisms, the more uncertainty factors are involved in the assessment, due to the quantity and quality of the data available or its interpretation. Protection of threatened species is based on an evaluation of the risk of extinction, that is, the red list of species, implemented by the International Union for Conservation of Nature (IUCN) on a worldwide basis. The guide for assessing the threatened status of species, published in Finnish in 2007, was also based on IUCN guidelines.

In terms of biodiversity conservation, it is important to examine the nation's entire range of species. This facilitates observations of environmental change and the anticipation of potentially detrimental changes as regards groups of species or species connected to certain habitats. Finland's number of species is currently estimated as at least 45,000. The fourth assessment of threatened species in Finland (The 2010 Red List of Finnish Species) evaluated the status of 21,398 species or lower taxa, accounting for some 47 per cent of the number of species in Finland. Fourteen groups of experts, assigned specifically to each group of organisms, were responsible for the assessment. In total, 2,247 species (10.5%) were classified as threatened in 2010. The Red List, revised in 2005 and appended to the Nature Conservation Decree (*Luonnonsuojelulasetus* 913/2005), includes 1,410 threatened species, of which 608 are under strict protection. The Steering Group for Evaluation of Threatened Species (LAUHA), appointed by the Ministry of the Environment, has proposed updating the appendix to the decree to cover 2,121 taxa, of which 660 species should be placed under strict protection (Rassi et al. 2010).

The survival of threatened species in the wild is at risk in Finland and, unless focused protection measures are adopted, some species are at imminent risk of extinction. The key measure in safeguarding threatened species would involve protecting their habitats. This can be done through conservation, management, restoration, remediation or

other measures, such as taking species and their habitats into account in all activities. A prime example of this is the operating model *Threatened species in forestry*, developed and introduced by forestry operators (Finnish Forest Industries Federation, the Central Union of Agricultural Producers and Forest Owners (MTK), Metsähallitus, the Forestry Development Centre Tapio, forest management associations and the Finnish Forest Centre), in collaboration with the Finnish Environment Institute (SYKE). The aforementioned forestry operators include almost all forest holders in Finland, with the exception of cities, municipalities and corporations. This model seeks to safeguard known occurrences of threatened species in commercially managed forests. Similar operating models should be developed in other administrative sectors. In addition to safeguarding habitats, species-specific measures, such as the breeding of certain species in order to facilitate their re-introduction to nature, and facilitating reproduction by building artificial nests, are sometimes recommended. Precautionary measures required for species under strict protection are described in species-specific conservation programmes.

Plant conservation is being promoted within the flexible framework of the Global Strategy for Plant Conservation (GSPC). The European Strategy for Plant Conservation (ESPC) was prepared on the basis, and as part, of the Global Strategy. The *Planta Europa* network promotes its objectives via member organisations. Under the ESPC, Finland has promoted several of the GSPC's goals within various administrative sectors. Many of the cross-cutting themes of the *Saving nature for people* action plan (2012–2020) implement the objectives of the aforementioned plant conservation strategies. The environmental administration has conducted assessments of threatened plant species in Finland (1985, 1990, 2000, 2010) and promoted the conservation, management and monitoring of plant species and their habitats. Responsibility for updating the national plant checklists lies with the Finnish Museum of Natural History. The Ministry of Agriculture and Forestry has promoted issues such as the conservation of semi-natural habitats and forest biodiversity. Conservation, management and monitoring of flora and fungi and their habitats have also been promoted regionally and locally, outside any national plans. In addition, the Finnish Environment Institute (SYKE) and Metsähallitus have compiled (2004–2005) preliminary proposals for national plant protection goals, on the basis of the aforementioned international strategies. These institutions have also joined the *Planta Europa* network.

Climate change

At present, the decline in biodiversity is mainly due to the loss and fragmentation of habitats, to environmental pollution, to the excessive use of animal and plant species to meet human needs, and to other direct consequences of human action. Besides habitat reduction and invasive alien species, climate change is viewed as one of the most serious global threats to biodiversity. The impacts of climate change are already evident in many ecosystems, due to the shift in climatic zones.

Extensive international research data shows that recent regional changes in temperature are having clear impacts on a global range of physical and biological phenomena. There is evidence of glaciers shrinking, permafrost melting, shortening of the ice cover period in rivers and lakes, and lengthening of the growth season. Climate change forecasts indicate that the most rapid and radical rise in temperatures will occur in the northern regions. An increase in winter precipitation and extreme weather phenomena are also expected to occur more often in the north.

Northern ecosystems are sensitive to irregular variations in natural phenomena and changes in species. Many biotic communities are at risk of total extinction, since they are unlikely to be able to adapt to changing climatic conditions or migrate northwards. Atmospheric pollution and soil contamination will impair the recovery and resistance of ecosystems in Arctic and northern regions.

In the north, temperature-based limits on many biological phenomena have a major influence on the functioning of ecosystems. The distribution and phenology of species are largely determined by temperature. Rising temperatures will result in new species spreading to our country, some of which may be invasive alien species. Simultaneously, our native species populations, which are adapted to northern conditions, will decline and lose habitat to southern species.

The production capacity of northern ecosystems, such as forest growth, is increasing due to warming. The resulting increase in biomass volume is having both positive and detrimental impacts on biodiversity, and may also increase the economic attractiveness of northern regions.

Changes in precipitation will probably have an effect on water turnover in the Baltic Sea, affecting water salinity. This is likely to have major impacts on species in the Baltic Sea. The shrinking of the ice cover in winter will result in partial disappearance of the sea ice habitat in the Baltic Sea, and, for instance, will have an impact on the reproduction of seals. Changes in temperature and salinity may cause changes conditions, making them favourable for many alien species.

Research has shown that, as a result of rising temperatures, the biology of many hundreds of species has changed to a statistically significant degree. Climate change and higher regional temperatures, in particular, have affected the timing of the reproduction of both flora and fauna, the length of the growing season and animal migration and movement, the distribution and population numbers of species, as well as the occurrence of pests and diseases.

The 2008 Red List evaluation of Finland's habitat types mentions climate change as the key cause of the growing threat facing several types of habitat in northern Finland. It is estimated that, in the future, climate change will pose a threat to more than 70 habitat types. According to the 2010 Red List evaluation of Finland's species, climate change is the primary cause in the case of 12 threatened and near threatened species, while for 56 species, it is one of the causes of threat.

Climate change also has a significant impact on many ecosystem services, that is, the ecological, economic and social benefits that biodiversity and ecosystems produce for humankind. According to the *Millennium Ecosystem Assessment* (2005), in most cases climate change is expected to degrade the capacity of ecosystems to produce ecosystem services. On the other hand, the biological production capacity of many terrestrial ecosystems in northern regions is expected to increase. As mentioned above, this will increase the opportunities for their exploitation, while posing new threats to the current biota in terrestrial ecosystems.

Invasive alien species

On a global scale, invasive alien species represent the second-most important threat to biodiversity, with habitat loss and fragmentation being viewed as the key threat. Research indicates that up to 480,000 alien species have been introduced and spread around the world, and are known to be the major cause of native species extinction in different parts of the world. The spread of alien species reduces overall species diversity, even if the actual number of species increases locally or regionally. Invasive alien species are thought to be the cause of more than 1,000 billion euros of global damage per year. This corresponds to around 2–3 per cent of the world's gross national product (GNP).

The first comprehensive list of invasive alien species discovered in Europe records more than 11,000 such species. Of these, the most established invasive alien species remain relatively restricted in range: for the time-being, only a small percentage, 10–15 per cent of alien species, have become so common as to be considered invasive. Still, the costs connected to invasive alien species are at least 12.5 billion euros every year in Europe.

Invasive alien species spread from their natural distribution range to new geographical areas, through either intentional or inadvertent human action. Globalisation and the greatly increased international movement of people and goods by sea, land and air have accelerated the spread of invasive alien species. Other environmental changes caused by humans, such as climate change, may aggravate the problem further.

In early 2011, 157 invasive alien species were identified in Finland. They are known to cause direct or indirect damage. Two thirds, that is, the majority of these, are invasive agricultural and forestry species. Of the alien species in other groups, five occur in the territorial waters of Finland in the Baltic Sea, five in inland waters, six are land vertebrates, 24 are plant species, and nine are indoor pests. In addition, about 123 species not native to Finland that are to be monitored or that may be locally harmful were identified in early 2011. Particularly harmful invasive alien species include Japanese rose, crayfish plague, hogweeds, Spanish slug and [American] mink, as well as dangerous plant pests or quarantine species (37 species).

Legislation on invasive alien species is in force, and enforced in Finland. Under the *Nature Conservation Act* (*Luonnonsuojelulaki* 1096/1996), non-native species must not be released into the wild if there is cause to suspect that the species may become established permanently. Moreover, the following acts include provisions on

non-native species: *Hunting Act* (Metsästyslaki 615/1993, 915/2011), *Fishing Act* (Kalastuslaki 286/1982, 252/1998), *Animal Disease Act* (Eläintautilaki 55/1980), and as concerns response to plant pests, *Act on protection of plant health* (Laki kasvinterveyden suojelemisesta 702/2003), *Act on planting material* (Taimiaineistolaki 1205/1994) and *Act on trade in seeds* (Siemenkauppalaki 728/2000). Also the *Forest Act* (Metsälaki 1093/1996), *Act on prevention of insect and fungi damage in forests* (Laki metsän hyönteis- ja sienituhojen torjunnasta 263/1991) and the *Act on Trade in Forest Reproductive Material* (Lakia metsänviljelyaineiston kaupasta 241/2002) are applicable to invasive alien species. In addition to these, the following can be considered indirectly applicable to invasive alien species: *Act on prevention of wild oats* (Laki hukkakauran torjunnasta 185/2002), *Animal Welfare Act* (Eläinsuojelulaki 247/1996), *Ministry of Agriculture and Forestry Decree on the import of certain live animals, their embryos and gametes* (Maa- ja metsätalousministeriön asetus eräiden elävien eläinten sekä niiden alkioiden ja sukusolujen tuonnista 866/2008), *the Water Act* (Vesilaki 264/1961), *Environmental Protection Act* (Ympäristönsuojelulaki 86/2000), *Act on Water Resources Management* (Laki vesienhoidon järjestämisestä 1299/2004), and *Public Order Act* (Järjestyslaki 612/2003).

Nature-based tourism and outdoor recreational activities

Tourism is the world's most rapidly growing industry. As such, it has grown at a fast pace in Finland too. According to Finland's Tourism Strategy, tourism businesses employed a total of 130,500 people in 2007, generating approximately 4 billion euros per year in tax revenues and accounting for 3.8 per cent of GDP (2007). Finland's Tourism Strategy 2020 seeks considerable growth: in 2020, tourism businesses were able to employ 171,000 people, accounting for 5.1 per cent of GDP. The strategy strives to develop tourism clusters and networks in particular, identifying undisturbed, clean natural environments as a strength of tourism in Finland.

Sustainable nature-based tourism and outdoor recreational activities yield various social, ecological and financial benefits to society, evident, for instance, in the form of impacts on health, income and employment. The tourism industry is a vital resource of regionally balanced development, because nature-based tourism provides employment and the prerequisites for livelihoods, even in Finland's remote rural areas. Nature-based activities and experiences facilitate and nurture the formation of a personal relationship with nature, which is often a precondition for a positive attitude to the conservation of biodiversity.

National parks, state-owned recreational areas and other protected areas and recreational sites considered most significant in terms of recreation and administered by Metsähallitus, attracted approximately five million visitors in 2011, of which more than two million visited national parks. In aggregate, national parks produced 108 million euros for the local economy, employing staff outside Metsähallitus worth some 1,400 man-years. The trend is clear: money invested by the government in recreational services in national parks and state-owned recreational areas is returned to society many times over in local business activities and jobs. An increase in nature-based tourism and the resulting positive impacts on the local economy have accordingly transformed the attitudes of local people to national parks.

In general, for various reasons such as the large area of the country, its relatively sparse population and its advanced tourism infrastructure and services, the environmental impacts of nature-based tourism and recreational activities are unproblematic. Tourism focuses on cities and tourist centres. Everyman's rights allows for movement of all kinds in the natural environment for everyone, regardless of the landowner. Such movement is mainly channelled towards paths, hiking trails and recreational areas. On the other hand, local adverse impacts of tourism and recreation, such as erosion, are evident in certain areas (e.g. the Pallas-Yllästunturi National Park).

Monitoring, research and data systems

Monitoring and research, and the data systems that serve them, constitute the knowledge base for decision-making on biodiversity. Monitoring and research data are indispensable to the objective assessment and justified focusing of policy measures affecting biodiversity. Such data are also essential to reporting required under EU legislation (e.g. the Habitats Directive, Article 17; Birds Directive, Article 12) and international agreements and conventions (e.g. Convention on Biological Diversity). Data systems are necessary to managing the large volumes of data produced in monitoring and research, and to their efficient utilisation.

Basically, all monitoring of biodiversity and factors affecting it, conducted using advanced methodologies, constitute research. Detailed data is required for the conservation of species and habitats, including data on the underlying mechanisms of changes observed in monitoring and on species biology. For the conservation, management and sustainable use of biodiversity, a societal framework is needed, as well as knowledge and understanding, for balancing the various goals and measures. In this regard, conservation biology and multi-disciplinary research into ecosystem services play a key role.

Use of research materials is encumbered by different practices for information collection and maintenance, the variable format, accuracy and content of data, and problems in accessing information and engaging in joint use. For instance, information on threatened species, collection data from natural history museums and data from local nature inventories and environmental impact assessments, cannot be easily accessed or combined in order to build an overall picture. There are also deficiencies in transferring compiled information, for instance, for use by local or regional bodies responsible for land use planning.

Several parties operating under the guidance of various ministries are responsible for producing biodiversity data in Finland. Environmental data on natural resources is collected and administered under the direction of the Ministry of Agriculture and Forestry, whereas other types of data on biodiversity are produced in the administrative sectors of the Ministry of Education and Culture (universities and natural history museums) and the Ministry of the Environment. Cooperation between the branches of government represented by these ministries has been enhanced by establishing LYNET — Finnish Partnership for Research on Natural Resources and the Environment. With respect to marine research, coordination between administrative sectors has been improved by establishing the national Marine Research Coordinating Group and preparing a national strategy for marine and maritime research (2011). Since 2009, the Finnish Environment Institute's Marine Research Centre has been responsible for marine research on biodiversity.

Research data on the state of and trends in biodiversity in Finland, and measures supporting the maintenance of biodiversity, and the efficiency of such measures, have increased considerably. Key research projects and reports include:

- Finnish Biodiversity Research Programme (FIBRE 1997–2002 and the integration and synthesis project BITUMI, Academy of Finland, the Finnish Funding Agency for Technology and Innovation (Tekes), Ministry of Transport and Communications, Ministry of Agriculture and Forestry, Ministry for Foreign Affairs, Ministry of the Environment, Ministry of Education, Maj and Tor Nessling Foundation, Finnish Forest Industries Federation, the Central Union of Agricultural Producers and Forest Owners (MTK))
- An evaluation of the representativeness of Finland's protected area network (SAVA) 1997–2002 (Finnish Environment Institute (SYKE), Ministry of the Environment)
- Significance of the Finnish agri-environment support scheme to biodiversity and landscapes (MYTVAS) (2000–2006, 2008–2013)
- Biodiversity Research Programme (MOSSE) 2003–2006 (Ministry of Agriculture and Forestry, Ministry of the Environment, Ministry of Education, Ministry of the Interior, Ministry for Foreign Affairs, Ministry of Transport and Communications, Finnish Road Administration, Finnish Forest Industries Federation and the Central Union of Agricultural Producers and Forest Owners (MTK))
- Finnish Inventory Programme for the Underwater Marine Environment (VELMU) 2003–2015 (Ministry of the Environment)
- Research and development projects in support of METSO, the Forest Biodiversity Programme for Southern Finland 2004–2016, e.g. Research Programme of Deficiently Known and Threatened Forest Species (PUTTE) 2004–2016 (Ministry of Agriculture and Forestry and Ministry of the Environment)
- Safeguarding forest biodiversity – policy instruments and socio-economic impacts (TUK) 2005–2010 (Finnish Forest Research Institute (Metla), Ministry of Agriculture and Forestry)
- Climate Change Adaptation Research Programme (ISTO) 2006–2010 (Ministry of Agriculture and Forestry, Ministry of the Environment, Ministry for Foreign Affairs, Ministry of Transport and Communications)
- Assessment of threatened habitat types in Finland 2008 (Finnish Environment Institute (SYKE))
- Ecosystem Services and Livelihoods — Vulnerability and Adaptation to a Changing Climate (VACCIA) 2009–2011 (Life+)

- Fourth assessment of threatened species in Finland 2010 (Ministry of the Environment, Finnish Environment Institute (SYKE))
- Fourth national report on the implementation of the Convention on Biological Diversity in Finland 2010 (Ministry of the Environment)
- Joint Baltic Sea Research and Development Programme (BONUS) 2010–2016 (Academy of Finland, Ministry of Employment and the Economy)
- LifeData development project (improving the life-cycle and accessibility of environmental data) 2011–2015 (LYNET)
- Finnish Research Programme on Climate Change (FICCA) 2011–2014 (Academy of Finland, Ministry for Foreign Affairs)
- Nordic Top-level Research Initiative Funding: Global change research; sub-programme “Effect Studies and Adaptation to Climate Change” and sub-programme “Interactions between Climate Change and the Cryosphere” 2010–2015 (Academy of Finland, Ministry of Education and Culture)
- Sustainable Governance of Aquatic Resources (AKVA) 2012–2016 (Academy of Finland, the Finnish Funding Agency for Technology and Innovation (Tekes), Ministry of Agriculture and Forestry, Ministry of Social Affairs and Health, Ministry for Foreign Affairs, Ministry of the Environment)

The utilisation of monitoring and research data has been improved with the help of indicators on changes in biodiversity and underlying factors. In collaboration between Finnish research institutions, authorities and non-governmental organisations, approximately 110 indicators describing the state of biodiversity have been compiled on the Biodiversity.fi website. These indicators cover the main habitats in Finland, while others describe climate change and invasive alien species. Indicators can be used for the comprehensive or theme-specific assessment of biodiversity trends, or linked directly to policy measures and their monitoring.

Global Taxonomy Initiative in Finland

It is a globally established fact that the science of naming, describing and classifying organisms (i.e. taxonomy, systematics) is insufficiently advanced to assist in the conservation of species. General interest, financial support, research resources and hence the specialisation and researcher training of students, have for long focused on other disciplines, while taxonomy is even considered an old-fashioned field of research.

The *Global Taxonomy Initiative* (GTI) seeks to increase knowledge on global biodiversity, all the way up to the level of genetic variation within populations. Greater knowledge promotes not only the conservation of biodiversity, but also the sustainable use of natural resources. In particular, this initiative seeks to promote projects that implement the Convention's basic objectives.

Approval of the programme of work on the initiative (Info Box) was accompanied by an emphasis on the need to coordinate its implementation with existing national, regional and global initiatives. One of these initiatives is the *Global Biodiversity Information Facility* (GBIF), promoting access to information on species and distributing primary data on biodiversity. Finland is a member of the GBIF. The GBIF's sources of information currently active in Finland (Universities of Helsinki, Eastern Finland, Jyväskylä, Oulu and Turku, the Kuopio City Museum and Birdlife Finland) provide access to approximately 9.6 million data records. Finland's ninth place among the GBIF nodes in terms of the number of data records can be considered satisfactory in international comparisons. The *Svenska artprojektet* in Sweden (2002–) aims at identifying the entire range of species in the country, publishing data on them, and providing researcher training in the field of taxonomy. No such large-scale efforts are in place in Finland, but, for instance, the goals of the *Research Programme of Deficiently Known and Threatened Forest Species* (PUTTE) are similar, although on a smaller scale. Research projects simultaneously in progress in both Finland and Sweden benefit from each other, due to natural history traditions and natural geographic connections.

The Finnish Museum of Natural History is responsible for the storage of Finland's national collections of natural history. These consist of around 9 million fauna specimens (of which some 8.3 million are insects), almost 3.5 million botanical specimens (of which 1.8 million are vascular plants and 0.7 million, cryptogams) and almost one million fungi. The Botanic Garden's collections include approximately 8,000 live plant accessions. In addition, the Museum of Natural History has a vast archive of observations of domestic organisms, consisting of an estimated 20 million observations (more than one half are avian observations), the oldest of which date back to the early 1800s.

Other natural history museums in Finland have an almost equal quantity of specimens on aggregate. The Botanical Gardens of the University of Oulu have a department of native plants, and one third of wild plant species of Finland are included in these live collections. Within the framework of HELCOM cooperation, the Finnish Institute of Marine Research has compiled a high-quality, extensive taxonomic database of phytoplankton, consisting of more than 2,000 species, sub-species and variations. The material described above is of vital importance to research into changes in biodiversity and reports on such changes in Finland.

The Ministry of the Environment is a major commissioner of services from the Finnish Museum of Natural History. Regional collections and the Finnish Museum of Natural History cooperate with each other and other parties, including the Finnish Environment Institute (SYKE). The division of duties between the Finnish Museum of Natural History and regional museums has been handled, for example, by the LUOMUS working group, which is seeking to clarify the position of the Finnish Museum of Natural History (Ministry of Education 2007), and by the Finnish Museum of Natural History, in its proposal to accelerate cooperation and the division of roles between natural history collections (2011). The management of museums and universities have largely reached a consensus on the development of natural history collections as a whole, but no progress has yet been made on practical measures.

Challenges and measures regarding habitats and natural resources

Forests

Forests are Finland's most common habitat type — 75 per cent of its land area, i.e. approximately 23 million hectares, are covered by forest (in 2010: 20.3 million hectares of forest land, and 2.5 million hectares of poorly productive sparsely wooded land). Some 90 per cent of Finland's forests are commercially managed. More than 20 tree species occur naturally in Finland, but our primary tree species — pine, spruce, silver birch and downy birch — account for approximately 97 per cent of the total volume of timber.

Humans have been modifying Finland's forest ecosystems for centuries. Since Finland's independence, use of forests has been based on wide-scale inventories of forest resources and on forest research. After the war, research and forestry development aimed to enhance the efficiency of timber production. In fact, since the 1950s forestry has become considerably more efficient and the structure of forests has developed largely into its present state. Although Finland's forests have been intensely utilised until recent years, the increase in growing stock has exceeded annual felling by 40 million m³ per year. The annual increase in growing stock in all forests now totals 104 million m³. In 2010, the drain totalled some 71.5 million m³, of which commercial fellings²³ accounted for around 52 million m³. Of commercial fellings, 78 per cent was carried out in privately held forests. In 2009, felling was carried out on about 470,000 hectares and, in 2010, almost 12 million m³ of raw wood were imported, including forest chips.

High basic investments in improving the usability of timber reserves, such as the construction of new forest truck roads and mire drainage in undrained areas, have practically come to an end. The traditional operating conditions of the forest industry and forestry in Finland have been undermined by changes in the international economy. The objective of Finland's National Forest Programme (NFP 2015), revised in 2010 and adopted by the government under a Government Resolution, is to develop the forest sector into a biocluster which will also produce materials and services more extensively for other sectors. In this, the aim is to accumulate well-being through diverse forest use and management. Programme goals include strengthening forest-based businesses and increasing the value of production, improving the profitability of forestry, and enhancing forest biodiversity, environmental benefits and the related well-being implications.

Safeguarding biodiversity is integral to the sustainable management and use of forests in Finland. Because the focus of protected areas lies in northern Finland, conservation of forest biodiversity beyond the current level is mainly required in the southern parts of the country. The latest assessment of threatened species in Finland was published in 2010. Since the previous assessment, which was conducted in 2000, knowledge of our forest species

²³ Saw timber, pulpwood and firewood in aggregate.

has increased considerably, in particular due to the *Research Programme of Deficiently Known and Threatened Forest Species* (PUTTE). New groups of organisms and species are included in the study. According to the latest assessment, the rate at which species are becoming threatened in forests has slightly declined. Reasons for this include major investments in safeguarding forest biodiversity in commercially managed forests and protected areas since the 1990s. On the other hand, the likelihood of species extinctions in the old-growth forests of southern Finland, in particular, is still clearly increasing. This is happening for a variety of reasons, one of which is that the majority of such species live in forest patches that are too small and isolated to fulfil their needs.

Herb-rich forests, the most significant habitat of threatened forest species, have become less numerous due to clearances for agricultural land over a period of hundreds of years. The quality of these forests has been impaired by forestry, fragmentation, falling volumes of decaying wood and take-over by spruce. By the end of 2010, fertile patches of herb-rich forest in a natural state, or resembling a natural state, as described in section 10 of the Forest Act, have been identified in a total area of 5,422 hectares in privately owned forests.

Forest fires, previously common and to a certain extent naturally inherent in the boreal forest belt, are practically non-existent due to effective control and changes in outlooks because of education. Research indicates that forest fires have been less common than generally believed in forests that are still in their natural state. Many species that benefit from fire have probably become more common during the period of slash and burn agriculture. Since burnbeating and forest fires became less frequent, these species have become threatened. Controlled burning, as part of forest management, became considerably less common after the mid-1960s. In 2010, approximately 520 hectares of forest was ravaged by fire. In addition, controlled burning as part of forest management was carried out on 174 hectares. In the previous five years, the area of controlled burning conducted under forest management has been around 600 hectares per year. Several projects are underway to advance controlled burning as part of nature management.

Three quarters of Finland's fungi species grow in forests, which also provide a habitat for more than half of the country's mammals. The lowest number of species is found in forests with a dry, oligotrophic soil and the highest number in herb-rich forests. Almost one third of all forest species are deemed herb-rich forest species, while 13 per cent inhabit old-growth forests. According to the latest survey (2010), forests are the main habitat of 37.9 per cent of threatened species. Forest species account for 36.2 per cent of all threatened species. According to an estimate by the Finnish Environment Institute (SYKE), 9 per cent of forest species included in the 2010 evaluation of threatened species were classified as threatened; this percentage has not changed over the preceding ten years. Of the 814 threatened forest species, 35 per cent live in old-growth dry heath forests, 47.1 per cent in herb-rich forests, 13.8 per cent in esker forests and 1.2 per cent in burnt forest areas. The number of threatened forest species has increased compared to 2000, mainly due to the new groups included in the assessment. On the other hand, the 2010 evaluation indicates that many forest species previously classified as threatened are no longer so. It is estimated that a total of 108 forest species have disappeared from Finland, that is, almost one third of all regionally extinct species. Of these, the majority are invertebrates, beetles in particular. Of all forest species, those dependent on decaying wood account for 20–25 per cent²⁴. According to the 10th National Forest Inventory 2004–2008 (NFI 10), the volume of decaying wood (dead standing trees and fallen trees) in forests and on poorly productive land in southern Finland has increased, now totalling 3.3 m³/ha. In northern Finland, the volume of decaying wood totalled 8 m³/ha in NFI 10 (the corresponding figure in NFI 9 was 8.3 m³/ha), indicating a slight decrease in the volumes of decaying wood, particularly as regards fallen trees. However, this is not actually due to changing volumes over the previous four years, but to random measurement variations.

The Forest Act includes an obligation to preserve the special features of so-called habitats of special importance that are in a natural state, or which resemble such a state. Sites of this kind include fertile patches of herb-rich forest that usually cover a small area, and nutrient-rich hardwood-spruce swamps. By the end of the year 2010, a total of 101,935 hectares of these habitats of special importance had been identified in privately held forests. This accounts for 0.7 per cent of the total area of forest land in private ownership. At the end of 2008, forests belonging to all owner groups were estimated to contain less than 143,000 hectares of habitats of special importance, as defined in section 10 of the Forest Act. The Nature Conservation Act identifies protected habitat types whose characteristic

²⁴ Siitonen 2001.

features must not be altered. Of these habitats, wild woods rich in broad-leafed deciduous species, hazel woods and common alder woods are forested. The act also includes provisions on protecting the breeding sites and resting places of animals included in Annex IV (a) of the Habitats Directive, such as the flying squirrel.

The National Forest Programme (NFP 2015) includes objectives and measures for the protection and management of forest biodiversity. *The Forest Biodiversity Programme for Southern Finland 2008–2016* (METSO) specifies 14 measures for promoting diversity. Both the NFP and METSO are aimed at halting the ongoing decline in forest habitats and forest species, and establishing stable and favourable trends in biodiversity. All measures included in the METSO programme are based on voluntary participation by landowners. The conservation biology criteria defined for METSO identify the forest habitats and structural features of forests whose preservation requires the most urgent measures. In particular, the METSO programme promotes the management and protection of dry heath forests with plenty of decaying wood, herb-rich forests, wooded mires, wooded flood meadows, sunlit slopes on sandy esker ridges, wooded heritage biotopes and forests along emergent coastlines. According to the 2010 interim assessment of METSO, the programme has intensified cooperation between environmental and forest organisations and continued with its landowner-oriented approach, already commended during the trial stages of the programme.

The forest management guidelines and recommendations of Metsähallitus and the Forestry Development Centre TAPIO also take biodiversity into account.²⁵ The Central Union of Agricultural Producers and Forest Owners (MTK) and forest industry enterprises have prepared programmes and instructions for their organisations on the diverse management and use of forests. Particular attention has been paid to increasing the volumes of decaying wood and deciduous trees. The results of the National Forest Inventory (NFI) seem to indicate that birch and other deciduous trees continued to account for largely the same share of the total stand volume between NFI 1 and NFI 11 (Statistical Yearbook of Forestry 2011, table on p. 68). If climate change occurs as predicted, deciduous trees will become increasingly dominant as living conditions favourable to spruce deteriorate. It is anticipated that climate change will have a clear impact on forests: forest growth will increase, the tree line will move farther north, ratios of tree species will change, southern species will move farther north, and the risk of local forest damage will increase.

The PEFC forest certification (*Programme for the Endorsement of Forest Certification Schemes*) and FSC certification (*Forest Stewardship Council*) also contribute to the promotion of forest biodiversity. Approximately 95 per cent of commercially managed forests in Finland are certified in compliance with the PEFC standard. Under this standard, the most significant criteria with regard to biodiversity are probably those concerned with the conservation of features typical of valuable habitats, and retention trees and decaying wood left at forest regeneration sites. According to the criterion, the average number of retention and decaying trees left is at least 5 to 10 trees per hectare. The Forestry Development Centre Tapio's environmental quality assessment indicates that ten live retention trees per hectare, with a volume of 2.8 m³/ha, were left during the clear felling of privately held forests in 2010. In 2005–2008, the value of retention trees left in the clear felling areas of privately held forests varied between 6.7–11.6 million euros per year.

Based on calculations in accordance with the FAO's forest definition, at the end of 2008 forest and poorly productive sparsely wooded land, both protected and in limited forestry use, totalled 2,963,000 hectares in Finland, or 13 per cent of the total area of forest and poorly productive sparsely wooded land. Protected forest and poorly productive sparsely wooded land accounted for 2,181,000 hectares (9.6%) of this area. Of protected forest and poorly productive sparsely wooded land, 94 per cent is strictly protected: 2,048,000 hectares of forest and poorly productive sparsely wooded land in Finland, or 9 per cent of all such land, is strictly protected. Strictly protected forest and poorly productive sparsely wooded land cannot be used for timber production. By area, wilderness areas and national parks form the major types of protected areas. In southern Finland, 500,000 hectares (4.3%) of forest and poorly productive sparsely wooded land is protected and in limited commercial use, while 262,000 hectares (2.3%) are strictly protected. In the entire country, 5.2 per cent of forest land area is strictly protected, while in southern Finland, the figure is 2.4 per cent.

²⁵ Recommendations for good forest management, prepared under the leadership of the Forestry Development Centre Tapio, are voluntary. Forest owners can decide for themselves on the extent to which they take the recommendations into account.

The Old-Growth Forest Conservation Programme and Programme for the Protection of Herb-rich Forests target protection measures at particularly threatened forest habitats. At the end of 2008, in Metsähallitus' regional ecological planning, just under 147,000 hectares of forests which were not included in nature conservation programmes, the Natura 2000 network or areas reserved for conservation in confirmed land use plans, were excluded from commercial use. In addition, in connection with various land owner groups significant forest areas, which are not included in conservation statistics, have been excluded from forestry. For instance, areas protected under decisions by forestry companies covered some 50,000 hectares at the end of 2008. Some forests in southern Finland consist of forests on islands, as well as shorelines and special forests which have long been free of felling. In many cases, these are small-scale belts. The number of gene reserve forests, established in accordance with the national programme on plant genetic resources for the purpose of protecting gene reserves, was 41 at the end of 2011, totalling 6,500 hectares in area.

Under the Act on the Financing of Sustainable Forestry, support can be allocated to forest owners in order to help secure the natural values of commercially managed forests on a broader basis than required under the Forest Act. The most promising measures are increasing the amount of decaying wood through retention trees and promoting controlled burning; the favourable impacts of these measures on biodiversity have also been verified through research. Retention trees are assumed to have beneficial impacts on biodiversity other than merely increasing the volume of decaying wood. Nature management measures are promoted through forest management recommendations and advice provided to forest owners.

Mires

One third of Finland's land area, 9.3 million hectares, is classified as peatland. Slightly over 60 per cent of the country's original 10.4 million hectares of mires has lost its natural state due to forestry, agriculture and the production of peat and hydropower. The most dramatic changes have occurred in the last 60 years. Large-scale exploitation of mires has caused a loss of biodiversity of mire ecosystems in Finland. Except for protected mires, most of the destruction of mire ecosystems has occurred in the southern half of Finland, with less than 10 per cent of the original mire area left in its natural state (incl. protected mires). Outside protected mires, very few mire area entities remain that have no artificial drainage ditches, and those that do have become increasingly isolated and smaller in area. Earlier exploitation of natural resources in mires, such as the digging of drainage ditches to make mires more productive for forestry purposes, as well as fertilisation and the handling of trees, have even affected the status of mires in protected areas. Despite the cessation of new mire drainage in undrained areas in the meantime, species populations in mires have continued to decline in the last 10 to 15 years.

Reduction of mires in their natural state has particularly involved mire types thought, based on the knowledge available at the time, to be best suited to agriculture, silviculture and peat production. As a consequence of agriculture and forestry, the number of nutrient-rich mire types has been reduced. The number of nutrient-rich mire types without drainage ditches, such as treeless rich fens, rich pine fens and rich spruce mires, has declined by around nine tenths since the early 1950s (Raunio et al. 2008).

Conservation of mires has primarily been based on government resolutions (National Mire Protection Programme, Old-growth Forest Conservation Programme and the programme for the development of the network of national parks and strict nature reserves). Government decisions on the Natura 2000 network have improved the conservation status of eutrophic mire types in particular. Approximately 1.125 million hectares (almost 13%) of the remaining mire area are protected. The number of protected mires varies greatly in different parts of the country (according to NFI 10, the numbers are as follows: southern, western and eastern Finland, some 206,000 ha in all, Northern Ostrobothnia–Kainuu some 222,000 ha and Lapland some 815,000 ha). Conservation of wooded mires is inadequate, with their average degree of protection south of Lapland amounting to only a few per cent. Excluding Lapland, the degree of conservation of other eutrophic mires is also low. Although most of the land area of protected mires lies in the northern part of the country, diverse protected mires and networks of significant mires can be found in locations south of the Province of Lapland.

In accordance with section 10 of the Forest Act, management and utilisation measures aimed at herb-rich and grassy hardwood-spruce swamps, ferny hardwood-spruce swamps, eutrophic paludal hardwood-spruce swamps, and

eutrophic fens located to the south of the Province of Lapland, dry heath forest islets in undrained peatlands, peatlands with sparse tree stand and flood meadows which are less productive than nutrient-poor dry heath forests and are in a natural state, or resemble a natural state, and are clearly distinguishable from their surroundings, must be carried out in a manner which preserves the special features of the habitats. At the end of 2010, 40,781 hectares of peatlands with sparse tree stand, as defined in section 10 of the Forest Act, 4,215 hectares of eutrophic fens, and 2,675 hectares of eutrophic wooded mires had been identified (METE survey) in privately held forests (2010 Annual Statistics by Forestry Development Centre Tapio, p. 54). State-owned forests include a total of 3,103 hectares of peatlands with sparse tree stands, eutrophic fens and eutrophic wooded mires (Erkki Hallman 22.3.2012).

According to information published in 2006, forestry companies have surveyed a total of 11,000 hectares of habitats of special importance on their lands, referred to in the Forest Act (all habitats) (Yrjönen 2006). In Finland, the protection of habitat types under section 29 of the Nature Conservation Act applies to extremely rare types of common alder woods. So far, some 170 hectares of these have been surveyed, with 108 hectares meeting the criteria of the act. A total of 81 decisions setting the boundaries of protected sites (covering a total of 83 ha) are currently in place.

Only a few mires at different stages of development on emergent coasts, and small-featured mire and forest mosaics characterised by wooded mires and pine bogs, exist in protected mire areas in southern and central Finland. Protection of sloping fens in upland areas in eastern and northern Finland, and of entities of various small water bodies, is also lacking in the eastern and northern parts of the country. The boundaries set for protected mires are often hydrologically deficient. This can lead to ditch drainage outside protected areas having a detrimental effect on protected mires.

In accordance with the latest assessment of threatened species (2010), the number of threatened mire species totals 104 (4.6%). One half of these live primarily in eutrophic fens. In comparison with the assessment conducted in 2000, thirty species, living primarily in mires, were found to have a lower status, while the status of only four had improved. Assessed in terms of the number of species, the trend was most negative among vascular plants, birds, bryophytes, and butterflies and moths. In the case of almost all species, peatland drainage and peat harvesting is the primary threat. Species' localities are being destroyed as a consequence of the continuing effects of earlier drainage operations and ditch cleaning and supplementary ditching, and new areas being used for peat harvesting.

According to the 2008 Red List evaluation of Finland's habitat types, mire habitats have become particularly threatened in southern Finland. In addition to the most eutrophic mire types, many mires that are more oligotrophic, such as genuine spruce swamps, pine mires typical of the edges of mires, and lawn mires, have been subject to intense reductions. Very few structurally continuous mire entities that are hydrologically in their natural state, known as mire complexes, remain. Succession series of mires in emergent coast areas are critically endangered.

Forest drainage has been the most significant threat to mire habitat types. Ditch cleaning and hydrological activities related to, for example, regeneration felling in wooded mires may still affect the hydrology of surrounding mires with no artificial drainage ditches. In addition, depending on runoff ratios of waters, ditch drainage areas can, in various ways, affect the hydrology of mires with no artificial drainage ditches. Detrimental impacts have partly been alleviated by channelling waters from ditch drainage areas into parts of mires with no artificial drainage ditches, particularly in aapa mire areas. Clearance of agricultural land has been another key reason for mires becoming threatened, particularly in southern Finland and in some eutrophic areas of northern Finland. The quality of wooded mires with no artificial drainage ditches and of wooded pine mires has been degraded by felling and the cultivation of soil. Hydrological engineering, peat harvesting, infrastructure construction and road networks, alongside groundwater abstraction, have caused mire ecosystems to become degraded and fragmented.

Wetlands

Along with mires and inland waters, wetlands are included in the Convention's programme of work on biological diversity of inland water ecosystems. Another agreement covering their conservation and restoration is the Convention on Wetlands of International Importance, called the Ramsar Convention. These conventions state that, around the world, the natural capacity of such wetlands to recover has been so severely affected that special

restoration and management measures are necessary. International agreements on the conservation of migratory species of wild animals (Convention on the Conservation of Migratory Species of Wild Animals, i.e. the Bonn Convention, and the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA)) emphasise the importance of wetlands preservation worldwide. The European Union's Birds Directive also grants special status to wetlands, due to their significance to birds. Conservation under the Waterfowl Habitats Conservation Programme (Government resolution 1982) covers all species and breeds found in Finland's waterfowl habitats, as well as the entities formed by them and the abiotic environment.

Restoration of wetlands aims to halt the decline in wetland species and to restore such areas into habitats suitable for various species. Wetlands have been restored using various methods. For sea bays, the restoration of reed beds to flood meadows, and their maintenance by organising sufficient grazing for sea bay areas, have proven to be the most significant and productive management methods.

The Waterfowl Habitats Conservation Programme covers 289 sites (74,750 ha), representing the different types and variations of Finland's waterfowl habitats found in and around lakes, eutrophic sea bays, shallow shores and estuaries. Of the original area covered by the Waterfowl Habitats Conservation Programme and in private ownership, more than 60 per cent has been preserved as protected areas, or brought under state ownership. The Natura 2000 network includes 467 special protection areas (SPAs) referred to in the Birds Directive, totalling 3.1 million hectares, that is, around 9 per cent of Finland's total area. In addition to nesting sites, these include resting areas used by birds during migration. Of these, 49 are entered as Ramsar sites under the Convention on Wetlands of International Importance (Ramsar).

In the case of waterfowl habitats in lakes, the most frequently used restoration measures include raising the water level, and dredging to remove aquatic vegetation. Flood meadows have been made more open by clearing willow thickets. Although the aim of restoration has been directed particularly at protecting threatened species such as the lesser white-fronted goose (*Anser erythropus*), the southern dunlin (*Calidris alpina schinzii*), the yellow-breasted bunting (*Emberiza aureola*) and the black-tailed godwit (*Limosa limosa*), the measures taken have had a positive impact on the habitats of almost all wetland bird species.

In the programming period 2007–2013, the Rural Development Programme for Mainland Finland is using a new form of investment subsidy: wetlands with multiple functions. In addition to water protection, this measure aims to promote biodiversity. The subsidy allows for wetlands to be established on their natural sites such as fields, on the edges of fields or on forest land, in fields prone to flooding, or on sites dried out by building embankments. Wetlands must be primarily established by damming. Projects that improve the natural state of streambeds can be implemented by restoring flood plains, establishing several small-scale wetlands, or building sills.

In 2007–2012, the Ministry of Agriculture and Forestry prepared a national game husbandry wetland strategy for Finland, covering game waterfowl and their key habitats. In its section on the various measures to be taken, the strategy presents basic policy guidelines, based on the biology of both wetlands and waterfowl populations viewed as key. Implementation of these guidelines continues the systematic management of game waterfowl populations and their habitats in Finland, in order to ensure that waterfowl remain a permanent element in Finnish nature. The main goal is to promote the management and restoration of wetlands outside protected areas, and the construction of new wetlands. Another goal is to ensure favourable future trends in waterfowl populations and to produce new data on the birds, as a basis for planning and decision-making. The long-term aim is to safeguard the diversity of wetlands and waterfowl habitats and species, while promoting the restoration of wetlands altered by humans and the building of new wetlands. Particularly in agricultural environments, the guidelines seek to enhance biodiversity and promote water protection by establishing new wetlands with multiple functions. These goals will be implemented through the joint impacts of various sets of measures, including improving waterfowl habitats, management of wetlands on privately-owned and state-owned land and the related funding, hunting of small carnivores, monitoring and research of waterfowl populations (and the development of such research), waterfowl hunting arrangements and placement under protection for a set period of time or in a specific location, training, advice, communications, cooperation between various parties and an evaluation of the distribution of responsibilities for the management of wetlands and waterfowl populations. In addition to ensuring the well-being of waterfowl, efforts will be devoted to achieving water resources protection, landscape protection and fishing-industry related objectives when restoring

wetlands and establishing new ones. In the last 30 years, hunters have established some 1,000 new wetlands in various parts of Finland. WWF Finland has planned and constructed around 30 wetlands and aims to establish more (status as of 23 March 2012). In the Loviisanjoki river region alone, the overall plan prepared by the WWF proposes the establishment of 45 wetlands. The WWF is also committed to promoting the implementation of sites proposed in the plan.

Agricultural environments, including semi-natural habitats

Over the centuries, agriculture has created habitats in Finland to which species characteristic of such habitats have migrated, while some symbiotic species that live in association with humans have become established within Finland's range of species. Crop cultivation has expanded the living space of a number of species, as well as creating habitats for new ones. Grazing domestic animals have created meadows with specific flora and fauna. Agriculture and the related livelihoods have had the greatest impact in terms of increasing biodiversity during the period of self-sufficiency, which continued in large parts of Finland until the 1950s and 1960s. After then, agriculture focused on crop cultivation, resulting in a rapid decline in the area covered by meadows, which permanently fell to approximately one hundredth of what it had been in the early 1900s. The overall field area in which machines were used more intensively and efficiently, and in which increasing amounts of external fertilisers and pesticides were used, increased correspondingly. Feed for cattle is no longer produced in natural pastures and meadows but via the intensive production of pasture and cultivated grass for cutting in fields. The change in farm structure which, particularly over the last few decades, has continued apace has decreased farm numbers to a fraction of the earlier figures, leading to changes in cultivation methods. The remaining farms have become increasingly large and specialised, but also biologically poorer in most cases. Species common during the era of meadow farming have become rarer. The increase in farm sizes, more-intense farming, and farm-specific and regional specialisation are having a degrading effect on biodiversity in agricultural environments.

A large number of wild fauna and flora continue to live in habitats created and maintained by agriculture. These species benefit from the outcomes of agriculture, such as open fields and grazing, and from many of the environmental measures agriculture involves, such as border strips and buffer zones. Some wild species that benefit from agriculture have not adapted to changes in farming methods. There have been declines in biota dependent on forest pastures, meadows and dry meadows in particular, as well in those dependent on ditch edges. Meadows and pasturage have been converted into fields and afforested, either through active forest management measures or by becoming naturally overgrown. However, in the last few decades the area under cultivation across the country has remained cultivated, or otherwise open. The transition from meadow farming to crop cultivation has not resulted in the disappearance of open agricultural landscape, with the total area of agricultural land remaining at approximately 2.2 million hectares.

According to surveys by the Finnish Environment Institute (SYKE), meadows and other semi-natural habitats have the richest flora and fauna, and constitute the most threatened area of natural landscape in Finland. Over 90 per cent of semi-natural habitats are classified as threatened. Semi-natural habitats are also valuable as sites of significance in terms of landscape, history and cultural history, since traditional land use may have continued at such locations for centuries.

The management of semi-natural habitats and other culturally associated habitat types can be organised as an activity performed by farmers themselves. With the help of agri-environmental support and other means, some 30,000 hectares of semi-natural habitats have been restored and maintained through such measures²⁶. In 2000, the working group for the management of traditional cultural landscapes, established by the Ministry of the Environment, set an objective of bringing 60,000 hectares of semi-natural habitats under management in Finland (in Sweden, environmental support covers some 450,000 ha of natural pastures and meadows).

²⁶ According to the literature, the area of restored and managed semi-natural habitats varies between 23,000 ha and 30,000 ha. The figure of 23,000 ha includes sites receiving support for the management of semi-natural habitats, while the figure of 25,000 ha includes natural pasture areas also receiving another form of special support, and the figure of 30,000 ha includes managed sites as well as those receiving agri-environmental support.

General knowledge of valuable semi-natural habitats is based on the national inventory of traditional cultural landscapes, conducted in the early 1990s. At that time, some 20,000 hectares were classified as valuable semi-natural habitats, but the inventory is already partly outdated. Only a few centres for economic development, transport and the environment were able to complete inventory data in the 2000s. The Finnish Environment Institute (SYKE) is implementing an information management project for semi-natural habitats, which will make it possible to update data on semi-natural habitats and issue instructions on how to manage them.

The management of semi-natural habitats is mainly funded through agri-environmental support. Around 25,000 hectares of meadows and various natural pastures are covered by special subsidies forming part of agri-environmental support. Only one half of sites deemed valuable in the aforementioned inventories are covered by support, while some receiving support are fairly modest in terms of their natural values.

In Finland, agriculture is steered by the common EU agricultural policy. This policy aims to have a broad-ranging impact, in that food safety, reduction of environmental damage and the maintenance of ecosystem services produced by agriculture (such as cultural landscapes, water and nutrient management, and biodiversity) must be taken into account in addition to food production. When agricultural and forest lands are fertile and favourable conditions for growth are created that promote biodiversity, more areas around productive farmland could be reserved for biodiversity, without loss of national food security or the supply of renewable raw materials.

In the programming period 2000–2006, the biological diversity of agricultural environments was maintained and managed through agri-environmental support included in the horizontal Rural Development Programme. The 2007–2013 Rural Development Programme implements biodiversity-promoting measures, mainly through agri-environmental support and non-productive investments, as part of Axis 2 of the programme. Biodiversity is promoted through basic and additional agri-environmental support measures, special support agreements concluded between the farmer and the government, and through non-productive investments.

Collection of information on agriculture and agricultural environments is broad-based. Over the last couple of decades, the biodiversity of agricultural environments has been studied by various research institutes and universities, the largest uniform research project being the MYTVAS, *Significance of the Finnish agri-environment support scheme for biodiversity and landscape*. This scheme involves the monitoring and assessment of the horizontal rural development programme, which began in 1995. Biodiversity research subject to MYTVAS monitoring has increased continuously. The agricultural section of the Biodiversity Research Programme (MOSSE 2003–2006) focused on developing planning and monitoring methods for biodiversity in agriculture. The definition of *High Nature Value* (HNV) areas was completed in 2006. Management of these areas is followed up under the monitoring of agri-environmental support.

According to the 2010 interim report for the *Significance of the Finnish agri-environment support scheme for biodiversity and landscape* (MYTVAS 3), the greatest threat to biodiversity lies in the prevailing trend in the landscape structure, typified by the reduction in open or semi-open areas excluded from proper agricultural use. Clearing of islets on arable land and various kinds of margin areas, drainage measures to increase the cultivated area, and the entire spectrum of measures taken to rationalise field structures, decrease the very areas that are most crucial to the biodiversity of farmland environments. However, the results of the follow-up study on specific measures show that locally biodiversity benefits have been achieved in areas where such measures have been implemented to a sufficient extent (semi-natural habitats, wetlands, riparian zones, green fallow/nature management fields). For this reason, it is particularly important to ensure that in all open arable areas, a sufficient part is excluded from actual cultivation and is maintained, whether these are natural pastures, nature management fields, biodiversity strips, riparian zones, filter strips, verges, islets on arable lands, or other corresponding sites. In 2010, 346 million euros was paid in agri-environmental support. The main focus of funding was on water protection measures, while a smaller portion was allocated to biodiversity management.

Substitute habitats

The number of various open, treeless and low-growth habitats has decreased considerably. The main reason for this is the decline in traditional forms of land use, such as the grazing of cattle in outdoor pastures. Other reasons for the decline in open environments include the overgrowth of shores (due to the eutrophication of water bodies),

prevention of forest fires and atmospheric nitrogen deposition causing eutrophication. Many ecologically unique habitats, such as sandy beaches and dunes, sunlit slopes of eskers and dry meadows have declined in number and species requiring open habitats have fallen under severe threat.

Many so-called substitute habitats, such as road and railway verges, airports, sand pits, quarries, power line openings, defence forces' training areas, loading areas and wasteland can serve as secondary refuge sites for open habitat species. Substitute habitats are of particular importance to insects, such as butterflies, beetles, hymenopters and dipterous insects, but also to the vascular plants and fungi that thrive in such habitats. However, most species that have become rarer in threatened habitat types are unable to utilise substitute habitats. Moreover, substitute habitats cannot replace habitats that are themselves threatened. The significance of substitute habitats to biodiversity greatly depends on their management. Unless they are properly managed for, wastelands tend to provide only temporary habitats, but when appropriately managed and tended, they play a significant role in the preservation and spread of biota.

In many cases, substitute habitats are larger in area than open habitats, natural ones or those associated with traditional livestock farming. Regularly mown road environments cover more than 161,000 hectares in Finland, 50 times more than the remaining area of meadows with valuable species. Because, in many respects, road environments resemble habitats cared for by mowing, they can complement the sparse network of meadows. At their best, road verges and intersection areas as such can constitute an impressive and diverse entity. Various methods, such as closer planning of the mowing schedule, can be used to further increase the number of valuable verges, provided that more specific information is acquired on the measures needed for the integration of road maintenance and nature management.

In 2006–2008, sunlit sites in esker forests, and their management, were studied under the leadership of the Finnish Environment Institute (SYKE). A total of 120 hectares of sites suitable for management were identified by the related surveys. The results indicate that sunlit environments can be managed both in protected areas and commercially managed forests, in connection with standard forest management measures. The related methods will be developed further in a follow-up project (201–2013).

Geological formations and biodiversity

Finland's ancient bedrock forms the basis of biodiversity. Geological structural features and differences in the composition of rocky outcrops are reflected in the topography and landscape, for example, series of lakes and islands, field valleys and forested hill sections. A geological history extending back more than 2,000 million years is visible in the better-preserved parts of the bedrock, for example, as strata in sedimentary rocks, or volcanic stones created by volcanic activity.

The geological diversity of the pedosphere and bedrock (geodiversity) provides a basis for the development of biodiversity. Geological factors related to the pedosphere and bedrock influence vegetation, through which they also affect other biota. Although the Convention on Biological Diversity does not directly apply to the protection of geodiversity, knowledge of dependence of wildlife on the characteristics of the pedosphere and bedrock is essential to protecting biodiversity. Exploitation of rock material from the bedrock, or of ores, extractive minerals and soil, leads to a thoroughgoing transformation of nature and can undermine biodiversity and the functioning of ecosystems.

In Finland, protection of geological formations is primarily based on the Nature Conservation Act and Land Extraction Act. Under the Nature Conservation Act, small-scale geological sites can be preserved as natural monuments. To study and safeguard geodiversity, the environmental administration has joined with expert institutions in the field to inventory and assess geological formations. Finland's most valuable esker areas were inventoried in the 1970s, while inventories of rocky areas, moraine landforms and aeolian sand and beach formations and small-scale geological sites were done in 1990–2011. The inventory of cobble deposit habitats began in 2010.

Gravel, sand and rock material extracted from bedrock are the most-used non-renewable natural resources in Finland. Each year in Finland, an estimated 18 tonnes of these extracted soil types are used per capita. Major purposes of use include constructing road networks and maintenance, and housing construction. Eskers and end moraines, consisting of gravel and sand, account for approximately 5 per cent of Finland's total area and are integral to the Finnish natural environment. Bare rock or rocky terrain covered by a thin layer of soil account for around 13 per cent of Finland's total surface area. Gravel and sand formations in their natural state are increasingly rare. The extraction of earth material and construction of infrastructure have destroyed esker environments, particularly in the vicinity of big cities. In the last few years, rock material crushed from rock has increasingly replaced natural gravel, which has decreased the pressure to exploit esker formations. Since the 1950s, 20,000–30,000 gravel and sand extraction sites and around 2,000 rock material extraction sites have been taken into use in Finland. Today, around 4,800 permits for extracting gravel and sand, some 1,700 for extracting rock material and some 600 for extracting other types of earth material are in force. There has been increasing pressure to exploit gravel and sand resources in sea areas. Planned extraction of gravel deposits in sea areas, considered threatened and valuable in terms of biodiversity, may pose a threat to the conservation of biodiversity.

In 1984, the Government issued a resolution on the National Esker Conservation Programme, drawn up for the protection of biodiversity in esker environments. This programme covers 159 eskers, with a total area of some 97,000 hectares. The National Esker Conservation Programme aims to preserve the natural geological, geomorphological, ecological and scenic features of the esker sites covered by the programme. In the case of protected eskers, their natural state and landscape must not be weakened through activities such as the extraction of earth material. Eskers are mainly protected on the basis of the Land Extraction Act and Decree. For most esker sites covered by the programme, building developments and the routes of roads and power lines must be controlled. Eskers and end moraines protected under the National Esker Conservation Programme include valuable habitats such as sunlit slopes, sunlit sand and gravel heathlands, herb-rich forests on eskers, and springs and brooks. These habitats are the home of flora and fauna that cannot thrive in any other environment.

Rocky sites, or individual formations related to them considered key to biodiversity, include gorge-like formations with an exceptional microclimate, or high steep slopes that may include sunlit slopes or shady herb-rich forest like slopes. Rocky sites include diverse valuable habitat types that may vary from geologically young, oligotrophic, open, glaciated rock on a granite platform, or shore cobble deposits covered by tree-covered quartzite hills, to nutrient-rich calcareous dry meadows, or ultra-alkaline serpentine rocks with specialised vegetation.

Approximately 3,150 rock sites, considered valuable in terms of nature conservation and landscape protection, have been inventoried. Of these, 1,300 (about 135 ha) are classified as being of national value. The aim of the national inventory of rocky areas is to list and classify the most valuable sites. Above all, the inventory provides data that can be used to assess when permits should be granted for activities covered by the Land Extraction Act. The entire country, excluding only Fell Lapland, Åland and the archipelago, has been covered by the inventory. The Finnish Environment Institute (SYKE) was responsible for the inventory, the field work for which was concluded in 2004.

Moraine landforms are the most common group of geomorphological formations in Finland, covering widely divergent formations in terms of their origin, structure and forms. A total of 369 moraine landforms have been surveyed across Finland, with 607 (some 57,300 ha) designated as nationally valuable. Field work for the inventory of moraine landforms, which was completed in 2005, was carried out through cooperation between the Geological Survey of Finland (GTK) and the Finnish Environment Institute (SYKE). The aim of this work was the production of uniform classification material on moraine landforms and these landforms in Finland as a whole. Such information is required in order to meet the needs of permit consideration under the Land Extraction Act and other land use planning. The increasing use of earth material and construction has intensified the pressure to exploit moraine resources even more, particularly in areas where gravel extraction from eskers has declined. Moraine landforms have the same kinds of natural values as rocks and eskers: sunlit slopes, open vegetation types, shady slopes or nutrient-rich soil with herb-rich forests or treeless rich fens.

In an inventory of Finland's most valuable aeolian sand and beach formations (2005–2011) undertaken by the Geological Survey of Finland (GTK) and the Finnish Environment Institute (SYKE), a total of 697 sites were surveyed. Of these, 417 deposits (around 70,000 ha) were designated as nationally valuable. The purpose of this inventory was to produce uniform classification material on Finland's valuable aeolian sand and beach formations and on these formations as a whole in order to meet the needs of permit consideration under the Land Extraction Act and other land use planning. In addition to geological and landscape values, aeolian and beach formations are of biological importance and possess ecologically special features as habitats for threatened species. Habitat types referred to in the Nature Conservation Act and Habitats Directive, and habitats of special importance referred to in the Forest Act, can be found within these. Dunes are the most important aeolian sand formations with regard to biodiversity, because they host a number of special habitats on the coast and are home to species that are rare and threatened in Finland. Vegetation types and related species requiring sunlit slopes are found in inland dune areas. Beach formations possess similar characteristics.

Lakes, rivers and other inland waters

Biodiversity loss has continued in Finland's inland water ecosystems. However, the conservation status of inland waters can be considered quantitatively good with regard to a number of habitat types. Small water bodies in their natural state have declined in number, while several species dependent on these waters have become threatened and their habitats have declined. The network of protected areas in inland waters covers 21 per cent of the lake surface area and 16 per cent of shoreline. A greater proportion of surface area is protected in the north than in the south. When assessing the need for protection, the entire catchment basin must be taken into account, since it is not usually worthwhile to protect a river bed or lake basin alone. Knowledge of biodiversity in underwater environments is inconsistent and in some respects lacking.

Along with mires and wetlands, inland waters are included in the Convention on Biological Diversity's programme of work on biological diversity of inland water ecosystems. Among other issues, this programme seeks to promote the natural circulation of water, integrated management and care of waters, catchment basin planning, attention to the biodiversity of inland waters when managing the pressures affecting waters, and monitoring of the status of biodiversity.

The EU's Water Framework Directive (WFD), which entered into force in 2000, covers surface and groundwater and it is in compliance with the principles of the Convention and its programme of work on inland waters biodiversity. The general objective of water resources management is to protect, improve and restore waters to ensure that their ecological status does not decline or weaken. A good ecological and chemical status is to be achieved by 2015; major action is required in order to meet these objectives. Implementation of the WFD has resulted in the preparation of water resources management plans for Finland's seven river basin management districts. These plans will be revised at six-year intervals. They include information on water bodies in the area, the loads on them and other human-induced impacts, the ecological status of water bodies, the objectives of water resources management and the required water resources protection and management measures. Measures are described in more detail in the action plans, several of which are prepared for each river basin management district. In 2010, the National Programme for Implementation of River Basin Management Plans 2010–2015 was prepared under broad-based cooperation. This programme specifies how the policy instruments proposed in the plans will be implemented, and by whom.

In accordance with the objectives of the WFD, in assessing the status of waters the focus is on the functioning of aquatic ecosystems. Classification and monitoring of the ecological status of water bodies, as required by the WFD, are mainly based on biological factors. Certain groups of organisms (fish, phytoplankton, aquatic vegetation, zoobenthos, periphyton) are used as indicators in such classification. Quality elements studied as those supporting biological factors include the hydrological-morphological and physico-chemical conditions of water bodies, such as water levels and variations in water flow, morphological changes in the streambed and shores, continuity, and the nutrient and oxygenation conditions of water. In river basin management work, it is estimated that, in terms of area, most of Finland's water bodies have an excellent or good ecological status. However, less than one third of the lakes and almost one half of the river water bodies targeted by such planning have only a satisfactory, passable or poor ecological status.

When seeking to improve the ecological status of waters, use is made of a range of steering methods related to various sectors. Such sectors include communities and rural areas, agriculture, forestry, regulation, construction and restoration of water bodies, groundwater, industry and business, fish farming, peat production and fur animal production, while taking into account soil acidity or the prevention of oil and chemical spills. The Government Resolution on River Basin Management Plans sets several objectives, including the launch of a restoration programme for small watercourses. The related measure has been entered in the Programme for Implementation of River Basin Management Plans. On the whole, in river basin management planning (typification, classification, monitoring) more effective account should be taken of small water bodies and small watercourses.

Water constitutes almost 10 per cent of Finland's surface area, including 187,888 lakes and ponds whose area exceeds five hundred square metres. Groundwater resources are a valuable natural resource for water supply and ecosystems. Most lakes and ponds are classified as small watercourses (less than 100 hectares). The frequency of lakes is highest north of Inari. Although the number of water bodies is high, in total they hold only 235 km³ of water, equivalent to around 25 per cent of the volume of Lake Ladoga, the largest lake in Europe. Because the lakes are shallow (average depth less than seven metres), they are sensitive to human activity. Inland waters have traditionally been classified into various types, on the basis of their nutrient content, vegetation, area or humus content.

Land uplift, erosion and sedimentation are causing Finland's water bodies to undergo natural changes. The aquatic environment has changed as a consequence of measures performed either in the actual water body or in its catchment basin. Factors that have affected the ecological status of habitats in Finland's inland waters, and the threatened status of species, include an increasing nutrient load, hydrological engineering, and changes in land use. Because the impacts tend to be more widespread in an aquatic ecosystem, none of the factors that degrade biodiversity can be examined in isolation. Moreover, climate change affects run-off, water flows and levels, as well as floods and the sufficiency of water. The nutrient load on water bodies is also increased by a number of factors, including a rise in wintertime precipitation and thus the rate of leaching, which lowers the status of waters.

Hydrological engineering in waterways more than a century ago in order to increase field areas, and the lowering of water levels in lakes, led to the transformation of aquatic and shore ecosystems. Ditch drainage of mires and clearing of brooks increased the leaching of nutrients and suspended solids. The most dramatic changes accompanied advancing industrialisation and increasing use of fertilisers. Some of these changes have been very intense, with a negative impact on the ecological status of aquatic and shore ecosystems. Water bodies have also been transformed through the construction of power plants, regulation of waterways, clearing, dredging and nutrient loads (the primary ones are those that cause eutrophication — hydrogen and phosphorus). There has been a positive trend in some oligotrophic lakes with clear water, as point source pollution from industry and communities has decreased and water quality has improved in general. However, the ecological status of waters in smaller lakes and brooks is particularly degraded by loads from forestry, agriculture and peat production, which increase eutrophication and sediment.

Approximately one third of Finland's water area is regulated. Almost all of the largest rivers have hydropower plants, which regulate the flow of rivers and lake-water levels. In addition, hydropower plants and dams form obstacles in water, hampering the free movement of fish and other biota. Small-scale hydraulic construction on shores (dredging and filling up of shores) is increasing, as plans are made to create waterfront plots on areas with low and muddy shores. Because such areas are unsuitable for boating, dredging is required in order to provide better conditions for leisure activities and to improve living comfort. While construction often affects the landscape, it can also have an impact on the functioning of ecosystems. Although individual projects have minor impacts, as the related measures become more common the overall effect is accumulating, leading to a reduction in the number of free shores in their natural state.

River basin management plans and action plans seek to improve the status of waters, through site restoration. The number of restoration projects has increased thanks to initiatives by the beneficiaries of such projects — the owners of water areas — as well as the receipt of outside funding in addition to state subsidies. Alongside other objectives, lake restoration projects seek to take biodiversity into account. In most cases, restoration decreases the damage caused by advanced eutrophication, and this also promotes biodiversity.

The Baltic Sea and shores

In 2009, the Finnish Government submitted a report to Parliament on Baltic Sea challenges and policy, defining the government's policy on improving the marine environment of the Baltic Sea. The act and decree on management plans for the marine environment (in accordance with the EU's Marine Strategy Directive) was adopted in 2011. This sets out the framework for achieving a good status for the marine environment of the Baltic Sea by 2020, specifying the bodies and actors responsible for implementing the provisions and measures. In order to achieve a good status for the marine environment, a marine resources management plan for Finland (2012), and the accompanying action plan (2015) and monitoring programme (2014), will be prepared. Qualitative indicators (11 total) will be used to define a good status for the marine environment; one of these involves biodiversity. Based on this indicator, the quality and occurrence of habitats and the distribution and abundance of species are related to the prevailing physiographic, geographic and climate conditions.

In accordance with the related government resolution (2004), the Programme for the Protection of the Baltic Sea has the objective of achieving a good ecological status for the Baltic Sea. Aims include the attainment of regionally and biologically representative marine and coastal ecosystems, a reduction in the impacts of factors threatening the natural status of marine habitats and the protection of the habitats of threatened species and species under strict protection. The Programme for the Protection of the Baltic Sea also aims to restore and manage Baltic Sea habitats and to reduce damage caused by invasive alien species. In 2005, the Ministry of the Environment approved the Action Plan for the Protection of the Baltic Sea and Inland Watercourses, which covers implementation measures for the Programme for the Protection of the Baltic Sea. In addition, the Water Protection Policy Outlines to 2015, approved by a government resolution in 2006, support the goals of the Programme for the Protection of the Baltic Sea.

In 2009, the European Council adopted a special EU Strategy for the Baltic Sea Region and an Action Plan consisting of four pillars and 15 priority areas. One of these pillars involves a sustainable environmental policy for the Baltic Sea, comprising five priority areas. The second priority area concerns biodiversity (incl. fishing), while the first includes measures against eutrophication; these are coordinated by the Finnish Ministry of the Environment together with Poland.

Finland has actively implemented the Convention on the Protection of the Marine Environment of the Baltic Sea Area (HELCOM) and the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR). The joint ministerial meeting of the conventions in 2003 set the objective of establishing an ecologically coherent network of protected areas in the Baltic Sea and the North-East Atlantic by 2010. Within the aforementioned sea areas, the aim of the network was to protect threatened habitats and species that are becoming rarer, and to take account of the development objectives of the EU's Natura 2000 network of protected areas.

The Natura 2000 programme has promoted the protection of Finland's coasts and marine areas. The Natura 2000 network includes protected areas within marine and coastal areas deemed significant with regard to the habitat types and species found therein, including five national parks, a number of other protected areas on state land and water areas, and protected areas on privately owned land. The primary aim of the Bothnian Sea national park, established in 2011, is the protection of underwater habitats. When approving the majority of Finland's Natura 2000 network, in 1998 the government decided that 22 marine areas included in the network would be entered in the BSPA network of protected areas (*Baltic Sea Protected Areas*), based on the Convention on the Protection of the Marine Environment of the Baltic Sea Area (HELCOM).

In the Baltic Sea, HELCOM has achieved the 10 per cent objective of protected areas proposed by CBD COP 7 (HELCOM BSPAs 10.3% (Natura 2000 sites + BSPA areas = 11.1%)); Finland's BSPAs account for 6.8% (incl. the EEZ and Natura 2000 sites + BSPAs, which account for 8.4%). Since the aforementioned 10 per cent objective has been met in the Baltic Sea, in 2010 the HELCOM ministerial meeting decided to raise the objective by extending it to open sea areas and the exclusive economic zone and, if scientifically justified, to the various basins of the Baltic Sea. Although the CBD area targets have been met in the Baltic Sea, in many areas management and use plans are still not in place. The aim is to prepare such plans by 2015 for all existing BSPAs. Protected areas are still unevenly distributed between the basins of the Baltic Sea, and the coast and the open sea. In addition, there are gaps in the network of protected areas.

In 2007, the HELCOM ministerial meeting approved the *Baltic Sea Action Plan* (BSAP), seeking to achieve a good ecological status for the Baltic Sea by 2021. One of the primary aims is to attain a favourable protection level for biodiversity in the Baltic Sea. This will be done by halting the loss of biodiversity, through restoration and ensuring the existence of habitats and species in the long term. Finland is implementing the BSAP programme through active participation in the work of the HELCOM Red List of Baltic Sea species and habitat types, by surveying key occurrences of species and habitats in marine areas, and by preparing management and use plans for Natura 2000/BSPAs (*Baltic Sea Protected Areas*).

In accordance with HELCOM recommendations, Finland has established seal protection areas, enhanced the monitoring of seals and produced information on threatened Baltic Sea habitat types through inventories of the underwater marine environment. Implementation of the revised recommendation on seals, approved in 2006 (HELCOM Recommendation 27-28/2) has been monitored in the HELCOM Seal Expert Group. The national grey seal and Baltic ringed seal management plan (2007) will be updated. Prepared under ASCOBANS (*Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas*), the Recovery Plan for Baltic Harbour Porpoises (Jastarnia) was approved in 2002 and revised in 2009. This plan was partly implemented under EC Regulation 812/2004. Finland's national plan for the conservation of Baltic Harbour Porpoises was completed in 2006. Finland is also participating in the international SAMBAH (*Static Acoustic Monitoring of the Baltic Sea Harbour Porpoise*) EU Life+ project (2010-2014), using acoustic monitoring devices to survey the occurrence of porpoises in the Baltic Sea.²⁷

Furthermore, Finland has prepared a strategy in line with the EU recommendation on *Integrated Coastal Zone Management* (ICZM). A report on the implementation of this strategy was submitted to the European Commission in 2006. Because of increasing pressure to use marine areas, several parties have initiated the development of marine spatial planning. In 2007, HELCOM approved a recommendation on the development of marine spatial planning principles (Recommendation 28E/9). For this purpose, HELCOM-VASAB (the intergovernmental Maritime Spatial Planning Working Group, *Vision and Strategies around the Baltic Sea*) was established in 2010. In 2008, the European Commission published its 'Roadmap for Maritime Spatial Planning: Achieving Common Principles in the EU'. In 2010, the EU Communication 'Maritime Spatial Planning in the EU — Achievements and Future Development' was approved. This established the need for EU-level actions to facilitate the integrated and efficient use of maritime spatial planning in all marine regions. The final format of the related legislation will be confirmed in 2012. Maritime spatial planning principles are being tested in the Baltic Sea, under the *Plan Bothnia* project financed by DG MARE. The project participants are HELCOM (coordination), Finland and Sweden. This project involves testing maritime spatial planning and the functioning of it in the Bothnian Sea, particularly in the border waters between Finland and Sweden.

Over the years, Baltic Sea protection efforts have produced good results, regardless of the continuing threats posed to this marine region. Although the phosphorus load that is causing the eutrophication of the Baltic Sea has fallen by 20 per cent (1994–2008), the nitrogen load has remained almost unchanged. Concentrations of certain harmful substances, such as DDT, PCBs and mercury, have decreased, but it has been found that a number of consumer chemicals, including fire retardants and pharmaceutical product residues, enter the marine ecosystem in treated wastewaters. Baltic Sea white-tailed eagle and grey seal populations have begun to grow as a result of protection measures. National and international communications on the conservation of the Baltic Sea have long traditions. HELCOM, in particular, produces a large number of publications on the Baltic Sea.

Alongside the foundations and associations (numbering more than 10 in Finland) working to protect the Baltic Sea, NGOs have long been collecting funds for this purpose. The John Nurminen Foundation has been working actively on behalf of a cleaner Baltic Sea since 2004, implementing projects related to eutrophication and tanker safety. The Foundation for a Living Baltic Sea, the *Baltic Sea Action Group* (BSAG), was established in 2007. This organisation supports projects based on advanced scientific research and the best

²⁷ www.sambah.org

available information. In 2010, Finland hosted a Baltic Sea Action Summit in 2010, resulting in commitments to various projects for the recovery of the Baltic Sea.

Fish stocks and fishing

In accordance with the Fishing Act, efforts must be taken when practicing fishing in Finland to maintain the maximum permanent productivity of the waters in question and special consideration must be given to ensure that the fish stock is exploited rationally, in line with the principle of sustainable use. Consequently, measures that might harmfully or adversely affect nature or the balance of nature must be avoided. In accordance with the Government Programme of Prime Minister Katainen's Cabinet, Finland supports EU fisheries policies designed to safeguard threatened fish species and sustainable fish populations, with regard to the needs of commercial fisheries.

In Finland, fishing rights mainly belong to the owners of the water area, usually owners of land bordering on the water body. Finland's water areas are divided into approximately 225 fishing regions. The Fishing Act requires the preparation of plans for the use and management of fishing waters for each fishing region. It also defines a framework for the regulation of fishing. Fishing can be regulated through a number of fishing restrictions, bans and regulations on undersized fish. Fish stocks are managed by means of fishing arrangements, fish stocking, restoration of fishing waters and fish passages. In recent years, fish stocking has paid increasing attention to the preservation of biodiversity, as well as the productivity of fish stocking. In this, the objective has been to achieve the most effective natural reproduction in fish stocks.

Excluding the rivers Tenojoki, Tornionjoki, Näätämöjoki and Simojoki, Finland's major migratory fish rivers have been altered by construction aimed at the generation of hydropower. Construction in waterways prevents the free movement of migratory fish. Hydrological engineering, regulation, daily flow regulation, dredging, clearing and the lowering of the water level in lakes lead to changes in shore and aquatic vegetation, affect the numbers and composition of zoobenthos in the littoral zone, and weaken the reproduction of fish species, particularly those spawning in the autumn.

Fish farming increased rapidly in the 1970s and 1980s. Production of fish for food peaked in 1991, with around 19.3 million kilos of fish produced for this purpose. In 2004, approximately 12.8 million kilos of fish were farmed for use as food, rainbow trout accounting for 12.3 million kilos of this. Most fish produced for consumption as food is farmed in the sea off the coast of south-western Finland. In addition to the production of fish for food, Finland is home to the extensive and diverse production of fish fry for fish stocking. In 2004, a total of 225 fish farms were engaged in producing fish for food, 158 of these being located in sea areas. Fish farms producing fish fry, and natural food pond businesses, are primarily situated in inland waters. Except for rainbow trout, most of the fish fry produced is used for fish stocking in natural waters.

Hydrological engineering mainly focuses on the development of projects in place, and on increasing the efficiency of power plants. New investments in old plants can also contribute to the construction of fish passages, in accordance with the fish passage strategy. Water regulation development projects have sought to decrease the detrimental impacts of water regulation on aquatic ecosystems, by taking account of recreational use and aquatic habitats, and considering the impacts of measures on other uses of water bodies.

In most cases, the restoration of flowing bodies of water aims to increase and improve the quantity and quality of spawning and fish fry production areas, which are important to migratory fish. The benefits of restoring spawning areas often depend on whether fish have unrestricted access from feeding areas to spawning areas. Obligations to restore flowing water bodies, related to the repeal of timber floating regulations, have almost been fulfilled. In addition, the extensive restoration of springs has begun. As major and medium-scale restoration of flowing bodies of water becomes increasingly rare, restoration of flowing waters is focusing more on small rivers and brooks. Insofar as possible, natural restoration methods are being used. The Nature Conservation Act, Forest Act and the amendment to the Water Act, all of which entered into force in 1997, considerably improved the basis for the conservation of small watercourses.

Fish species classified as critically endangered in Finland include landlocked Atlantic salmon (*Salmo salar* m. *sebago*), migratory sea trout (*Salmo trutta*), wild populations of Arctic char (*Salvelinus alpinus*) in the Vuoksi river basin, and

grayling (*Thymallus thymallus*) that spawn in the sea. Endangered species include the European eel (*Anguilla Anguilla*), migrating European whitefish (*Coregonus lavaretus lavaretus*) and native inland water populations of sea trout (*Salmo trutta*) south of the Polar Circle. Vulnerable species include salmon in rivers running into the Baltic Sea and the Arctic Ocean, European whitefish varieties *Coregonus lavaretus pallasii* and *Coregonus lavaretus widegreni*, and spined loach (*Cobitis taenia*). The status of Baltic Sea salmon has improved significantly since the mid-1990s, after the naturally reproducing salmon populations in the rivers Simojoki and Tornionjoki became stronger. Near threatened fish species include river lamprey (*Lampetra fluviatilis*), indigenous sea trout (*Salmo trutta*) populations in inland waters north of the Polar Circle, Arctic char (*Salvelinus alpinus*) outside the Lake Saimaa area, the European whitefish *Coregonus lavaretus nilssoni*, grayling (*Thymallus thymallus*) populations in inland waters in southern Finland and asp (*Aspius aspius*). Rivers and brooks are the primary habitat of the majority of threatened fish species. Small watercourses with naturally reproducing populations of sea trout, Arctic char, European whitefish, grayling, river lamprey or crayfish are valuable in terms of fishery. This also applies to water bodies in which fish stocking has succeeded in establishing a reproducing fish stock.

In Finland, the threat status and decline of fish populations is usually connected to a fall in the number and quality of fish reproduction areas, or the complete disruption of the reproduction cycle of fish populations due to the construction of barriers to migration. Many of the fish populations affected have also suffered from overfishing. With the exception of spined loach, all other eleven fish species or populations classified as threatened, and six classified as near threatened, are commercially utilised species.

The precautionary principle should form the key principle guiding the exploitation of fish stocks. Based on this, for example, for species whose generation of progeny depends on the size of the spawning population, the majority of fish should be allowed time to spawn at least once before being caught. For instance, the return of sea trout mature brood fish to spawn in their home rivers should be further enhanced through fishing regulations.

Game animals, game resources and hunting

In Finland hunting rights, and the right to grant them, belong to landowners. Game populations are regulated by imposing closed hunting seasons and specifying total allowable catches. The Ministry of Agriculture and Forestry makes annual decisions on the highest permitted size of catch and regional quotas for certain game animals, to ensure that the hunting of such species complies with the principle of sustainable development and the EU's Habitats and Birds Directives. This applies to wolves, bears, otters, lynxes, Baltic ringed seal, grey seal and certain game bird species. Game habitats are improved through game management efforts by hunting clubs, for instance. Approximately 311,000 Finns have paid the game management fee and, of these, around 230,000 are active hunters (Info Box).

Changes in land use, in agriculture and forestry in particular, and hunting, have changed the habitats and populations of game animals. In the last ten years, the lynx population has tripled and the bear population doubled. In the period 1997–2008, the lynx population grew from 795 to 1,600, indicating 6.5 per cent annual growth in the population on average. Following this, population growth has continued to accelerate regardless of growing hunting pressure. On the basis of data collected using the wildlife triangle scheme for game monitoring, Finland's lynx population increased by up to 21 per cent per year in the period 2001–2009. The Finnish Game and Fisheries Research Institute (RKTL) estimates the number of lynxes to be between 2,430 and 2,630 (2011).

Between 1998 and 2011, the bear population grew from approximately 800 to almost 1,800. The growth in the bear and lynx populations are the result of systematic population management in accordance with management plans.

Under section 37 of the Hunting Act, wolves are protected throughout the country all year round. Since the amendment to the Hunting Act that entered into force on 1 March 2011, exceptions to the year-round protection of wolves have only been possible on the basis of derogations from protection referred to in section 41 of the Hunting Act, even in the reindeer herding area. The conditions for granting derogations are laid down in section 41a of the Hunting Act. These correspond to the provisions laid down in Article 16 of the EU Habitats Directive. In January 2012, the Finnish Game and Fisheries Research Institute estimated that Finland's wolf population was about 150–165 animals. The population grew rapidly from around 100 animals in 1998 to about 250, until, from 2007, it began to decline considerably in parts of Finland outside the reindeer herding area, probably as a consequence of unlawful

hunting. As a damage reduction measure, some wolves are hunted every year, but in practice only in the reindeer herding area, where damage inflicted on freely grazing reindeer is practically impossible to prevent in advance. In the reindeer herding area, wolves are covered by the provisions of Annex V, which means that wolf hunting is basically possible. The number of wolves in the reindeer herding area is influenced by individuals arriving from Russia and from the southern part of the area. Seasonal variations may occur within this influx. The future goal must be to achieve favourable protection levels for the wolf population, while protecting the movement of wolves between Scandinavia and Russia, required for the implementation of this goal.

The wolverine population has increased slightly, from around 120 in 1998 to some 150–170 in 2009. The estimated population number of this species is primarily based on special censuses conducted by Metsähallitus in Upper Lapland and Kainuu, in cooperation with the Finnish Wildlife Agency. Wolverines are fully protected all year and hunting has been completely prohibited since 1993. No derogations from protection have been granted.

Of the 9,000 wild forest reindeer in Europe, approximately 1,800 Finnish forest reindeer (*Rangifer tarandus fennicus*) live in two regions in Finland — Kainuu and Suomenselkä. The Kainuu population continues to decline: in the 2010 air census, over 800 reindeer were observed in the area. On the basis of the air census conducted in Suomenselkä in 2008, the population was estimated at 1,100–1,300 animals. An increase in mortality has been the cause of the population decline in the early 2000s. The main reason for this mortality, affecting calves in particular, is considered to be the concentration of the wolf and bear populations concentration in the Kainuu region, where wild forest reindeer live.

The Finnish Game and Fisheries Research Institute (RKTL) estimates the entire calculated population of the Baltic ringed seal at some 9,000 animals (2011). Sufficient research information on the size and health status of the ringed seal population is only available from the Bothnian Bay. There, the calculated population has been found to have grown relatively steadily since 1988, to some 6,500 animals at present. The occurrence of uterine stenosis has also clearly declined. The present size of and trends in the Baltic ringed seal population have enabled restricted hunting in the Bothnian Bay, on the basis of damage caused by the species.

The calculated population of the Baltic grey seal has, in turn, more than doubled in the 2000s. Since 1990, the grey seal population has grown by some 7.5 per cent annually. The result of the 2011 census, 24,000 animals, indicates the highest population of grey seals in the 2000s. Although the rate of growth of the grey seal population seems to have slowed in the 2000s, hunting is having no significant impact on population growth. In most cases, fewer than half of the highest permitted number of seals is caught, because the catch is affected by difficult weather and ice conditions, and regional hunting restrictions.

The population of the bean goose (*Anser fabalis*) nesting in Finland is estimated to have decreased to at least half of its numbers in the 1990s, but in general terms, insufficient knowledge is available on the status of and trends in the population. Since 2010, the hunting of the bean goose has been prohibited in certain areas, leading to the postponement of hunting after the end of the general closed season. This is probably resulting in a decrease in the numbers of goose taken.

In recent years, the elk population has remained largely unchanged in Finland. Intense hunting in the 2000s has successfully caused a decrease in the winter population of the most important game animal in Finland, from more than 140,000 elk at the turn of the millennium, to the current levels of 80,000–100,000.

The populations of forest grouse species key to hunting have remained relatively low, even though positive trends have been detected in recent years. In one way or another, the number of forest grouse species can vary greatly between years, due to early summer weather conditions, snow depth, nutritional status and predation by carnivores.

According to the latest Red List of Finnish Species (2010), of the mammals included as game animals, wolverines are critically endangered (CR) and wolves endangered (EN). European beavers, bears, western polecats and lynxes are vulnerable (VU), while the Baltic ringed seal, Finnish wild forest reindeer and white hare are near threatened. Bear and lynx populations have been increasing for several years. These may have already reached the number of 1,000 fertile animals considered crucial to the listing of threatened species, or they will reach this number in the next few years. Of game birds, the northern pintail (*Anas acuta*), garganey (*anas querquedula*), pochard (*Aythya ferina*), tufted duck (*Aythya fuligula*) and moorhen (*Gallinula chloropus*) are vulnerable (VU), while the bean goose (*Anser*

fabalis), velvet scoter (*Melanitta fusca*), willow ptarmigan (*Lagopus lagopus*), goosander (*Mergus merganser*), red-breasted merganser (*Mergus serrator*), common eider (*Somateria mollissima*), black grouse (*Tetrao tetrix*) and capercaillie (*Tetrao urogallus*) are near threatened.

Many invasive alien species of game animal have become common and their populations in Finland have become established. These include the North American (Canadian) beaver, the raccoon dog, the Canada goose, the American mink, the white-tailed deer, the fallow deer, the pheasant, the muskrat and the mouflon. Finnish legislation pays attention to this issue — according to section 42(1) of the Hunting Act, the import or release of alien bird or mammal species and alien game animal populations into the wild is prohibited, unless the related permission is granted by the Finnish Wildlife Agency.

Nature in northern regions and reindeer herding

In Finland, the arctic fell environment is unique in comparison with other circumpolar regions north of the Polar Circle. Some fells tower over forest and mire areas, and the higher up the fell, the vegetation becomes more subarctic or orohemiarctic. In corresponding regions in the northern hemisphere, arctic tundra or, in more favourable areas, even forest tundra can be found, containing Siberian spruce and larch. The mountain birch forests of Fell Lapland are exceptional in comparison with other corresponding areas. In Finland, arctic vegetation occurs partly in patches and the forest line is subject to continuous change, due to natural climate change. In the northern part of Finland, forests and mires differ in character from the prevailing pattern in the circumpolar region. Here, coniferous forests grow exceptionally far north. The ecosystems of aapa mires and palsa mires are unusually diverse and well-developed in Finland. These special features of northern ecosystems are well represented in the network of protected areas. However, climate change poses a significant long-term threat, and the impacts need to be anticipated.

Unlike other, equally northerly areas, relatively high use is made of Finland's fell areas, for the needs of reindeer husbandry and tourism, among other purposes. Human influence is evident almost everywhere in the fell regions. Even agriculture and forestry is conducted exceptionally far north in Finland in comparison with other parts of the world. Reindeer husbandry occupies a northern area accounting for approximately 36 per cent of Finland's total area. Reindeer husbandry has enabled people to live in the far north. The profitability of reindeer husbandry depends on several aspects, including the condition of pastures, support systems, producer prices, administration of reindeer husbandry, competing forms of land use, such as increasing mining activity, snow conditions, additional feeding and damage caused by traffic and predators. Based on current knowledge, it is uncertain whether reindeer husbandry will be able to adapt — in any case, the risks involved in pursuing this livelihood will increase. Reindeer husbandry is both a very important livelihood and crucial to tourism in the region.

The reindeer herding area covers most of the Province of Lapland, and parts of the provinces of Ostrobothnia and Kainuu. Reindeer are kept as domestic animals outside the reindeer herding area. State-owned land in the northernmost parts of the reindeer herding area (20 northernmost reindeer owners' associations) is specifically designated for reindeer herding purposes. Such land cannot be used in a way that would cause substantial harm to reindeer husbandry. The number of reindeer by land area is the highest in the northern parts of the reindeer herding area, and is highest by lichen area in the southern parts. There are major differences between reindeer owners' associations. In the Sámi Homeland, reindeer herding plays a special role as the basis of the Sámi culture.

Although reindeer herding is based on the ability of reindeer to find nutrition in the wild, additional feeding in winter is common within most reindeer owners' associations. Reindeer herding within the Sámi Homeland reindeer owners' associations is still based on making the greatest possible use of natural pastures, without the need for significant additional feeding. The maximum number of reindeer able to graze on natural pastures in this way has largely been determined by the quantity and quality of lichen pastures.

Sámi reindeer herding is based on a pasture rotation system, which, in turn, is based on the biology of reindeer, natural conditions and the cultural habits of reindeer breeders. Reindeer graze in different areas in summer and winter. Moreover, there is a special pasture area for the spring calving season, and for the mating of reindeer in the autumn. The pasture rotation system serves to ensure the carrying capacity of various pastures, and their

sufficiency, but the functioning of the system is also affected by competing forms of land use, snow conditions and the condition of pastures.

In addition to the growing number of reindeer, in many locations problems in pasture rotation have contributed to the currently poorer condition of reindeer pastures. The Ministry of Agriculture and Forestry is obliged to regulate the number of live reindeer for ten years at a time, at a level that does not exceed the carrying capacity of winter pastures. The current maximum number is 203,700 reindeer (goal set in 2010, no change to the highest permitted number of reindeer). In addition to the condition of winter pastures, increasing attention should be paid to the condition of summer pastures and the regeneration of mountain birch.

Most of Finland's arctic fell habitats are protected in various ways. Everywhere, these ecosystems are somewhat affected by reindeer herding, tourism and other types of recreational use of natural areas. Mining projects, road building and tourism-related construction have all had considerable impacts in certain localities. In terms of the conservation and management of biodiversity, these impacts can be controlled through national legislation that guides reindeer husbandry, and via the environmental impact assessment of projects and planning of the management and use of protected areas.

Monitoring of the status of reindeer pastures has proven that intensive grazing reduces the number of species in the forest and tundra ecosystems, decreases lichen biomass, hampers the regeneration of forests (e.g. by preventing mountain birch from regenerating) and reduces the numbers of mycorrhiza and soil organisms. Pasture inventories show that the area of old horsehair lichen spruce and pine forests has most clearly declined in the area of reindeer owners' associations affected by intense forestry. Old horsehair lichen spruce and pine forests are a vital source of nutrition for reindeer, particularly in late winter when snow conditions make it difficult for reindeer to find nutrition. Horsehair lichen pastures are particularly important in the central and southern parts of the reindeer herding area, where lichen pastures cover a smaller part of the area belonging to the reindeer owners' associations than in the north.

The maximum number of reindeer and optimal output from reindeer herding are largely based on sustainable use of pastures. Although pasture inventories have shown that lichen pastures can revive at a relatively rapid pace through pasture rotation and the regulation of reindeer numbers, the condition of reindeer pastures remains relatively poor as a whole. The condition of pastures in the reindeer herding area varies for different reasons, depending on, for example, the long-term reindeer density of reindeer owners' associations, pasture rotation and additional feeding practices, and the quality of pastureland. In addition to increasing numbers of reindeer, changing reindeer farming methods and more efficient reindeer herding, one reason for the excessive wear of pastures and the declining status of their habitats lies in their smaller area and fragmentation due to other forms of land use. Forestry has a major, long-lasting impact on lichen pastures and the growth of horsehair lichen, which are crucial as winter fodder. In fell areas, tourism also has an effect on the conditions for engaging in reindeer husbandry. In pastures in parts of fell areas less affected by the impacts of other forms of land use than elsewhere in the reindeer herding area, the destruction of mountain birch caused by the mass occurrence of autumnal moths (*Epirrita autumnata*) and now of small winter moths (*Operophtera brumata*) is a source of special additional pressure.

Urban and built up areas

In Finland, the population is concentrated in densely built up communities, with some 80 per cent of Finnish people living in urban areas. This trend has intensified since Finland joined the European Union. The most remote urban areas are emptying out and urban communities are growing. In the days to come, Finland's population will be centred in an increasingly small area in the southern and south-western zone of urban areas, where biodiversity is highest. Urban environments and species are being particularly affected by increasingly efficient land use, waterfront construction and mechanical tear and wear.

On the other hand, in old cities in Finland, features of the natural environment that existed at the time the city was founded have been preserved, even in the centres of the largest cities. Depending on the location, cities have representative seaside environments, esker and rock habitats, riverside and river mouth habitats, alongside lake and sea archipelago and diverse forests. In addition, cities are home to species adapted to and specialised in land use

and the human way of life. These species are often typical to the early stages of natural development, and rarely occur in rural areas. Such species are specific to built cultural environments.

On the other hand, construction has fragmented urban environments into increasingly small islands, with weak or completely severed connections to the surrounding natural areas. We are at risk of losing the exchange of species, typical of Finnish urban habitats, between natural areas surrounding urban areas and between green spaces within urban areas, and connections between aquatic and terrestrial ecosystems. Almost without exception, islands of the natural environment preserved in urban areas are popular as recreation sites, while green spaces as well as forests in densely built up areas undoubtedly provide health benefits. Nearby nature areas are therefore extremely important to residents, as sources of well-being and public health. Research indicates that residents appreciate wide natural green spaces and find it important that they remain undeveloped. Simultaneously, our urban environments are showing signs of wear and tear due to increasing use.

Finland's urban areas are not as densely constructed as in other parts of Europe. Integration of the urban structure has sought to enhance the utilisation of the existing urban structure and the related networks, while promoting the mitigation of climate change and sustainable development. The integration of the urban structure mainly involves the development of land left vacant from industry, railways and seaports to make the urban structure more coherent. This reduces the need to travel and decreases energy consumption. While integration of the urban structure facilitates the conservation of extensive natural areas outside densely built up areas, inside these densely built up areas too little attention has been paid to the nurturing of biodiversity and ensuring the integrity of natural areas. The integration trend may therefore also counter efforts to preserve nature and green spaces in urban areas. Lack of natural areas in overly densely built cities prompts people to seek nature outside the city. This increases travel and has a detrimental effect with regard to climate change. A lack of natural areas may also prevent people from seeking nature-based recreation, or lead them to do so more rarely, thus reducing the related recreational and health benefits.

Nature reserves have been established to conserve nature in cities and urban areas and, in particular, restrictions have been placed on habitat types that require protection. Many cities contain areas included in the Natura 2000 network. Habitats of special importance, referred to in the Forest Act, are taken into account in municipal forest planning. Five national urban parks have been established in Finland under the Land Use and Building Act, all of them covering natural areas of both regional and national value. Plans for establishing new national urban parks are pending. Various natural areas in cities and urban areas support the existing network of protected areas and constitute ecological corridors and networks, that is, green and blue infrastructure reaching out from within the urban structure.

Restoration of habitats and nature management

Restoration refers to measures employed to restore ecosystems, which have been degraded, damaged or destroyed by human activity, in order to bring them as close as possible to their natural state. Nature management in protected areas refers to the revival or management of a habitat characteristic of a certain habitat, or favourable to protected species. Restoration of forests seeks to restore lost structural features within forests. Methods used in forests include controlled burning of dry heath forests and the removal of spruce from herb-rich forests. In mires, the primary goal is to restore natural hydrological conditions in mire area entities. Wetlands are restored, for example, by raising water levels, digging open water areas and restoring the grazing of animals in flood meadows.

Restoration and remediation of habitats are key methods of slowing down the loss of biodiversity. Restoration, management and remediation measures in mire areas are necessary in order to enhance the effectiveness of the protected area network. There is also a continuously increasing need to restore and remediate habitats in order to preserve viable populations of threatened species and those in decline.

As part of the METSO action plan, mires and forests in nature reserves have been restored and managed on a large scale. By the end of 2010, restoration and natural management measures had been implemented on approximately 38,000 hectares of protected areas. This work focused on state-owned land. The impacts of restoration are monitored both with the help of comprehensive technical management monitoring and the network

of test areas for impact assessment monitoring. This network was established by Metsähallitus and is representative in terms of its natural history and various restoration measures. Forest stand structure, vegetation, hydrology and species are all subject to monitoring. The LajiGIS database, developed for monitoring data, is due for completion in 2012. Researchers in the field cooperate in analysing monitoring results. Although ecological change at restoration sites tends to be slow, preliminary data on the success of restoration is encouraging.

Mires with artificial ditches for forest drainage purposes have been restored almost solely in protected, state-owned areas. In protected areas governed by Metsähallitus, it is estimated that the mire area in need of restoration totals over 30,000 hectares. By the end of 2010, more than one half (approximately 18,000 ha) of this area had been restored. In addition, around 10,000 hectares need to be restored in order to improve the boundaries set for protected areas, thereby forming better-functioning hydrological entities. Another 2,000 hectares need to be restored in privately owned nature reserves.

Hundreds of hectares have been restored in state-owned commercially managed forests, focusing mainly on the controlled burning and restoration of mires in connection with the management of game habitats. Although the compilation of statistics on nature management measures implemented in privately owned commercially managed forests is still under development, according to data collected by Forestry Development Centre Tapio, since 2008 funding for nature management projects has been allocated as follows to management and restoration projects in METSO habitats: for planning measures on some 4,100 hectares, and for implementation measures, on some 800 hectares.

In recent years, a number of restoration and nature management guides, and training related to protected areas and areas in commercial use have been developed in cooperation with the forest and environmental administration, as part of the METSO programme. Forest restoration and nature management guides, mainly for protected areas, were published in 2011 and a corresponding guide for the restoration of mires was published in 2012. A guide for monitoring the restoration of forests and mires and sunlit habitats on eskers was published in 2009.

The Sámi indigenous people and biodiversity

The Convention on Biological Diversity (CBD) acknowledges the close dependence of indigenous peoples' cultures on the sustainable use of biological natural resources. It also emphasises the significance of indigenous peoples' (the Sámi in Finland) traditional knowledge of biodiversity to the future of their cultures. Interaction between natural processes, people and culture has shaped the current landscape of the Sámi Homeland. The Sámi culture is a nature-bound one in which humans are a part of nature rather than dominating it. Conservation of biodiversity is vital to the future of this culture.

Most of the Sámi Homeland is covered by nature reserves or wilderness. The basic nature conservation principles of these areas are in line with the objectives of safeguarding the Sámi culture and the continuity of traditional livelihoods. According to the Act on the Sámi Parliament (974/1995), authorities must negotiate with the Sámi Parliament on projects such as those involving the management, use, leasing and assignment of state lands, conservation areas and wilderness areas, and any legislative or administrative changes to occupations related to the Sámi form of culture. The Sámi Homeland covers northernmost Finland: the municipalities of Enontekiö, Inari and Utsjoki, as well as the area of the reindeer owners' association of Lapland in the municipality of Sodankylä. Traditional and current Sámi settlements are grouped near to waters abundant in fish and the pinewood zone.

The Sámi have used and are still using large areas of land for the pursuit of their traditional livelihoods, including reindeer herding, fishing, hunting, gathering and handicrafts. In the Sámi landscape, the ancient and present uses of the area are visible as existing structures and routes, often still in use. The impacts of reindeer herding on the local landscape are visible not only in structures, but also in the effects of herding on the flora. Ancient uses of nature live on in Sámi language place names. Values, customary law, traditions and traditional uses of land guide the way in which Sámi communities use nature.

In accordance with the Finnish Constitution, as an indigenous people the Sámi have the right to maintain and develop their own language and culture. The Sámi also have cultural and language-related autonomy in the Sámi

Homeland area, as separately provided by law. The implementation of cultural autonomy is regulated in more detail by the Act on the Sámi Parliament (974/1995). Cultural autonomy is implemented by the Sámi Parliament established pursuant to the Act. The task of the Sámi Parliament is to nurture the Sámi language and culture, as well as to take care of matters relating to their status as an indigenous people. In matters pertaining to its tasks, the Sámi Parliament represents the Sámi in national and international relations. The law also includes provisions obliging the authorities to negotiate with the Sámi Parliament in all far-reaching and important measures which may directly and specifically affect the status of the Sámi as an indigenous people and which, in the Sámi Homeland, apply to certain issues specified by the Act. In addition, the Skolt Sámi have their own administrative structure, the Skolt village meeting, in the Skolt area located within the municipality of Inari. In accordance with the Skolt Act, the Skolt village meeting must be heard on any major projects involving the Skolt area.

The number of Sámi in Finland totals 9,918 (2012). Of these, approximately one third speak the Sámi language as their mother tongue. More than 65 per cent of the Sámi live outside the Sámi Homeland — a situation which poses challenges to the preservation of both the Sámi language and biodiversity-related traditional knowledge.

In 2009-2011, the *national group of experts in accordance with Article 8(j) regarding traditional knowledge of indigenous and local communities of the Convention on Biological Diversity* (Article 8(j) working group), appointed by the Ministry of the Environment, studied the national implementation of Article 8(j) of the Convention regarding traditional knowledge of indigenous peoples. The working group's task was to coordinate measures regarding traditional knowledge of indigenous peoples, referred to in the Convention, and to enhance general knowledge of the programme of work related to Article 8(j). The working group aimed to promote the implementation of the work programme in Finland through cooperation between various ministries and stakeholders, and to provide recommendations for the implementation of the Convention in Finland. During its work, the working group commissioned a study of the relationship of the voluntary Akwé: Kon Guidelines to Finnish legislation, as well as a survey of the customary laws of the Sámi. It also translated the Akwé: Kon Guidelines into Finnish and published them, and prepared proposals for instructions on applying the Akwé: Kon Guidelines in environmental impact assessment procedures and in the implementation of the Land Use and Building Act.

Genetic diversity

Conservation of genetic resources for agriculture, forestry and fisheries

The genetic resources of crops, domestic animals and forest trees refer to their genetic diversity, different species and breeds, and intraspecific variation. Over the millennia, genetic resources vital to agriculture and forestry in Finland, and to the nation's cultural heritage, have adapted to the local climate, soil and landscape, making them distinct. Conservation of genetic resources will safeguard the availability of biodiversity, in order to meet the needs of farmers, breeding and research, and future generations. Adequate diversity is particularly vital to breeding and therefore to food security in Finland. Because of climate change, the protection and sustainable use of genetic resources is increasingly important.

International agreements and national genetic resource programmes aim to ensure the future availability of plant varieties, forest reproductive material and animal breeds that best suit the needs of agriculture and forestry. In addition to the international Convention on Biological Diversity, the *FAO International Treaty on Plant Genetic Resources for Food and Agriculture* (IT, 2004), defines a global, legally binding framework for the conservation of genetic resources. This treaty established a multilateral system based on access to plant genetic resources and the sharing of benefits, gained from their commercial and other use, between contracting parties. In addition, the Global Plan of Action for Plant Genetic Resources (GPA), prepared under the Food and Agriculture Organization (FAO), and the Commission on Genetic Resources for Food and Agriculture (CGRFA), working under the FAO, require the preparation of national genetic resource programmes. Genetic resources in forest trees are conserved by implementing the agreements made through the *Forest Europe* process, which includes objectives and forms of cooperation at the European level. The FAO's agreement on plant genetic resources does not cover forest trees, but a report on the State of the World's Forest Genetic Resources is currently being prepared within the FAO, and Finland is participating in this effort. A national programme on plant genetic resources for agriculture and forestry in

Finland was launched in 2003 and one on animal genetic resources in 2004. Appointed by the Ministry of Agriculture and Forestry, the National Advisory Body for Genetic Resources monitors and develops these programmes.

Plant genetic resources

As regards plant genetic resources for agriculture, it is worth noting that, in the case of Finland, commercial agriculture is being practiced in the world's northernmost conditions. Crops thriving in these conditions are genetically adapted to the cold and long winter, as well as a short growing season and long hours of daylight. As agricultural practices have changed, landraces and old varieties of field crops have almost entirely vanished from active farming, because their output levels are lower than the harvests of currently used varieties. In recent years, however, they have become increasingly appreciated, as proven by their local presentation as 'heritage plant varieties'.

In most cases, the genetic resources of crops are preserved as seeds in gene bank freezers (*ex situ* preservation): this facilitates the long-term preservation of live seeds of, for example, barley, wheat, oats, rye and grass seeds for dozens of years. The Nordic Genetic Resource Center — NordGen — is located in Alnarp, southern Sweden. This gene bank includes approximately 1,600 frozen seed samples from Finland. In addition to the seed collection, the gene bank maintains a Nordic collection of potatoes. Vegetatively propagated plant species, such as fruit trees, garden berry bushes, vegetatively propagated vegetables and herbs and medicinal plants, ornamental plants and perennials are stored in national field gene banks and in laboratory conditions (*ex situ* preservation). Agrifood Research Finland MTT and its network of units in the field serve as the primary location for the preservation of collections in Finland.

The most natural method of preserving genetic resources involves cultivating plants in their original environment (*in situ* preservation). Landrace plants and old cultivars can be conserved in their original cultivation environment on farms (*in situ on farm*), and garden plants in private gardens (*in situ in garden*). In addition to seeds and field gene banks, in certain cases genetic resources can be preserved in laboratories in slow-growth conditions, or deep-frozen in liquid nitrogen (cryopreservation). No *in situ* preservation of wild relatives of cultivated plants has yet been arranged in Finland, but a national action programme is being developed within the framework of an EU project (2011–2014).

Animal genetic resources

Finland's animal genetic resources consist of animals taken from the wild. Their hereditary differences and genetic variation have developed between breeds and individuals over the millennia. Finnish landrace animal breeds were developed from the first domestic animals. Of Finnish landrace breeds and separate populations of breeds, Eastern Finncattle, Northern Finncattle, Kainuu grey sheep, Åland sheep, the working type of Finnhorse, and the Finnish landrace chicken are threatened.

Biodiversity and the special characteristics of breeds are likely to be needed in future domestic animal production, because production conditions, breeding objectives and consumers' needs change. Maintenance of different breeds facilitates the development of new breeds and heterosis (hybrid vigour which enhances health and fertility).

Animal genetic resources are preserved as live animals and in embryo and gamete gene banks. *NordGen Farm Animals* serves as a coordinating and information organisation that develops methods by which administrative authorities, animal breeding organisations and organisations can preserve rare breeds in order to safeguard the genetic diversity of farm animals. This organisation does not preserve genetic resources.

Genetic resources of forest trees

In Finland, forestry is based on local tree species and origins. A network of genetic reserve forests has been established in order to preserve forest genetic resources. Preserved collections and nature reserves complement this network. The national programme on plant genetic resources for agriculture and forestry includes the protection of genetic resources of forest trees. Safeguarding the genetic diversity of forest trees is also one of the objectives of regulations on trading in forest reproductive material and forest tree-breeding activity. When a tree species is rare and only occurs in small areas, or its habitat is threatened, the *ex situ* method is used in the genetic protection of

forest trees. *Ex situ* preservation methods include genetic resource collections (particularly for deciduous trees), transplantations and a seed bank. In Europe, international cooperation occurs within the EUFORGEN programme and at the Nordic level, all within the Nordic genetic resource network under the auspices of NordGen Forest.

Fish genetic resources

Hydraulic engineering, environmental loading, stocking of invasive alien fish populations and fishing have all weakened local fish populations, resulting in loss of genetic diversity. For example, the majority of sea trout populations have disappeared from coastal rivers, but some of the genetic features of this species may be saved within local trout populations in the upstream parts of the water body.

Genetically modified organisms and the Cartagena Protocol on Biosafety

Gene technology methods facilitate the analysis and alteration of organisms' genomes. In agriculture, forestry, wildlife management and fishery, gene technology seeks to enhance the productivity of flora and fauna, their resistance to various diseases and environmental stress factors, and their possibilities of quality enhancement.

As genetically modified organisms (GMO) become more common, new types of challenges will be posed to the safeguarding and sustainable use of biodiversity. Some breeding qualities, even those achieved through traditional methods (e.g. tolerance of cold and drought, resistance to pesticides, diseases or insects), may involve selection advantage and thus become established in the same plant family in the wild²⁸, where some such species may be detrimental to biodiversity. On the other hand, gene technology methods can also be utilised to promote the maintenance of biodiversity by developing production animals (e.g. phytase pig), plant varieties, cultivation methods and resistant varieties that are less stressful to the environment. Better cultivation reliability, decreasing use of pesticides and cultivation technologies that reduce soil erosion are all beneficial to biodiversity.

Use of gene technology in research, laboratories, industrial facilities, cultivation and various products on the market is regulated through a number of European Community regulations. The European Union has granted approval to GMOs for various purposes, such as food, feed and processing. So far, one insect-resistant corn and one starchy potato variety have been approved for cultivation. Products based on these, such as starch or oil, and certain products made using GMOs, such as riboflavin (vitamin B2), may be used in Finland.

Both EU and national legislation include provisions on the approval and use of GMOs. Under the Ministry of Agriculture and Forestry, the Gene Technology Strategy and Action Plan 2003–2007 was prepared in 2003, and updated in 2009 for the period 2009–2013. Proposals for action by the working group that studied facilitation of the coexistence of genetically modified cultivated plants and ordinary and organic agricultural production in Finland were completed in 2005, but the so-called co-existence act, Government Proposal 246/2009 for an act on genetically modified plant production, expired in spring 2011.

The directive on the deliberate release into the environment of genetically modified organisms (2001/18/EC) is being amended to allow national restrictions on the cultivation of GMO varieties, while not altering the centralised permit procedure based on scientific risk assessment. The Commission's proposal is being handled by the Council's *ad hoc* working group. In Finland, the Ministry of Social Affairs and Health, the Ministry of the Environment, the Ministry of Agriculture and Forestry, the Ministry of Justice, the Ministry for Foreign Affairs, and a representative of the Åland Government, have participated in the preparation of issues for the working group. According to the Government Programme of Prime Minister Katainen's Cabinet (2011), it is important that EU Member States have the right to declare their territory free of GMO cultivation.

In Finland, GMO plant varieties have only been cultivated for research purposes. So far, no commercial cultivation of GMOs is being conducted in Finland.

²⁸ The GM applications developed are mainly plants. GM salmon, to which a growth hormone gene that accelerates growth has been transferred, is known to possess fitness benefits due to its size. Female salmon favour GM males, even though the latter are often sterile.

The Cartagena Protocol on Biosafety to the Convention on Biological Diversity, and the Nagoya-Kuala Lumpur Supplementary Protocol include requirements (e.g. *Biosafety Clearing House*) on the import and export of GMOs to third countries.

Access to genetic resources and the equitable sharing of benefits

The Convention on Biological Diversity lists access to genetic resources and the fair and equitable sharing of the benefits arising from their use (*Access and Benefit-Sharing*, ABS) as one of its main objectives. The Bonn ABS guidelines (*Bonn Guidelines*) were approved at the 6th Conference of Parties (COP) in 2002, in order to promote the objectives of the Convention. These guidelines apply to all types of genetic resources falling within the scope of the Convention and the related traditional knowledge, inventions and practices and benefits gained from their use. The Bonn Guidelines also seek to promote the conservation and sustainable use of biodiversity. A working group appointed by the Finnish Ministry of the Environment proactively considered the national application of the Bonn guidelines, and submitted a memorandum to the Ministry on the matter in 2006.

The World Summit on Sustainable Development (Johannesburg 2002) resolved to conclude ABS Protocol negotiations by 2010 (resolution 440). In accordance with this objective, the Nagoya ABS Protocol was approved at the 10th Conference of Parties in Nagoya, Japan, in 2010. The Protocol was open for signatures, from 2 February 2011 to 1 February 2012. At the conclusion of this stage, the number of signatures was 92. The Protocol will enter into force 90 days after it has been ratified by 50 states or regional economic organisations. By 27 September 2012, six Parties had ratified the Protocol. The European Union and its Member States will probably ratify the Protocol simultaneously. Reservations to the Protocol are not possible.

The protocol covers the different stages of the utilisation of genetic resources, from access through to the sharing of benefits. It also promotes access to the products and benefits of biotechnologies, based on genetic resources. The Nagoya Protocol also complements the UN Food and Agricultural Organisation's International Treaty on Plant Genetic Resources for Food and Agriculture (2001) (SopS 8990/2004).

The Nagoya Protocol is significant with regard to the main objectives of the Convention, but is particularly important to developing countries and other countries rich in biodiversity. Under the Protocol, access to genetic resources and sharing of benefits must be open, transparent and predictable, as emphasised by the European Union. The Protocol does not include all details discussed in negotiations, as some of the issues have been postponed; pending approval by the COP to the Protocol after the Protocol has entered into force.

International measures in support of the implementation of the Convention on Biological Diversity

Resource mobilisation strategy

Loss of biodiversity and the resulting degradation of ecosystem services have extremely severe effects. It is estimated that loss of biodiversity will decrease global GDP by up to seven per cent by 2050 (TEEB 2010, 2011). As a consequence, the world's poorest countries and their indigenous peoples will suffer most.

The aim of the global strategic plan 2011–2020, approved by the 10th Conference of Parties to the Convention on Biological Diversity (Aichi targets, Nagoya, 2010), is to halt the loss of biodiversity by 2020, to acquire the required resources and to establish the required financial and administrative tools (incl. green accounting, incentives and tax policy reforms and mobilisation of innovative public and private resources). Approved by the 9th Conference of Parties (CBD COP-9), the Strategy for Resource Mobilisation (2008) includes, among other things, the objectives and schedule for attaining the resource goals and determining the developed country Parties' commitments in accordance with Article 20 of the Convention. A prerequisite for receiving international support under decision X/3 is that developing country Parties commit themselves to the objectives of the Convention and manage their contractual obligations. Decision X/3 also lists 15 indicators for evaluating the implementation of the Strategy for Resource Mobilisation. The first report on national implementation of the Strategy for Resource Mobilisation must be submitted

to the Convention in 2015. This report should show how Article 20 of the CBD, the Biodiversity Strategy 2011–2020 and the Aichi 2020 goals and targets (Target 20 in particular) will be implemented.²⁹

The targeting of resources must be examined on a broad basis (incl. green economy and natural capital), not only from the viewpoint of increasing international public funding. Resource mobilisation applies the multi-dimensional principle of collecting public and private funding from as many sources as possible. The sources discussed include official development assistance (ODA) funding, financing opportunities involved in the development of green infrastructure, elimination of harmful subsidies, tax reforms, incentives, the economic valuation of ecosystem services and fees gained from providing ecosystem services, environmental impact assessments and environmental assessment of plans and programmes, and various private-sector projects and measures. Administration, business and civil society will play a key role at different levels in the implementation of plans for sustainable consumption and production. In order to prevent the discussion from focusing on ODA or other public funding only, the European Union is emphasising voluntary bilateral forms of financing and cooperation. The multi-dimensional principle described above has also been termed *Innovative Financing Mechanisms* (IFM).

The baseline for financing has not yet been decided. As the basis for such a baseline, reports being drawn up by the Parties, on national resources and the implementation of the agreed 15 indicators will play a key role. The baseline defines the resources spent nationally on biodiversity during the reference period, and is used to set funding goals and to measure implementation. One year between 2006 and 2010, or an average of these, has been proposed as the baseline. Even industrial countries find it challenging to define the baseline and gain reliable and comparable related information. Finland, for instance, has no precise data on issues such as private sector funding of biodiversity. The reporting framework of the Convention must therefore be as flexible as possible.

Cooperation in multilateral environmental agreements and processes

The first conventions on biodiversity, such as the Ramsar Convention on Wetlands (1971), which remains in force, and the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) (1973) aim at the implementation of traditional nature conservation, that is, the protection of organisms and habitats. The conservation of biodiversity has since become more broad-based in content, while also encompassing sustainable use and biodiversity. The Convention on Biological Diversity (1992, see the decree implementing the Convention on Biological Diversity – *Asetus biologista monimuotoisuutta koskevan yleissopimuksen voimaansaattamisesta* 78/1994), signed during the United Nations Conference on Environment and Development (UNCED, Rio de Janeiro 1992) and its implementation, have made the concept of biodiversity integral to sustainable development and turned it into a basis for ecosystem services. Simultaneously, the importance of biodiversity to the prevention of global socio-economic threats, such as the problem of poverty in developing countries, has been emphasised (United Nation's *Millennium Development Goals*, 2000 and MDG Progress Report 2005). In the programme of the Rio+20 Conference (2012), the importance biodiversity to sustainable development was taken into account.

Since the 10th Conference of Parties to the Convention (Nagoya, 2010), several biodiversity agreements have supported the joint implementation of the new CBD Strategic Plan, for example, by urging Parties to participate in updating the *National Biodiversity Strategies and Action Plans* (NBSAPs). This significant trend is assisting in the integration of all objectives in support of biodiversity agreements under the Convention, thus intensifying cooperation on the more effective implementation of agreements (Info Box). The Global Environment Facility (GEF) acts as the financing mechanism for the Convention. For this reason, inclusion of the objectives of other biodiversity agreements in national strategies and action plans, which are in line with the CBD, facilitates GEF financing for all biodiversity agreements. Promotion of synergies between these agreements could also promote implementation of the objectives of CBD resource mobilisation (incl. strengthening cooperation and national coordination).

²⁹ By 2020, at the latest, the mobilisation of financial resources for effectively implementing the Strategic Plan 2011-2020 based on all sources and in accordance with the consolidated and agreed process on the Strategy for Resource Mobilisation should lead to a substantial increase in funding compared to the current levels. The target will be subject to changes contingent to resource needs assessments to be developed and reported on by the Parties.

Improving the science–policy interface

Thus far, the *Millennium Ecosystem Assessment* (MA, 2005) is the most comprehensive scientific synthesis of information from biodiversity and ecosystem services. It has clearly demonstrated that life-sustaining ecosystem services are collapsing and that developing countries will suffer most from this. Effective and comprehensive prevention of biodiversity loss and a halt to the degradation of ecosystem services cannot be achieved without an efficient flow of information between decision-makers and the scientific community.

The Millennium Ecosystem Assessment initiated the negotiations for the creation of a new permanent mechanism to improve the science–policy interface on biodiversity and ecosystem services issues. The IMoSEB (*International Mechanism of Scientific Expertise on Biodiversity*) initiative of France (2005) sought to outline various nations' views on the nature of the new mechanism. However, this initiative failed and the United Nations Environmental Programme (UNEP) was authorised to lead negotiations on the IPBES (*Intergovernmental Science–Policy Platform on Biodiversity and Ecosystem Services*). Finland has supported the negotiations, led by UNEP, aimed at establishing the IBPES.

A breakthrough was achieved at the third inter-governmental meeting on the IPBES, held in South Korea (Busan 2010). The 86 participating nations agreed on the key operational principles of the IPBES, recorded in the *Busan Outcome Document*. Although the Busan meeting was not authorised to establish the IPBES, the Outcome Document recommended that the 65th UN General Assembly do so. The UN General Assembly decided to consider the Busan report (Resolution 65/162), but according to the interpretation of the UN's Rule of Law Unit, the resolution did not constitute the establishment of the IPBES, and the IPBES did not reach the status of a UN body.

In line with the policies outlined in Busan, the IPBES was established as an independent inter-governmental body, at an inter-governmental meeting held on 16–21 April 2012 in Panama (Panama City). In brief, its tasks are as follows: 1) recognising research needs and promoting the production of information; 2) preparation of regular assessments based on the data available on biodiversity and ecosystem services and their relationships; 3) identifying tools and methods relevant in terms of policy; and 4) supporting the operational capacity of developing countries. The IPBES secretariat is based in Bonn, Germany.

Development cooperation and transfer of technology

In developing countries, sustainable use of biodiversity through well-functioning ecosystem services has been found crucial, particularly to the income of the poorest sections of the population. Because ecosystem services provide livelihoods and food security, ensure health and provide shelter from natural disasters, they are the key to almost all of the UN's Millennium Development Goals. Biodiversity is therefore very broadly linked to development as a whole, not only the environmental aspect of sustainable development.

According to the Ministry for Foreign Affairs, in recent years annual funding for development cooperation projects related to biodiversity has been some 10 million euros. The main bilateral and regional cooperation goals are sustainable management, the use and protection of natural resources and the strengthening of national capacity in partner countries. A key financing target is the regional environmental project implemented alongside the Andean Community of Nations. The leading principle of this project is the sustainable use of nature in the Andean region, and equal distribution of the benefits gained. Another significant programme is the Mekong region environmental programme in Asia, which seeks to alleviate poverty, and to strengthen the sustainability of the environment and promote social equality, by giving the environment greater priority in the development strategies and investment plans of countries in the region.

Regional cooperation

Nature conservation cooperation between Finland and Russia began in the 1970s. Since the late 1980s, key development targets have included promoting the Fennoscandian Green Belt and protecting biodiversity in areas close to the Finnish border. Through project cooperation (funding for cooperation with neighbouring areas), Finland has financed the Finnish–Russian Development Programme on Sustainable Forest Management and Conservation

of Biodiversity in Northwest Russia (1997–2011) of the Ministry for Foreign Affairs, the Ministry of the Environment and the Ministry of Agriculture and Forestry. Within this programme, the Ministry of Agriculture and Forestry coordinated forestry projects, and the Ministry of the Environment ran nature conservation projects. Nature conservation projects were implemented in northwest Russia in the Republic of Karelia and the administrative regions of Leningrad, Murmansk, Arkhangelsk and Vologda, and the City of St. Petersburg. A total of 47 projects were implemented under the programme. These nature conservation projects had a favourable impact on the establishment of new protected areas in northwest Russia and on the development of a network of nature reserves. The approval of the Kalevala National Park (2002) by the Government of the Republic of Karelia was the key achievement of the programme.

Cooperation between Finland and Russia has supported research into nature conservation, an essential prerequisite for defining the ecological and economic grounds for local decisions on protected areas. Joint expert seminars and negotiations have been organised in Finland and Russia every year, and on this basis support has been provided for Russian expertise and dialogue within the administration and NGOs. The northwest Russia programme has also supported the natural science publishing activities of Russian partners that promote nature conservation. Metsähallitus has been particularly involved in developing cooperation between protected areas, in order to establish a chain of cross-border twin parks along the frontier. EU funding programmes have also been utilised to develop this park network.

An important joint project, covering all of northwest Russia, was the *Gap Analysis of Northwest Russia*, which analysed the gaps in and representativeness of the network of protected areas in the region. This includes an inventory of the natural values of present and planned protected areas. The planning of protection, and land use assessment and analysis, also form part of this project. In addition, the use of a geographic information system has been developed.

The Finnish–Russian Development Programme on Sustainable Forest Management and Conservation of Biodiversity in Northwest Russia has ended. Cooperation with Russia now takes place within the framework of the green belt, and as part of environmental cooperation in the Barents Region. Upon the initiative of Russian experts and NGOs, enhancement of the Fennoscandian Green Belt and protection has begun. An international discussion has also been initiated on extending the Green Belt from Fennoscandia, through Central Europe to the Balkans.

The south coast of Finland forms part of the hemiboreal zone, which also includes the Baltic countries and the southern parts of the Leningrad region. Nature conservation cooperation with Estonia and the other Baltic countries would also be important to maintaining the southern dimension of Finnish nature and hemiboreal biodiversity. The EU's common goals for maintaining biodiversity emphasise the need for such cooperation. Accordingly, nature conservation cooperation has formed part of bilateral environmental protection work between Finland and Russia. Attention has recently focused on the obligations imposed on Estonia due to its EU membership, and Finland has placed its experience at Estonia's disposal in meeting those obligations. Close cooperation and exchange of information between Finnish and Estonian authorities and experts has promoted the conservation of biodiversity in both countries, for instance, as regards issues related to nature reserves.

Finland, Sweden and Norway have all been conducting their own bilateral nature conservation projects in northwest Russia. To enhance and coordinate cooperation, the *International Contact Forum on Habitat Conservation in the Barents Region* (HCF), was established in 1999: this is one of the activities of the Barents Euro-Arctic Council Working Group on the Environment. The key project of the expert group on nature conservation, which functions under the Working Group on the Environment, is promoting the development of the *Barents Protected Area Network* (BPAN). Executive committees, working groups and financing opportunities provided by the Nordic Council of Ministers provide a permanent cooperation platform for promoting biodiversity, not only in the Nordic Countries but also in the Baltic countries and Russia. The EUROPARC Federation's Nordic–Baltic section also functions as a cooperation body for nature reserve authorities within this field of cooperation.

Finland is active on the Arctic Council's CAFF (*Conservation of Arctic Flora and Fauna*) working group, which seeks to protect circumpolar nature. Diverse projects within the CAFF programme of work are targeted at arctic birds (sea birds in particular), flora, threatened plants and protected areas. Practical preparations for the implementation of CAFF's

extensive circumpolar biodiversity monitoring programme (CBMP) were initiated under the leadership of Canada in 2005. Today, CBMP is the most significant of CAFF's own projects. The marine monitoring plan is complete and running, the freshwater monitoring plan will be completed in the near future, and the terrestrial monitoring programme will be ready by early 2013. Another significant CAFF project over the next few years is the *Arctic Biodiversity Assessment* (ABA), largely performed on the basis of CBMP monitoring results and involving dozens of researchers in the Arctic region. An extensive ABA assessment report, with proposals for action, was due for publication in spring 2013.

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Definitions

Article 8(j)

(j) Subject to its national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices.”