National Programme on Biological Diversity

Introduction

What is biological diversity?

The term "biological diversity" is relatively new as is not well understood among the general public. The term was introduced to describe the variety of life forms on Earth. The concept includes the diversity of plants, animals and microorganisms, their genetic diversity, as well as the ecosystem diversity formed by the species. The term biological diversity refers to the diversity of living nature.

In Latvia, scientists have recorded the presence of 27,443 species, and they acknowledge that only 75 % of insect species and 60 % of Protist species have been recorded. The microscopic fungi and soil invertebrates are also not well known.

Since the glaciers receded from Latvia to the present, the well-being and life of humans has directly depended on the use of natural resources. The existing natural heritage has allowed the survival and economies of many generations of residents. Our fore-fathers lived in close harmony with nature, and intuitively knew how much they could remove from nature to allow permanent sustenance in food, building materials, fuel, clothing and natural medicines. Nature has also influenced the Latvian cultural heritage, and continues to form our ethical and aesthetic perceptions.

At the turn of the 19th and 20th centuries in Latvia, and particularly after the First World War during a rise in the economy and technologies, forest coverage rapidly decreased, bogs were drained and utilised, and numbers of large mammal declined. The intensive use of natural resources continued to the present. The construction of hydro-electrical dams on the Daugava River destroyed the only locations for at least ten species in Latvia. Many plant and animal species have been purposely or otherwise introduced, and they now have impact on populations of local species and can wholly destroy or degrade local ecosystems. Nature as a whole (humans, ecosystems, sensitive plant and animal species) is significantly affected by water/air pollution and accumulation of hazardous chemicals. Presently, the impact of degradation of the ozone layer, ultraviolet radiation and climatic change on humans and nature is not completely understood.

Alongside the observed negative effects observed in nature due to intensive economic activity, a perceived need arose in Latvia and elsewhere for a strategy in nature protection and sustainable use of natural resources. The century-long experience has shown that it is economically more effective to plan use of natural resources according to the possibilities of renewal, rather than to invest large financing for nature protection after over-exploitation. Therefore, a priority of protection of biological diversity is the involvement of economic sectors, as well as nature

protection and sustainable resource management principles, in planning of sector economic development.

Experience has proven that nature protection is possible only with the involvement of municipal governmental institutions, interest groups, non-governmental organisations, and businesses. Therefore, various management models for protected territories are being applied and tested in Latvia. Consultative Councils have been formed for protected territories, which include representatives from municipal governmental institutions, forest management districts, the fishery sector, cultural and monument protection institutions, non-governmental organisation, and local businesses. Management of the territories is in the hands of municipal governmental or public organisations. In the future, we will be able to assess the operation of the various models, with respect to the most appropriate and effective methods. A complete and integrated economical assessment of natural resources in Latvia has not been undertaken, but there is a clear trend in acceptance that sustainable management of protected territories and services to tourists, anglers and hunters are important alternatives in rural development which can create new jobs and financial sources. It is important that tourism and recreation pressure does not exceed the tolerance level of the environment.

International commitments of Latvia

On 5 June 1992, Latvia signed the Rio de Janeiro Convention on Biological Diversity, which was ratified in 1995 by the Saeima of Latvia. This confirmed the willingness to adhere to the convention and to integrate it into national policy. According to Article 6 of the Convention, the main actions of the participating nations to ensure maintenance and sustainable use of biological diversity are:

a. develop national strategies, plans and programmes for the conservation and sustainable use of biological diversity, or adapt for this purpose existing strategies, plans or programmes;
b. integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policy.

The Third Pan European Conference of Ministers for the Environment was held in Sofia in 1995. At this meeting, the Pan European Biological and Landscape Diversity Strategy was accepted, which included the action theme "Integration of requirements for biological and landscape diversity in sectors". As a result, action programmes for protection of biological and landscape diversity, and for sustainable resource management, must be developed and implemented for economic sectors. In 1998 at the Fourth European Environmental Protection Ministers Conference, the Ministers affirmed as a declaration their determination to strengthen the existing instruments and to introduce new tools to improve integration of biological and landscape protection in sector policy at national and international levels, including development of the respective economical and financial initiatives.

In 1997, the European Union accepted the Biological Diversity Strategy, to integrate the requirements of the Convention On Biological Diversity into sector Regulations. Since Latvia is associated to this organisation by formal agreement, by which Latvia

has confirmed its determination to harmonise its legislation with EU policy, then the Articles of the Strategy are binding also for Latvia.

Planning of protection of biological diversity in Latvia since re-independence

In 1995, the Cabinet of Ministers of the Republic of Latvia accepted the "National Environmental Policy Plan for Latvia", which was the first strategic document in environmental protection since re-independence. The Environmental Protection Policy goals, besides those regarding environmental quality, are to maintain the current level of biological diversity, ensure sustainable use of natural resources, and to create a basis for sustainable development. The policy envisages integration of environmental protection policy into all sectors of the economy (into the economy in general as well as into sector strategic plans, and policy) and to promote public awareness of the issue.

To co-ordinate implementation of State interests and international commitments, the Cabinet of Ministers (10 February 1999) accepted Rule No. 60 "On Implementation of the 5 June 1992 Rio de Janeiro Convention On Biological Diversity", under which an inter-Ministry Commission was formed.

The goal of the National Programme On Biological Diversity is to promote sustainable use of natural resources, at the same time protecting nature by regulation of nature protection at the State to municipal and public levels to ensure implementation of international commitments, and to help foreign and local businesses in recognising priorities for investment and technical aid projects. Simultaneously with development of the Strategy Section of the National Programme, work has begun on development of an Action Plan. The Action Plan will allow to identify the required complex of activities for implementation of the National Programme, and to define the priorities, the persons or organisations responsible for carrying out the actions, and the required finances.

The National Programme On Protection of Biological Diversity in Latvia was created with the financial and organisational aid of the Global Environmental Facility and the United Nations Development Programme. During the project, seminars were organised which were attended by about 100 representatives from various Ministries, State institutions, universities, research institutions, non-governmental organisations and independent experts. We thank all for the support and co-operation!

Strategic objectives of the National Programme on Biological Diversity

Relatively high ecosystem diversity has been maintained in Latvia, which has formed as a result of soil and climatic factors, as well as due to development of economic practices, their intensity, and local traditions. Further economic development can lead to a rapid decline in the coverage of habitats important for biological diversity, or even their loss in some regions. Various anthropogenic activities have already caused changes in community structure and species dominance in most commercial forests, and in lakes and rivers. Therefore, one of the strategy objectives is to:

- Maintain and improve the diversity of ecosystems and their natural elements.

Environmental heterogeneity has helped to form the species diversity among habitats. Extinction of species can occur by destruction or alteration of habitats. Since the natural species structure of communities is a component of biological diversity, a strategy objective is to:

- Maintain and improve natural species diversity.

An inherent component of biological diversity is the available genetic resources. Maintenance of genetic diversity throughout distribution ranges is a main factor for the continued existence of any species. The diversity of crop plants and animal breeds has significance in natural and cultural/historical heritage, and is important in future breeding work. Therefore, efforts must be made to:

- Maintain the genetic diversity of natural species, as well as of crop plants and animal breeds.

The interaction of peoples and their environment is seen in the traditional landscape, which has not only cultural/historical value. The heterogeneity of landscape elements has created species and habitat diversity, and is the basis of existence. Therefore, a strategy objective is:

- Promote the conservation of the traditional landscape structures.

The sustainable use of living natural resources is associated with a need for their renewal. The understanding of natural processes and application of methods for improvement of resources including conservation of biological diversity are intrinsic parts of a sustainable economy. Therefore, a strategy objective is to:

- Ensure sustainable use of natural resources.

Description and solutions of problems associated with protection of biological diversity

The development of the Strategy on Biological Diversity involved identification of the problems in protection of ecosystem, species and genetic diversity. The problems were assessed by professional biologists, specialists from various nature protection institutions, scientists from research institutes, and representatives from universities and non-governmental organisations.

A problem is defined as a human-caused effect which leads to a reduction of the distribution range of a biotope of species, or which changes the role of a plant or animal species in its natural or semi-natural (as a result of human traditions) community. Problems, especially those caused by an economic sector, should not be understood as only a negative effect of the sector on biological diversity. Often, the problem is a result of long-term use of methods which have been objectively developed, and a positive change can be ensured by a specific activity. In most cases, the sustainable development of an economic sector depends on rational resource management.

Modification of methods used or new guiding principles will lead to both efficient economic development and conservation of biological diversity. The Section on the Description and solutions of problems associated with protection of biological diversity consists of two parts. The first part "Nature protection" describes the problems associated with conservation of natural and semi-natural (formed by Man) ecosystems and species in Latvia. The Convention on Biological Diversity addresses the importance of crop and animal breeds in maintenance of genetic diversity. Aspects of conservation of genetic diversity are described in the Chapter "Protection of crop and livestock breeds".

The second Section, "Sustainable use of living natural resources", includes problems associated with direct use of natural resources by economic sectors (forestry, fishery), as well as sectors which can indirectly affect ecosystems or species (transport, energy production). In many cases, there is an overlap between both sections (for example, Chapters on agriculture and forestry), since the problems within a sector can be solved only by application of both traditional nature protection activities in a specific ecosystem or its part, and by use of specific activities or by conservation of resources.

Each chapter includes a short, general description of the respective ecosystem or sector, followed by identification of the main problems in conservation of biological diversity. Within each chapter, the problems are numbered. Besides the listed main problems which have obvious importance in conservation of biological diversity, specific and sometimes detailed problems are also given. An objective was not to derive problems having equal magnitude among the chapters, since this would be difficult considering the differences in available knowledge and specificity of the various ecosystems and sectors. The problems are not listed by priority. An objective is provided for each problem. Before each problem, a brief description and means to achieve the objectives are provided. Within each Chapter, the objectives are numbered. The causes of the problems, and the solutions to eliminate the causes, are not treated separately from solutions focused on reduction of the effects.

I. Nature protection

1. Baltic Sea and the Gulf of Riga.

The biological diversity of Latvia is significantly enriched by the unique brackish water communities and ecosystems of the Baltic Sea and the Gulf of Riga waters. The coastal waters provide rich fish resources. Conservation of the biological diversity there is possible only by maintaining a balance between fishery and nature protection (see Chapter 15). The Irbe Strait of the Gulf of Riga is an important wintering site for water birds. The sea coast area is also intensively used for recreation.

The deeps of the sea basin are important spawning areas, but accumulating organic pollution has created zones of oxygen deficiency and hydrogen sulphide conditions. High amounts of organic matter and mineral nutrients enter the Sea with municipal and industrial waste waters, and agricultural runoff, which is most detrimental to the deeps, causes mortality of roe and fish fry.

1.1. Smooth the decline in communities of the deep sea areas.

1.1.1. Continue improvement of wastewater treatment and control, promote the programme "Water supply and wastewater treatment in small and medium-sized cities of Latvia (800+)" .

1.1.2. Step-up control of wastewater quality and waste management in coastal Pagasts.

1.1.3. Halt disposal of fish and fish processing waste from fishing and fish processing vessels.

1.1.4. Produce recommendations for development of sustainable agricultural in protection belts around the Baltic Sea and Gulf of Riga, as well as around lakes and rivers, to decrease soil erosion and nutrient runoff.

Brown and Red algae macrophyte beds play a major role in self-purification of waters and oxygen enrichment. These beds provide an important habitat for fish prey organisms. They are also spawning areas and the locations for early development of many fish species. Over a long period of intermittent incidents of oil release to the sea, the macrophyte beds on rocky gravel have decreased in size, or in some cases they have even disappeared. Increasing eutrophication has caused a decline in light penetrability, creating poor conditions for macrophyte growth. With these changes, the suitable habitat area for fish spawns has also decreased.

1.2. Eliminate further decline of macrophyte beds.

The solutions 1.1.1., 1.1.2., 1.1.3., and 1.1.4. are aimed to halt further decline in area of macrophyte beds.

1.2.1. Develop an oil pollution control and oil spill liquidation plan; develop a model to predict oil spill distribution along the Latvian coast.

1.2.2. Develop and implement a compensation mechanism which will ensure procurement of compensation for environmental damage ensued.

1.2.3. Strengthen international co-operation in exchange of information and liquidation of effects of oil release.

1.2.4. Promote and support study of macrophyte community distribution, dynamics and limiting factors.

A rapid decline in diversity of coastal communities and species, associated with significant changes in community structure, have been observed in the Gulf of Riga. These ecosystems are unique in their diversity and high productivity, in contrast to the ecosystems of the open sea. A lower salinity in the Gulf of Riga allows development of both saline and fresh water plants and animal species. The main causes of changes in coastal ecosystems are pollution, sand abstraction or dumping in the sea, dredging, construction of hydrotechnical objects (for example, jetties) and fishing with tools that disturb benthic communities.

1.3. Prevent a further decline in coastal community and species diversity, and changes in natural community structure.

The condition of coastal shallow waters can be significantly improved by reducing pollution loads (solutions 1.1.1., 1.1.2., 1.1.3., 1.1.4.).

1.3.1. Control commercial activity in the coastal shallow water zone, and enforce compliance to restrictions.

1.3.2. Create protected areas in coastal waters and develop their nature protection plans.

1.3.3. Environmental impact assessment should always include evaluation of biological resources and their expected trends.

Coastal waters are important areas for concentration of wintering and migrating birds. Since they are also rich in fish resources, the are intensively fished. Water birds and seals, especially pups, often become entangled in fish nets causing their death. Oil spills cause high mortality of water birds.

With the development of oil transport, as well as oil exploration and oil field exploitation, pollution from this sector can significantly increase the risk to internationally important coastal areas for wintering, resting and feeding of water birds.

1.4. Decrease mortality of seals and water birds.

The main solutions are 1.2.1., 1.2.2., 1.2.3., 1.2.4., 1.2.5..

1.4.1. Develop a system for regular survey of animal mortality due to fish nets.

1.4.2. Develop recommendations for improvement of fishing tools and methods.

1.4.3. Environmental impact analysis must include evaluation of threats to areas for wintering, resting and feeding of water birds.

In the Baltic Sea, due to its low salinity, most fish species are at their geographical distribution boundary. Thus, the distribution and productivity of the entire populations is affected by natural and anthropogenic environmental changes, and by intensive fishing. Due to over-fishing, the populations of six marine fish have been decreasing.

1.5. Prevent a decline in fish populations.

The most important solutions are associated with fishery 15.2.1. - 15.2.5., 15.2.7., 15.2.8..

Solutions given above (1.1.1., 1.1.2., 1.1.3., 1.1.4., 1.2.1., 1.2.2., 1.2.3.) can also improve the condition of fish populations.

1.5.1. Develop protection plans for rare fish species.

1.5.2. Support the study of distribution, population dynamics and limiting factors of rare species, as well as methods for their artificial reproduction.

Many species of fish, invertebrates and plants which are alien to the Latvian flora and fauna have been introduced with ship ballast water.

There exists a possibility that there will be an interest in the future for introduction and growing of alien species in coastal waters.

1.6. Prevent expansion of introduced species.

1.6.1. Ensure a ban on introduction of alien species into natural waters, and restrictions on their growing in fish ponds.

1.6.2. Control the use of ballast waters.

1.6.3. Support the study of distribution and population dynamics of introduced species in waters, and their effect of local populations.

See also solutions 15.3.1., 15.3.2.

2. Beaches and dunes.

The Latvia sea coast stretches for almost 500 km. Of the coastline, a 300 km long zone, largely on the Kurzeme coast, has been largely undisturbed and supports natural ecosystems. The beaches and dunes are mostly sandy; gravel, pebble and rocky shores are infrequent. On the beach and dunes, the ecosystems are formed by a rather small number of species which are adapted to the unique conditions. The vegetation is usually sparse, making it very sensitive to human activity. In depressions between dunes where the moisture regime is unstable, the communities include species typical of both dunes and meadows, and even of mires and waters. Along some stretches, beaches have become overgrown with reeds and bulrushes. Cliffs are rare along the Latvian coast, but they can be found for example at Jurkalne and Tuja.

The beaches and dunes are, of course, popular for recreation. A large part of the coastal zone falls within city territories, where fishery and harbour activities have increasing impact. Poorly planned and intensive use by recreationers result in trampling of the beach, fore-dune and white dune vegetation, pollution of the sand, disturbance of birds during nesting, and disturbance of the habitat for insects and amphibians. Beach tending efforts remove the drift material zone and its very characteristic plant and animal communities.

The grey dunes are covered by stable, sparse vegetation formed by lichens, bryophytes and low herbs, as well as by isolated trees and shrubs. Dune meadows have formed as a result of traditional farming methods, mostly by use as pasture. Meadows are dominated by graminoids and a humus layer has formed. Today, these areas have lost their previous importance.

Significant areas of dune meadows and grey dunes have developed into forests or are overgrown. Near towns or cities, the dunes are trampled or have become housing zones. Relatively few stretches of grey dunes and meadows have remained.

This Chapter covers only non-forested dunes: the fore-dunes and grey dunes.

2.1. Reduce the degradation processes of beach and dune ecosystems.

2.1.1. Supplement the protected nature area network with new areas designated by the various categories of protection, and develop and implement the respective nature protection plans.

2.1.2. Determine allowed recreation pressure levels for specific coastal zones which are identified in physical plans.

2.1.3. Develop a unified biological diversity monitoring system for the coastal zone.

2.1.4. Develop programmes for protection of beach and dune habitats.

2.1.5. Prevent tree planting and building on grey dunes or dune meadows.

2.1.6. Encourage the use of dune meadows for pasture, considering the European Union Regulation (EEC 2078/92) "On agricultural production methods compatible with the requirements of the environment and the maintenance of the countryside" (*see Footnote 1*).

2.1.7. Inclusion of coastal ecosystem evaluation in environmental impact assessment. Conduct environmental impact assessment for sea coast investment programmes and Blue Flag beaches (*see Footnote 2*).

2.1.8. Encourage use of local species for dune stabilisation, and prohibit planting of alien species on dunes.

2.1.9. Restrict development of expansive species (for example, roses Rosa rugosa, sea buckthorn and elaeagnus) on dunes.

2.1.10. Ensure availability of general information to the public on nature protection territories and belts, and the nature protection regimes along the coast.

Other important solutions to prevent degradation of dune and beach communities are 1.2.1., 1.2.3., 17.1.2., 17.1.3., 17.1.4., 17.1.6., 17.1.7., 17.1.11., 17.1.12.

In recent years, sea cliff areas have become very popular among tourists. If these beach areas lack the required facilities and a regulatory infrastructure for tourists, the typical plant and animal communities will be destroyed and erosion will intensify.

2.2. Promote conservation of sea cliff areas

2.2.1. Supplement the list of Specially Protected Natural Monuments to include the typical sea cliff stretches with most importance for biological diversity.

2.2.2. Promote the study of sea cliff ecosystems.

2.2.3. Promote the education and distribution of information on the importance of sea cliffs and their protection.

See also the above solutions 2.1.1., 2.1.2., 2.1.3., 2.1.4.

Solutions for the conservation of the unique ecosystems of sea cliffs may be found in solutions regarding conservation of exposed sedimentary rock and cave ecosystems (solutions 8.1.1., 8.1.2.), and in solutions to control problems related to tourism and recreation (solutions 17.1.2., 17.1.3., 17.1.4., 17.1.6., 17.1.11.).

Many sea shore stretches are becoming overgrown in large areas with reeds and bulrushes. The conditions which have resulted in these expanding stands and changes in the community structure have not been studied. Reeds have been observed to overgrow both meadows and sandy beaches.

2.3. Monitor the expansion of reed and bulrush populations, and the resulting effects on biological diversity.

2.3.1. Promote the study of factors affecting the expansion of reed and bulrush populations.

2.3.2. Promote the integrated ecosystem study of reed and bulrush habitats.

See above solutions 2.1.1., 2.1.2., 2.1.3., 2.1.4..

3. Rivers and lakes.

There are over 12,400 rivers and 2256 lakes in Latvia, covering 3.7 % of the territory. The shallow coastal lakes are particularly important for biological diversity, as the high primary productivity of these ecosystems ensures a food reserve for water birds and other animals. Of high interest are lakes with emergent vegetation typical of clear water, poor in organic substances, but these lakes are threatened by pollution and intensive recreation. Long river stretches have been regulated on plains and lowlands, destroying their typical ecosystems.

In swiftly flowing river stretches, a mixture of rapids and deep pockets ensures a diversity of microhabitats in a small area. As such stretches have high potential use for hydro-electrical power production, they have been often altered by flooding due to construction of dams and water mills. In recent years, the operation of many abandoned small hydro-electrical power stations has been resumed. Often, large areas along small rivers have been flooded by beavers.

3.1. Conservation of swiftly flowing river stretches.

3.1.1. Develop criteria for assessment of biological diversity in rivers.

3.1.2. Conduct integrated assessment of biological diversity in areas identified for possible construction of hydroelectical facilities and conduct substantiated assessment of losses and gains to ensure objective decision making.

3.1.3. Conduct inventory biological diversity in important river stretches and include this information in physical plans.

3.1.4. Develop a programme to restore the most important swiftly flowing rivers which have been flooded by beavers, as described in the beaver protection plan.

3.1.5. Develop a concept of management planning for river basins.

Solutions of importance given in the Chapter on energy production are 19.4.1., 19.4.2., 19.4.3., 19.4.4..

Natural rivers and their valleys are important dispersal routes (corridors). Many rivers or their stretches are regulated, which has obstructed the dispersal routes of many species, causing a decline in community diversity.

3.2. Ensure the function of ecological corridors along rivers.

3.2.1. Develop a ecological network plan, integrating it into physical planning.

3.2.2. Develop nature protection plans for rivers or their stretches included in the ecological network.

3.2.3. Assess the possibility of, and need for, reclamation of straightened river stretches.

3.2.4. In planning of protection belts, include, if necessary, renewal plans for coastal and flood plain meadows.

Untreated waste water inputs into rivers and lakes intensify eutrophication (increase in nutrient contents and cycling), which results in rapid growth of specific species, a decline of clean water species, and simplification of plant and animal communities. Most Latvian lakes are eutrophic, and only a few are oligotrophic or mesotrophic. The eutrophication of oligotrophic and mesotrophic lakes causes a loss of the animal and plant species typical of clean lakes.

3.3. Prevent the loss of sensitive species and communities, and simplification of communities in fresh waters.

See also solutions 1.1.1., 1.1.2, 1.1.4..

3.3.1. Develop and implement nature protection plans for protected lakes and protected lake habitats.

3.3.2. Ensure integrated monitoring of aquatic ecosystems.

3.3.3. Include bioindication methods in monitoring of water quality.

3.3.4. Involve the public in reclamation projects and monitoring of water quality.

A major contribution to conservation of fish species and their spawning area can come from the fishery sector (solutions 15.4.2, - 15.4.8.).

The building of hydro-elctrical dams obstructs fish migration routes, threatening natural spawning populations. Important spawning sites on the Daugava River have been lost for salmon, salmon-trout, vimba, and river lamprey. Migratory fish populations are intensively fished.

3.4. Protect fish migratory routes along rivers.

3.4.1. Renewal of important fish migration routes.

The main solutions are associated with energy production (solutions 19.4.1., 19.4.2., 19.4.3.) and fishery (solutions 5.4.3., 15.4.7.). See also solutions 3.1.1., 3.1.2..

4. Forests.

Forests cover 44.6% of the area of Latvia. Of the forests, about two-thirds are coniferous woods, and pine is the dominant species. Forestry has changed the relative proportions of forest types: presently, large areas are covered by birch, white alder and aspen, and few old oak and ash stands have survived. There are very few woods which have not been used previously for agriculture.

Recently, forestry and wood product production has become one of the leading sectors of the economy, and hence the rate of forest harvest has increased.

Due to long-term forestry traditions, few forests exist which can be characterised as natural forests (see page 33). The natural forest area is continuing to decline, and their conservation must be a priority in protection of biological diversity. The habitat requirements of many forest species include the presence of old trees, fallen trees, and an undisturbed herb and shrub understorey.

4.1. Prevent a decline in diversity of forest habitats.

4.1.1. Ensure inventory and protection of natural forest habitats.

4.1.2. Create a list of protected forest habitats and ensure their protection.

4.1.3. Expand the list of protected areas and protection methods.

4.1.4. Enforce compliance to protection of locations of rare plant and animal species in forests.

4.1.5. Train and inform forestry specialists and forest managers.

4.1.6. Inform the public on biological diversity in forests and the importance of its protection.

See also solution 13.15.

In Latvia, a very small area of forests is fully protected from all forestry activity. Less than 0.2 % of the forest area falls within strict regime zones of reserves. Those areas have major importance in observation of natural development of forests, and for protection of locations of very rare species which require undisturbed reproduction.

4.2. Ensure suitable conditions for populations of forest animals.

See solutions 4.1.3..

4.2.1. Develop protection plans for protected and game animals.

4.2.2. Develop protection plans for large carnivores.

4.2.3. Determine seasons of restricted forest activity in habitats of sensitive rare species (mating of capercaillie, nesting of large forest birds), in the vicinity of nests.

To achieve these objectives, solution 13.1.4. is very important.

Obstruction of migratory routes of forest animals can also affect their natural life cycle and distribution. If seasonal migrations are disturbed,

populations become isolated, gene exchange is hampered and genetic diversity is lowered. The above causes a decline in survival and ability to adapt to a changing environment, and shrinking of the natural distribution area. Forest fragmentation caused by commercial activity has resulted in similar habitats being separated by large distances, which affects also species without long migration paths.

4.3. Protect migration paths and reduce the rate of forest fragmentation.

4.3.1. Develop a plan for an ecological network and integrate it into physical planning.

4.3.2. Map the migration routes of protected and game animals, determine the cross-point habitats, and determine the required protection actions.

4.3.4. The maximum allowed clearcut size must not be exceeded in forest management and harvest, and if necessary, the limits must be corrected.

Pollution has also caused changes in the species composition of forest communities. An uncharacteristic species composition of the herb and shrub layer has been rapidly evolving, particularly in pine forests on dry sands. In such forests, the characteristic understorey species have declined, and the relative cover of graminoids, weeds and escaped garden species has been increasing. One of the causes for this change has been the greenhouse effect (increase of CO2 concentrations). A decrease of emissions of greenhouse gases is planned, as specified by the "Political plan to decrease contribution to climatic changes" (*see Footnote 3*).

Particularly rapid changes are observed near cities and popular recreation areas. In forests with high recreation pressure, it is difficult, if not impossible, to protect species sensitive to disturbance. Intensive travel causes soil compaction and decreases wood growth.

4.4. Maintain the characteristic species composition of forest communities.

4.4.1. Improve the forest monitoring system.

4.4.2. Regulate recreationer movement in areas with high recreation pressure and provide the required facilities.

4.4.3. Monitor distribution of alien species in forests and combat expansive species.

5. Mires.

Mires occupy 4.9 % of the area of Latvia. Mire ecosystems are important in stabilisation of the climate and the water regime. Unique plant and animal communities have formed in mires, which include also glacial relicts.

About 12 % of the mire area is under State protection.

Mires have long been used for peat harvest, and humans have put effort into their drainage to create arable land and pasture. Recent interest has stirred to intensify peat harvest, as the peat resources in some European countries (for example, Germany, Ireland, Netherlands) have dwindled.

In Latvia, there are few mire complexes where drainage has never been installed. Peat harvest and forest activities have caused degradation of mire plant and animal communities. There are few fens and spring bogs among the protected mires.

5.1. Prevent future human-caused changes in biological diversity of the important plant and animal communities.

5.1.1. Develop criteria to assess the biological value of mires.

5.1.2. Complete mire ecosystem inventory and biological diversity assessment.

5.1.3. Expand the network of protected areas, to ensure protection of mire biological diversity in all regions and of all mires important for biological diversity.

5.1.4. Ensure the function of at least two mire monitoring stations.

5.1.5. Involve land owners in hay collection and pasture use on fens, utilising the EU Directive No. 2978/92 "On agricultural production methods compatible with the requirements of the environment and the maintenance of the countryside".

5.1.6. Support research on vegetation dynamics in relation to pasture use and hay collection, and development of the optimal management strategy.

6. Crop fields.

Ploughed land covers 67 % of the total agricultural land. Species found in crop fields have adapted to a human-formed environment, and plant communities are dominated by one cultivated species. Weed community composition is dependent on soil and climatic conditions. Specific insect communities, including pollinators and the natural enemies of crop pests, are associated with the weed communities. Crop fields are also the home and feeding area of other animals(birds and mammals. The entire collection of species is an indicator of the history of agricultural development in rural Latvia.

Maintenance of the diversity of species in crop fields requires permanent human activity. Contemporary intensive agricultural methods destroys the species and communities which have adapted over centuries to traditional methods.

Using specific principles and non-intensive methods, it is possible to maintain the characteristic biological diversity of traditional agriculture. These solutions are given in the Chapter on Agriculture (solutions 14.2.1. - 14.2.6.).

Intensive agricultural methods based on extensive use of chemical fertilisers and pesticides lead to significantly lower species diversity in crop field communities. The species composition of communities is also affected by land drainage and liming. Therefore, the typical weed species of dry, sand, acidic and wet soils have almost completely disappeared. A higher biological diversity is related to decreased population size of each species, and hence also a reduced possibility of rapid growth and expansion of a few aggressive and resistant weed species. A part of the traditional agricultural weed species can and should be maintained even in intensive agriculture (solutions 14.2.2., 14.2.4., 14.2.5., 14.2.6.). However, other solutions are required in most cases.

6.1. Maintain the typical weed and animal communities of crop fields cultivated using traditional methods.

6.1.1. Support introduction of sustainable agricultural practices.

6.1.2. Support study of the effect of various agricultural methods on biological diversity.

6.1.3. Develop research-based recommendations for conservation of biological diversity in crop fields, and develop the associated methods.

6.1.4. Develop a system for monitoring of crop field plant and animal communities.

6.1.5. Create a collection and seed bank for endangered and rare weed species.

7. Meadows and pastures.

Meadows and pasture cover 33 % of the agricultural area. Most of them are cultivated meadows, planted perennial fields, or fallow land, and they are

used for hay collection. The greater part of the cultivated meadows and pastures are more productive and more commercially important than the semi-natural meadows managed by traditional methods. Management of meadows

and pastures is important in conservation of the traditional mosaic landscape in rural Latvia. The plant, insect and other invertebrate communities in cultivated meadows and pastures are poor and simplified. Non-cultivated (further called semi-natural) meadows support a rich plant and invertebrate diversity, containing about one-third of all flowering plants and ferns in Latvia. About 40% of the rare and endangered species grow in meadows. Many bird species nest and feed in meadows. In official statistics of land use, semi-natural meadows are not identified separately. Therefore, there is a lack of information for biologists on meadow distribution and area, and the rates and causes of their loss cannot be assessed.

In many regions, only a small area of land has been managed in the long-term as meadows. On fertile soils, land use is often changed and meadows are ploughed. One of the reasons for loss of semi-natural meadows is drainage of over-wet land. On large land areas, plant community composition has changed, and wet meadows have been replaced by crop fields or cultivated meadows. Cultivation of semi-natural meadows alters the structure and composition of the communities. Therefore, large meadow areas have lost their biological importance. The most drastic changes in community composition and structure occur after cultivation, especially after fertilisation, of dry meadows.

7.1. Maintain the area of semi-natural meadows.

7.1.1. Develop a network of protected meadows which have highest biological value, including meadow communities with nationally and regionally rare and protected species, and integrate this network into physical planning.

7.1.2. Involve meadow owners in management, as specified in the European Union Regulation EEC 2078/92 "On agricultural production methods compatible with the requirements of the environment and the maintenance of the countryside" (*see Footnote 1*).

7.1.3. Inform the public on the biological diversity value of meadows and methods for their conservation.

Solutions given in the Chapter on agriculture (14.1.1., 14.1.2., 14.1.3., 14.4.1., 14.5.1., 14.5.2., 14.6.1, 14.6.2., 14.6.3.) will help to aid conservation of meadows.

Most of the semi-natural meadows are overgrown or are rapidly overgrowing, largely due to the present economic conditions. The dry meadows with low productivity are first abandoned, followed by the wet meadows which are difficult to harvest with equipment. In reserves and restricted areas, overgrowth of meadows has been due to

misunderstood nature protection management which has not allowed any commercial activity. The coastal meadows are one of the rarest habitats in Latvia, and are found in both restricted areas and in cities, but since residents there are no longer involved with agriculture, they are rapidly overgrowing with reeds. It is expected that afforestation of agricultural land will further dwindle the coverage of semi-natural meadows.

7.2. Prevent overgrowing of natural meadows and pasture.

Solutions given above (7.1.2., 7.1.5., 7.1.6.) will also prevent overgrowing of meadows.

7.2.1. Conduct an environmental impact assessment for the afforestation programme, particularly considering the impact on conservation of valuable meadows.

7.2.2. Promote suitable meadow management in protected areas.

7.2.3. Promote monitoring of meadow management regimes. Optimise management methods for various meadow types and indicator species, to facilitate assessment of meadow condition by land owners and agricultural specialists.

Long-term, non-cultivated pasture coverage is very low. The plant communities characteristic of long-term pasture land use have adapted to trampling, grass removal, and the permanent presence of livestock.

However, livestock numbers have rapidly declined, and low-productive pastures are no longer used or they are improved (cultivation, fertiliser application). This change in land use has altered the pasture plant communities, and caused a decline in species richness, and a loss of the colourful flowers and rare species.

7.3. Maintain the characteristic plant and animal communities of semi-natural meadows.

It is necessary to identify and maintain the most valuable pastures (see solutions 7.1.1. - 7.1.3, 7.2.1.). The conservation of pastures is only possible with suitable management. Solutions are given in the Chapter on agriculture (solutions 14.1.1., 14.1.2., 14.1.3., 14.7.1.).

8. Exposed sedimentary rock and caves.

In river valleys, over one-thousand locations of exposed sedimentary rock and 211 natural caves have been identified. Various rare algae, lichen and higher plant species have adapted to life on bedrock. Caves are a unique natural formation in Latvia. Most of the caves are shallow and eroded in sandstone, but some can reach a few hundred metres in length. Adapted animal species inhabit the less frequently visited caves, and several are important as bat wintering locations.

Most of the bedrock exposures and caves are included in the list of specially protected natural monuments.

Locations of bedrock exposures and natural caves are popular tourist sites. In most cases, the areas lack the proper facilities for tourists, and trampling has major impact. Regulation of water levels has threatened many caves by flooding. Construction of the hydro-electrical power dams of the Daugava River destroyed the magnificent dolomite exposures in the Daugava Valley, and also the unique plant and animal habitats. Dolomite exposure sites are often used for cliff climber competitions and training, thereby destroying the unique vegetation.

8.1. Maintain sedimentary rock exposures and cave ecosystems.

8.1.1. Develop visit limits for natural geological monuments and ensure their compliance.

8.1.2. Develop and carry out projects to provide the required service facilities for popular geological monuments, including actions to ensure public safety, as well as compliance with regulations on protection and use of natural monuments.

8.1.3. Prohibit sport and training events on valuable dolomite exposures.

8.1.4. Involve municipal governmental institutions and land owners in protection and tending of geological monuments.

Important solutions are associated with tourism management; planning, construction and maintenance of tourist service facilities around popular sites, and organisation of sport activities (solutions 17.1.2., 17.1.3., 17.1.4., 17.1.6., 17.1.7., 17.1.11., 17.1.12.)

Planning and construction of hydro-electrical projects must consider the interests of maintenance of biological diversity and protection of geological natural monuments (solutions 18.1.3., 18.1.5., 18.1.7., 19.4.1.).

Regulation of beaver numbers can reduce the risk of flooding of bedrock exposures and caves (3.1.4.).

9. Karst sink-holes.

Large territories with karst-formed ecosystems are located in the southern part of Bauska Districta and in Riga District (around Allazi, Salaspils and Baldone). These areas have been little studied from a perspective of biological diversity, but the existing microclimate, soil factors and other ecological factors may accommodate species that occur only in karst sink-holes. Some of the karst sink-holes are included in the list of protected natural monuments.

Many karst sink-holes were flooded by construction hydro-electrical dams on the Daugava River, destroyed by mining of gypsum, and some were degraded by dumping of waste. Most of the non-flooded karst sink-holes are overgrown.

9.1. Protection of karst sink-hole ecosystems.

Important solutions are given in the Chapter on sedimentary rock exposures and caves (8.1.3., 8.1.4).

9.1.1. Develop recommendations and substantiation for creation of protected karst areas.

9.2.2. Support study of karst sink-hole ecosystems and their diversity.

9.2.3. Develop recommendations for monitoring of karst sink-holes and their ecosystems.

9.2.4. Implement and monitor waste management in municipalities located in karst sink-hole regions.

10. Urban ecosystems

Human planned and regularly tended ecosystems include parks, squares, cemeteries and other public gardens. In these urban ecosystems, foreign species have a dominant role. Urban gardens provide a refuge for many local animal and plant species. The presence of wild species in the city environment is naturally appealing, providing a link between humans and nature, and is an asset in environmental education of urban children.

Every urban area includes territories where the natural vegetation has been destroyed allowing random colonisation by various species. Usually these types of communities are very dynamic and short-term. Within the administrative districts of Latvian cities, large areas of natural ecosystems have survived. City green belts are particularly important for recreation and improvement of air quality.

The survival of wild species in cities, the maintenance and creation of species habitats, and conservation of natural biotopes, depend on city planning and management by the respective municipal departments, and their informativity and interests. Some required solutions are given in the Chapter on Urban environment and city management (solutions 21.1., 21.2., 21.3., 21.4.).

In cities, the diversity of introduced foreign species (especially plant species) is high. Most of them are concentrated on roadsides, railway right-of ways, in waste storage facilities, weedy lots, and construction sites. Most of the foreign species do not remain in their habitats for a long period, but several species have expanded in this century outside of urban areas where they have become aggressive weeds (for example, small flowered blake, Galinsoga parviflora).

10.1. Identify the trends in expansion of distribution of species in human environments, with the appropriate monitoring.

10.1.1. Control the expansion of aggressive weeds.

To a certain extent, the expansion of aggressive weeds can be restricted by reducing the area of abandoned lots, tending of construction sites, and proper waste management (solution 21.5.1.).

The old rural parks and dendrological gardens formed around the previous manor centres, have unique architectural, historical and natural value.

The gardens contain both planted local and foreign exotic species. Many of the foreign tree species have successfully adapted to our climatic and soil conditions, and produce viable seed. Such trees can be utilised as a source of seeds or cuttings for reproduction of adapted species or varieties. Rural parks include many old, hollowed trees, which are sometimes the only refuge in the local area for species adapted to such habitats (owls, bats, rare insects, polypores). The parks also support an interesting array of traditional decorative plants and incidentally introduced foreign species.

While many parks have lost their landscape architectural value, their cultural-historical value remains.

10.2. Maintain the biological diversity of old rural parks.

10.2.1. Conduct inventory of the natural value of old parks and dendrological gardens.

10.2.2. Develop and implement nature protection plans for dendrological gardens.

10.2.3. Involve owners and municipal governmental institutions in protection of the natural value of dendrological gardens.

11. Species protection.

There have been recorded 18,047 animal, 5396 plant and about 4000 fungi species in Latvia. Scientists estimate that about 907 species (3.3% of the total number) are rare and threatened. Wild plants and animals are important in all ecosystem components. With the extinction of a species, the interrelations between species are lost, along with the potential to utilise the hitherto unknown properties of the species.

It is believed that 31 plant and animal species have become extinct in Latvia. Extinctions have been caused by habitat loss and degradation, and environmental pollution. The healthy existence of a plant or animal species and conservation of its populations is possible only in natural conditions in natural habitats (conservation in situ).

11.1. Prevent decline of numbers and distributions of local wild species in nature.

11.1.1. Ensure suitable protection status for threatened species.

11.1.2. Develop and implement protection plans that will ensure species distributions and sustainability of populations.

11.1.3. Promote study of the ecology and biology of threatened species, and their population dynamics.

11.1.4. Supplement the network of protected nature areas for rare species and establish microreserves for species protection outside of the protected nature areas.

11.1.5. Improve the control system for protection of species, to ensure its regular and effective function.

11.1.6. Include information on habitats of protected species in forest management and physical plans.

In parallel with in situ protection of species, actions are sometimes also required for species conservation outside of their natural habitats (ex situ). Conservation of particularly threatened and species at the brink of extinction is often only possible by ex situ methods. For example, it is difficult to maintain various weed species adapted to traditional agriculture practice in their almost extinct habitat (solution 6.1.5.). If ex situ methods are required for conservation of a species in Latvia, the appropriate actions will appear in the respective species protection plans (solutions 6.1.4., 11.1.2). Zoological and botanical gardens are important for conservation of many species and for education. The Microbial Strain Collection of Latvia houses pure cultures of bacterial and microscopic fungi strains.

11.2. Implement actions to ensure protection of species outside of their natural habitats.

11.2.1. Develop principles for maintenance of rare and threatened species in zoological gardens.

11.2.2. Develop plant collections and seed banks.

11.2.3. Maintain and expand the microbial strain collection.

Wild plant and animal populations are affected by their local and international market.

11.2.4. Ensure the appropriate actions as required by the Convention "On International Trade in Endangered Species of Wild Fauna and Flora".

11.2.5. Ensure education and appropriate action of customs workers and border guards regarding the Convention on trade with wild species.

11.2.6. In co-operation with municipal governmental institutions, develop the required municipal regulations on trade with wild species and enforce compliance to the regulations.

11.2.7. Inform and educate the police on regulations concerning trade with wild animals.

Many wild species are traditional foods, and their procurement is a popular form of recreation. The distributions and population sizes of these species are affected by hunting and fishing, as well as by berry and mushroom picking. Solutions regarding maintenance of fish and game animal resources are given in Chapters on fishery and hunting management (solutions under 15.2., 16.1., 16.2., 16.3.). The picking of medicinal herbs is also popular in Latvia. Harvest of Roman snails has begun in recent years.

11.4. Maintain commercially important wild species resources.

11.4.1. Survey medicinal plant resources.

11.4.2. Develop nature reserves for the most important locations of medicinal herbs, where priority is given to resource maintenance and sustainable use.

11.4.3. For medicinal plants with limited distribution in Latvia, determine potentially harvestable amounts and annually allowed harvests.

11.4.4. Develop and implement commercial regulations for harvest and trade of medicinal plants, including requirements for protection of species.

11.4.5. Popularise and promote agricultural growing of medicinal plants.

11.4.6. Utilise economic tools to regulate industrial harvest of wild berries and mushrooms.

11.4.7. In co-operation with municipal governmental institutions, regulate trade in protected species in cities.

11.4.8. Ensure sustainable use of Roman snail resources.

In recent years, decorative wild plants are intensively commercially removed around cities. In the vicinity of Riga, all evergreen species are threatened, as well as many common colourful flowers, mosses and lichens. The appropriate municipal and nature protection institutions must co-operate to ensure their protection (solution 21.4.1.).

11.5. Protect locations of wild decorative species near urban areas.

11.5.1. Inform and educate the public on the importance of maintenance and protection of decorative species.

12. Protection of crop and livestock breeds.

Over centuries, farmers in Latvia have produced several crop and livestock breeds which are adapted to local conditions. Such genetic resources are important, as they have potential use in future breeding efforts. Therefore, attention must be paid to maintenance of samples of the local genetic material. Both local and foreign forms have been used in selection work in Latvia, to produce the now widely-grown varieties of barley, potatoes, oats, clover, and later, of wheat and rye. Significant steps have been made in selection of livestock fodder crops. Cows, pigs, sheep and horses are widely raised in Latvia, and very productive breeds adapted to local conditions have been developed for each.

The emphasis on new, productive breeds requiring intensive technologies is associated with a risk of losing the traditional local breeds. The importance of protecting the local genetic material has only recently been addressed. Today, only a few breeds produced from local material have survived. Some local crop varieties, particularly vegetables, fruit trees and berry shrubs, have survived in individual

gardens. The genetic stock in many individual gardens has been surveyed, but such information is lacking for vegetables. The recent popularity of foreign vegetable varieties has resulted in a decline of planting of local varieties, and many of them may become extinct.

12.1. Maintain local crop varieties.

12.1.1. Develop a programme for maintenance of genetic resources of crops.

12.1.2. Survey selection collections and individual gardens. Develop a collection of crops with Latvian origin, and, if necessary, acquire the required samples from foreign gene banks.

12.1.3. Append the Latvian crop variety gene bank, and ensure adequate conditions for their long-term safe storage.

12.1.4. In co-operation with gene banks in the other Baltic and Nordic countries, develop a system for storage of plant genetic resource collections.

12.1.5. Popularise the features, importance and growing of crops of Latvian origin.

Productive foreign livestock breeds have been gaining popularity in Latvia, causing a risk in a decline of genetic diversity of local livestock breeds. Inventory is lacking on the present genetic diversity of traditional Latvian breeds (for example, of brown sheep and poultry).

12.2. Maintain local breeds of livestock.

12.2.1. Develop a programme for maintenance of genetic resources of livestock.

12.2.2. Popularise the characteristic features, importance and raising of local-origin breeds.

II. Sustainable use of living natural resources

13. Forestry.

Wood is important export sector, and the intensity of wood harvest has increased by almost twice in the last five years. Forest management for wood harvest is the most important factor affecting biological diversity. The Latvian Forest Policy, accepted in 1998, was developed to ensure sustainable use of wood resources (*see Footnote 4*).

13.1. Promote sustainable forest management.

13.1.1. Develop an action plan for maintenance of biological diversity in forests.

13.1.2. Promote development and implementation of a system for forest management unit certification.

13.1.3. Inform the Private Forest Owner Association and other interest groups on biological diversity, and involve them in finding solutions to the given problems.

13.1.4. Develop and implement economic instruments to promote development of sustainable forestry and maintenance of biological diversity in forests.

13.1.5. Improve education of forestry specialists in biological diversity and raise the level of public knowledge on the biological importance of forests.

Intensive forest management leads to loss of natural forest structure and hence also of many specific habitats and adapted species. Natural forests are generally characterised by variable tree height and age classes, understorey tree layers, canopy gaps, and wet depressions with different vegetation. All of those characters create optimal conditions for species and habitat diversity.

13.2. Care of rare forest habitats.

13.2.1. Forest management planning and forest harvest must consider natural forest habitats, protected habitats, and locations of protected species.

13.2.2. In natural forest habitats, protected habitats, and locations of protected species, enforce compliance to restrictions on forestry activities, and conduct the required actions for maintenance of biological diversity.

See also solution 4.1.1..

Any species can be negatively affected by disturbance. Forest activities are conducted in all seasons, including the most important reproduction period, which is most often in spring and early summer for animals. Forest

activity during the vegetation period has a negative impact on the forest understorey.

13.3. Reduce the impact of disturbance from forest activities.

13.3.1. As much as possible, reduce the intensity of forest management activities during the vegetation period, especially in areas adjacent to locations of protected species and protected nature areas.

13.3.2. Develop and implement non-intensive forestry methods in locations of protected species and medicinal plant populations.

Traditional forest management has increased coverage of spruce, which has been planted in locations uncharacteristic for this species.

13.4. Optimise the relative coverage of forest types.

13.4.1. Regeneration of forests with tree species of the respective natural habitats.

Many plant and animal species have adapted to life in a habitat with a specific tree age or tree stand age. Therefore, it is necessary that a forest area contains all age classes of trees and stand ages. To ensure sustainable forestry activity and potential survival of all forest species, similar relative coverage of stands of all age classes is required.

13.5. Improve forest age structure.

13.5.1. Promote planning of similar coverage of stands of all age classes.

13.5.2. Maintain a constant proportion of old trees in stands.

The presence of dead wood, and burned and hollowed trees is an intrinsic component of forest stands. Since most of the forest species listed in the

Latvian Red Data Book are closely associated with large diameter dead, hollowed or burned trees, it seem clear that these elements are in insufficient amounts in today's forests.

13.6.Promote activities to ensure the presence of characteristic elements of natural forests.

13.6.1. Preserve large diameter dead and damaged trees, increasing their frequency in forests.

Species diversity is commonly higher in locations where forests adjoin to different ecosystems (mires, waters, meadows). The forest edge differs also from the main forest stand by a different tree species composition and a gradual transition from a low to high canopy. The edge contains species of both bordering habitats, as well as species that feed in one habitat, but otherwise live in the other. Management of forest edges without recognising its unique features can threaten species diversity in both forests and adjacent areas.

13.7. Conduct activities to improve biological diversity when conducting forestry activities in forest edges.

13.7.1. Preserve the contact zones of forests with other ecosystems, particularly along water body shores and mires.

13.7.2. Promote renewal of natural edges by use of appropriate forest management methods.

Silviculture in Latvia has long traditions of local seed collection and preparation of planting material. The regional features are also considered.

13.8. Continue maintenance of the genetic diversity of commercially important tree species.

13.8.1. Permit regeneration of forest using only local seed and planting stock.

13.8.2. As much as possible, promote natural regeneration of forest.

13.8.3. Promote maintenance of forest genetic resources in Latvia.

13.8.4. Exclude the use of genetically modified trees.

A dense understorey frequently forms in urban and their surrounding areas, which includes not only local species which are atypical of forests, but also foreign tree species (for example, Amelanchier spicata, Cotoneaster lucida and Acer negundo).

13.9. Control the distribution of foreign tree species in forests.

13.9.1. Utilise specific tending methods in forests with high densities of foreign tree species in plant communities.

14. Agriculture

Forests cover 39 % of Latvia. In recent years, the agricultural intensity has decreased, and in 1995, production utilised only 15 % of the agricultural land. Almost 80 % of the private farms use non-intensive methods. The productivity of many crops had fallen by 12-28 % between 1990 and 1995.

However, farms utilising intensive methods have stabilised, and the future may see losses in biological diversity in many regions, particularly in the Zemgale Plain, and parts of the Coastal Plain around, for example, around Riga and Ventspils.

It is important to recognise that biological diversity and their limiting elements should be maintained also in areas with intensive agricultural land use, as they are an intrinsic part of the rural environment in Latvia. The awareness and co-operation of farmers and the general public are very important for conservation of rural landscapes.

In the 1970s and 1980s, land drainage projects created large agricultural expanses, simultaneously destroying the living and feeding areas for many species. Intensively managed agricultural areas have lost practically all of the important landscape elements required for maintenance of biological diversity - individual trees, individual shrubs or their clumps, ponds. Soil erosion by wind has become a problem regionally (Zemgale Plain and Coastal Plain).

14.1. Maintain the characteristic habitat mosaic of rural landscapes.

Solutions 14.1.1., 14.1.2., 14.1.3. are important for all problems related to agriculture.

14.1.1. Implement the European Union EEC 2078/92 "On agricultural production methods compatible with the requirements of the environment and the maintenance of the countryside" (*see Footnote 1*).

14.1.2. Implement and popularise the Code of Good Agricultural Practices (*see Footnote 5*).

14.1.3. Promote diversity of land use in rural landscapes.

14.1.4. Preserve individual trees and shrubs, and groups of trees and shrubs, on agricultural land.

14.1.5. Preserve large field stones and their groups in fields.

14.1.6. In large open agricultural landscapes, create protection belts utilising local tree species.

14.1.7. Popularise the importance of landscape elements in rural areas, to encourage land owners in establishment or maintenance of treed roadsides, hedge-rows and ponds.

Intensive agricultural land use has changed the species composition of crop communities (see problem 6.1.). Many of the plant and animal species of crop communities can be maintained by use of suitable agricultural methods, such as derived for biological agriculture techniques. However, in conjunction with a number of prerequisites, the conservation of crop communities can be successful by use of non-intensive farming methods.

14.2. Maintain the characteristic species of crop fields.

14.2.1. Popularise the use of biological agriculture methods and environmentally friendly production of food products.

14.2.2. On agricultural land not farmed using biological agriculture, techniques, fertiliser and pesticide use should be based on principles of sustainable agricultural principles.

14.2.3. Prevent the flow of pesticides and fertilisers from treated crop fields.

14.2.4. Leave crop field edges free from pesticide and fertiliser use.

14.2.5. Maintain and tend unploughed border balks between crop fields.

14.2.6. Prevent soil compaction.

Conservation of meadows is an integral part of agricultural management for biological diversity. Intensive agricultural activity should be balanced with traditional management of meadows which favours biological diversity (solutions 7.1.1. - 7.1.6.).

Many meadows with high biological value are overgrowing, since hay collection is not economical due to their low productivity. Therefore, a subsidy system is required for management of meadows with high biological value. Occasionally, particularly in eastern Latvia, hay is regularly collected in small, usually drained, fens (see solution 5.2.2.).

14.3. Ensure management of semi-natural meadows and fens.

14.3.1. Continue hay collection in long-term use meadows.

14.3.2. Promote hay collection in specific wet areas, river and lake plains, and traditionally used fens.

On productive soils, meadows are frequently converted to crop fields, and wet meadows are drained. Such changes in land use often occur in river valleys, where the meadows are rich in species and diverse. Such areas require inventory and development of a protection and subsidy strategy (solutions 7.1.1. - 7.1.3.).

14.4. Prevent a decrease in coverage of semi-natural meadows.

14.4.1. Prevent ploughing of traditionally used meadows.

14.4.2. Prevent drainage system instalment in meadows of high biological importance.

Cultivation of meadows, will increase their productivity, but will decrease species richness of the plant communities. It is particularly important to maintain non-cultivated plots on sandy soils and calcareous soils. Important meadow elements for biological diversity are individual trees or their groups, especially wild fruit trees and shrubs (wild apples, pears, hawthorn, roses) (solution 14.1.4.; see also solutions 7.1.1. - 7.1.3.).

14.5. Retard simplification of meadow communities.

14.5.1. Develop fertilisation normatives that take into account biological sensitivity, incorporating them into the Code of Good Agricultural Practices (*see Footnote 5*), and provide subsidies for utilisation of such normatives.

14.5.2. On meadows of high biological value, prevent fertiliser use and other cultivation improvements.

14.5.3. Leave individual trees and shrubs in meadows and pastures.

On large farms, pastures are frequently changed, not allowing succession to communities with species characteristic of pastures. On large livestock farms, animals graze largely on cultivated pastures, which are important bird nesting and feeding areas, but which lack the characteristic plant and insect species of pastures. With an increase in abandoned agricultural land area, pastures in wet depressions, flood plains, fens and on dry or calcareous soils are longer economically efficient, as the area of productive land is sufficient.

The most significant solutions are associated with the establishment of a network of traditionally utilised pasture, their management, and subsidies to the respective land owners (solutions 7.1.1. - 7.1.3., 7.2.2., 14.1.4.).

14.6. Prevent simplification of semi-natural pasture communities.

14.6.1. Continue traditional management of farm pastures.

14.6.2. At least partly, renew pasture land use in some locations: juniper stands, forest pastures, river and lake plains, and fens.

14.6.3. Establish pastures on the steepest slopes of hills, lake depressions, river valleys, and on poor soils and calcareous soils.

Mechanised agricultural field work in spring can destroy bird (for example, lapwing) nests. Hay and crop harvest can destroy not only nests, by also young birds and animals.

14.7. Prevent mortality of animals and their young during agricultural work.

14.7.1. Implement agricultural methods with low impact on animals.

It has been observed in cultivation of new crop varieties that they can survive not only in weedy sites and roadsides, as seen for example with Yellow Lupin (Lupinus luteus), but they can also survive also in natural plant communities. Sosnovska cow-parsnip (Heracleum mantegazzianum), earlier cultivated as livestock feed, has widely expanded throughout Latvia. The American mink has escaped from fur farms and become established in the wild. There is no guarantee that the American cranberry (Oxycoccus macrocarpon) will not become introduced in natural bog communities from plantations. The highest level of caution should be taken when beginning growing of introduced crops or animals.

14.8. Contain the distribution of introduced species.

14.8.1. Allow the introduction of agricultural crops only after rigorous testing and experience in other countries. Observe a principle of caution when making decisions on cultivation of introduced species.

14.8.2. Promote study of distribution of introduced species and their entry to natural communities.

14.8.3. Control the distribution of aggressive species, especially by their removal from natural communities.

14.8.4. Develop and implement regulations on introduction of new crops, and stipulate grower responsibility for damages ensued to local species and communities.

14.8.5. Promote study of local cranberry forms and popularise their cultivation on formerly harvested peat bogs.

Local crop varieties and animal breeds are rapidly being lost, which is aggravated by the increasing imports of seed material and lack of information on local varieties.

14.9. Maintain local plant varieties and animal breeds.

14.9.1. Promote growing of traditional varieties of cranberry, decorative plants, fruit trees and shrubs.

14.9.2. Develop exhibits of local crop varieties and animal breeds, and establish demonstration collections and farms.

14.9.3. Identify the superior breed lines (families).

14.9.4. Develop a superior stud sperm bank and ensure suitable conditions for long-term and safe storage.

14.9.5. Develop, maintain and expand a breed data bank for Latvian livestock and poultry breeds.

14.9.6. Promote the genetical analysis and genotyping of Latvian livestock and poultry breeds, in co-operation with Nordic gene banks and other organisations.

14.9.7. Develop expositions, demonstration collections, and model farms for local crop plants, livestock and poultry breeds.

15. Fishery.

The fishery sector includes fishing (commercial and sport fishing), fish processing, fish aquaculture and other methods of fish and aquatic organism artificial reproduction, resource protection, and fishery research. The fishery sector manages fish, lamprey, crayfish and other living resources (including commercially important aquatic plants) in the Latvian economic zone of the Baltic Sea and the Gulf of Riga (about 28,000 km^2 area), and in interior waters: 2,260 lakes (area about 1,000 km^2), four largest rivers (Daugava, Lielupe, Gauja and Venta), artificially created basins on rivers, as well as 12,400 small rivers and creeks (total length 37,000 km). Of the 63 recorded fish species in Latvian waters, 34 species have commercial importance. Sector activities are closely associated with management and protection of living resources of Latvian waters, including also the conservation and protection of biological diversity.

The use of environmentally harmful or non-selective fishing tools, non-sustainable exploitation of resources, and non-sustainable artificial reproduction of fish, without regard to ecosystem features, can cause impact to ecosystem structure or habitats, decreasing biological diversity. For example, trawling can degrade the benthic flora and fauna, decrease the potential spawn area and the ecosystem food reserves. The use of fine-mesh nets, and over-fishing of a commercially important species or group of species, can upset the balance in ecosystem food chains.

15.1. Maintain ecosystem and habitat diversity, and their natural structure.

15.1.1. Control the use of fishing methods which destroy benthic communities.

15.1.2. Increase the selectivity of fishing tools.

15.1.3. Maintain the natural relative abundances of species by use of artificial reproduction management.

15.1.4. Regulate commercial harvest of aquatic plants and invertebrates.

15.1.5. Promote study of fish resources and key-stone habitats in food chains.

15.1.6. Strengthen the system of fish resource monitoring.

15.1.7. Enforce fishing control.

15.1.8. Combat the use of illegal fishing methods (electrical fishing, explosives, use of chemical substances, and others).

Insufficiently regulated and controlled commercial and sport fishing can cause a decrease in distribution ranges of fish species, or even extinction. Fishing can have impact also on water birds and animal abundance and distributions.

15.2. Maintain species diversity and richness, and population productivity.

15.2.1. Promote monitoring studies, to achieve research-based regulation of fish resource harvest and understanding of conditions when it is necessary to halt commercial or sport fishing.

15.2.2. In co-operation with other countries in the Baltic Sea Basin, develop international sustainable management programmes for cod, anchovy and sprat.

15.2.3. Increase the natural fish spawn, control fishing in spawn areas during spawning and in regions with high density of fish young, and regulate side-catches of young fish.

15.2.4. Increase natural fish population sizes with artificially grown young, to achieve a natural balance.

15.2.5. Create a unified system for data registration and control of artificial reproduction of fish resources, crayfish and other aquatic organisms.

15.2.6. Develop a programme for population revival, reintroduction and protection of threatened fish species.

15.2.7. Develop fishing tools to decrease impact on seal and water fowl mortality.

15.2.8. Promote study of fish and their food species diversity.

15.2.9. Enforce compliance to angling restrictions.

15.2.10. Promote education of sport and professional fishermen, as well as municipal governmental personnel, on rational use of fish resources and maintenance of biological diversity.

See also solution 15.1.7.

Species grown in aquaculture (fish ponds) can escape into the natural environment and rapidly expand in distribution, out-competing local species, and also distributing dangerous parasites and diseases.

In Latvia, there are 8 known species which have been introduced by intent or accidentally into natural waters.

15.3. Prevent entry of foreign fish species or other organisms into the natural environment (see 1.6.).

Solutions 1.6.1.,1.6.3..

15.3.1. Control and combat the already widespread aggressive species.

15.3.2. Assess the safety of the utilised technologies for fish growing in existing aquacultures, and the impact of possible release of the grown foreign species in natural ecosystems.

15.3.3. Exclude the introduction of genetically modified aquatic organisms in nature.

The genetic diversity of fish populations can be affected by long-term selective fishing, overfishing of populations, and by long-term selective artificial reproduction. Natural fish populations may become extinct or disrupted by damming of rivers, destruction of spawning locations, and water pollution. All of the above factors decrease the ability of individuals and populations to adapt and survive in a changing environment.

15.4. Protect the genetic diversity of fish populations and individuals.

15.4.1. In co-operation with other countries of the Baltic Sea region, develop and implement a long-term international action plan on protection of natural populations of Baltic Sea salmon.

15.4.2. Ensure survey and study of natural populations of migratory fish.

15.4.3. Identify specific protection and monitoring regimes for the most important spawn rivers of migratory fish.

15.4.4. Decrease overgrowth of rivers, and renew spawning locations by use of artificial spawning substrates.

15.4.5. Restrict fishing and hydro-technical construction in river estuaries and harbours during migration of fish adults and young.

15.4.6. Decrease impact of fishing on spawning populations of migratory fish.

15.4.7. When conducting natural reproduction of fish, regard the young to be members of specific river basin populations.

15.4.8. Decrease the impact of selection in artificial regenerated fish populations.

16. Game animal management.

Hunting has traditionally been a popular form of recreation. Historically, hunting and hunting management have had several negative effects on biological diversity. Interest conflicts can arise between hunting area managers and other interest groups concerning losses of game animals or damage caused by the game animals themselves.

Game animal resource management in Latvia is hindered by the lack of a unified strategy on development principles of game animal management.

When hunters have interests in hunting of a certain animal species, subjective assessment of the population health is more likely, and can result in erroneous estimates of hunted animal numbers. Game animal managers conduct activities to increase game animal numbers and reduce their natural predator numbers. In many cases, game animal management acts against natural evolutionary processes.

Hunters, as a major interest group, could be actively involved in solving several nature protection problems. In recent years, beaver numbers have increased dramatically due to decreased hunting pressure. The lifestyle of beavers has caused extensive damage in forestry and agriculture. Beavers have frequently also destroyed rare habitats, which brings them in conflict with interests of nature protection. Many potential habitats of waterfowl and waders have become overgrown, and the renewal of these territories is in the interests of hunters. Hunters can also become involved in the regulation of introduced carnivore populations.

16.1. Promote development of sustainable game animal management.

Solutions 16.1.1. - 16.1.5. are associated with the remaining problems of game animal management.

16.1.1. Prepare a national programme on use of game animal resources and territories.

16.1.2. Include development of game animal management in physical planning.

16.1.3. Include hunting and associated activities (hunting and hunting tourism services, hunting trophy production, photographic hunting) in development plans for tourism and rural development.

16.1.4. Create a council of experts for consultation in solving problems related to hunting.

16.1.5. Promote education of hunters in maintenance of biological diversity.

16.1.6. Manage populations of game animals at their typical ecological densities.

16.1.7. Define hunting management territories with specified intensity of hunting, developing criteria for identification of the hunting territories and their management.

16.1.8. Optimise size of hunting management territories, matching their size with that of the required land area to support healthy populations of large game animals.

16.1.9. Develop and implement a unified monitoring programme for game animals.

To solution 16.1.6, the following solutions can be added:

16.1.10. Promote beaver hunting.

16.1.11. Develop research-based recommendations for activities to regenerate waterfowl and wader nesting habitats.

16.1.12. Promote and organise hunting of waterfowl and waders.

See also solutions 4.2.2., 4.2.3..

Inadequate hunting methods, such as non-selective methods and other methods which are illegal under international agreements, continue to affect hunting resources. Non-game animals and even animals which are illegal to hunt are frequently captured in inadequate, non-selective traps. Hunting is permitted during mating locations and periods, in night hours, and with the aid of attraction by electronic sound reproduction. There are also many cases when hunters fail to distinguish between hunted and non-hunted animals, particularly regarding waterfowl.

Poaching still exists, which not only reduces populations, but also prohibits accurate estimation of animal numbers, which further affects assessment of resources and their allowed exploitation. Wild dogs and cats around rural communities and farms significantly affect the populations of many hunted animals, including grouse, rabbit and roe deer.

16.2. Prevent use of inadequate hunting methods and illegal hunting.

16.2.1. Identify the allowed hunting tools and methods for each species.

16.2.2. Enforce compliance to hunting regulations.

16.2.3. Restrict hunting during mating periods, as identified in species protection plans.

16.2.4. Enforce compliance to regulations on keeping of dogs and cats.

16.2.5. Harmonise hunting legislation to meet European Union requirements.

See solutions 4.2.2., 11.1.2., 16.1.5..

Additional feeding and night hunting can result in behavioural changes in populations of game animals. Hunting is by itself an important factor affecting behaviour of some game animals.

16.3. Reduce impact of game animal hunting on animal behaviour.

The main solution is 16.1.7., which should involve the following additional solutions:

16.3.1. Identify areas where waterfowl hunting is to be prohibited.

16.3.2. Identify areas where additional feeding is to be restricted.

16.3.3. Allow night hunting only in areas with significant damage to agricultural crops and animals.

16.3.4. Use devices to scare off animals from territories where they can potentially cause damage.

Hunting is an important disturbance factor for non-game animals, especially during spring. Many species lack a restricted hunting season. Hunting is fully prohibited only in strict-regime reserves, and only in a very small area. Hunting significantly affects migrating bird species in their resting locations and along their migration paths, especially regarding birds which migrate large distances. Many of the suitable resting areas have been altered, degraded or fully destroyed.

16.4. Reduce the effect of hunting disturbance on non-hunted animals.

The solutions 16.1.7. and 16.2.5. should involve the following few additional solutions:

16.4.1. Designate territories closed for hunting,

16.4.2. Prohibit hunting in about 10% of habitats suitable for resting of birds.

16.4.3. Restrict hunting in spring.

16.4.4. Introduce hunting restrictions for every local species.

The earlier introduced racoon dog and American mink have considerably affected local species populations. In recent years, a few other foreign game animal species or subspecies have been introduced and this process is

becoming popular and not sufficiently controlled to guarantee that no new species will escape into the wild.

16.5. Prevent the impact of introduced species on natural populations.

16.5.1. Promote hunting of introduced predator species.

16.5.2. Monitor the population dynamics of introduced predator species.

16.5.3. Develop legislation on introduction of foreign species, and ensure compliance.

17. Tourism, recreation and sports.

Popular tourist sites are often associated with valuable nature territories, and therefore tourism has a significant effect on biological diversity. The flow of recreationers affects the natural structure of ecosystems and can even destroy sensitive habitats. Ecosystems having low species richness are particularly sensitive: dunes and beaches, and dry pine forests. Many lake and river shores are under heavy recreationer pressure. Caves and sedimentary rock exposures are popular tourism sites, where tourists trample the vegetation and traditionally carve their names in rock. A few dolomite exposures are used for sport and tourism events, which degrade the plant and animal communities.

Rare and decorative plant species disappear from tourism and recreation sites.

Building and improvement of tourism services can completely destroy important and rare habitats. Improperly planned tourism can cause loss of resources and the tourism sites which themselves have served to attract people to promote tourism.

17.1. Maintain valuable habitats, as well as ecological community structure and composition at popular tourism and recreation sites.

17.1.1. Promote "Latvia's tourism development plan" (*see Footnote 6*) and the incorporation of the principles and objectives of the Law On Tourism.

17.1.2. Maintain valuable habitats at current and potential tourism sites.

17.1.3. At popular tourism and recreation sites, determine allowed tourism flow intensity, and enforce that the maximum allowed intensity is not surpassed.

17.1.4. Adhere to requirements given in nature protection plans for protected nature territories.

17.1.5. Control distribution of tourism flow, funnelling it from particularly sensitive locations to sites where less damage is possible.

17.1.6. Promote development of specialised nature tourism.

17.1.7. Planning of tourism and sports areas must consider environmental impact, and concentrate on potential sites where less damage to nature is expected.

17.1.8. Planning of sport activities, tourism and other events in areas where minimal damage can be incurred on nature.

17.1.9. Promote co-operation between tourism workers, environmental specialists and municipal governmental institutions on development of sustainable tourism at important natural sites.

17.1.10. Develop and promote a collection of local agricultural breeds as a site for tourism.

17.1.11. Develop a certification process for specially educated nature guides.

17.1.12. Determine the environmental tolerance of tourist sites, to be used to designate allowed tourism intensities.

See also solution 8.1.2.

Intensive tourism flow, intensively attended activities and specific forms of recreation are significant disturbance factors for animal species. The largest damage can be expected during periods of reproduction and feeding of young. Typical activities which can disturb animals are orienteering competitions, automobile sports, especially auto rally competitions, as well as small motorised boat recreation, water motorcycles and water-skiing. The water activities can destroy spawning sites, fish roe and young, and rare plant communities.

17.2. Decrease disturbance pressure to animal species, particularly during reproductive periods.

Solutions in 17.1. (17.1.1. - 17.1.12.)

18. Building construction

Building construction attracts about half of State investments and forms the basis for all economic sectors. Construction processes have significant and diverse impact on the environment. In the development of the long-term building construction development programme, the objectives of construction material production are being included.

All construction work destroys the existing habitats at the construction sites where the construction objects are built. Later, artificial communities (parks, gardens) are created or the area is allowed to randomly colonise with species of anthropogenic communities. Damage to biological diversity is particularly extensive when rare habitats or locations of rare species are destroyed. Construction sites are locations where foreign species, weeds and escaped plants from gardens can multiply, and they form a habitat for specific animal species.

18.1. Prevent destruction of habitats and locations of rare species during construction.

18.1.1. In physical planning, conduct detailed study of biological diversity and environmental impact assessment of the potential construction locations.

18.1.2. In physical plans (including town and county plans), identify the important territories for biological diversity, and the restrictions imposed for construction.

18.1.3. Ensure that recommendations given by environmental protection institutions are respected when building permits are granted in territories with restrictions for building.

18.1.4. When planning building on open lots or in areas without physical plans, assess biological diversity and respect recommendations of environmental protection institutions when assessing building permit proposals.

18.1.5. Improve education in environmental protection for architects and building engineers.

8.1.6. Prohibit building in protected nature reserves and State reserves, as well as within protections belts on dunes or around water bodies.

18.1.7. Prohibit building on locations of protected plants and animals.

18.1.8. Enforce compliance to the current restrictions on building.

Important habitats can be destroyed by mining of construction materials. Solutions associated with these problems are given in the Chapter "Mining of Valuable Minerals".

Large populations on construction sites can affect and expand into the surrounding natural communities. Construction often affects the natural water regime in a large areas, which can cause a rapid and major change in communities. Prognosis of changes in habitats is required by environmental impact assessment.

18.2. Minimise alterations in natural plant and animal communities around construction sites.

Solutions given in 18.1.

19. Energy production.

Approximately 19 % of the total energy production in Latvia is harnessed from wood combustion and water. Use of local resources for energy production has increased, and hence also the use of wood and water resources. The operation of many small hydroelectrical power stations has been renewed, and new stations are being planned. Significant land areas are utilised for energy production infrastructure and electrical power right-of ways.

Significant solutions are given in Chapter 18.

Recently, interest has increased in the use of local fuels in heating of individual homes and in boiler houses. Also, attention has been raised to the potential use of

wind resources and wind generators. These trends have been stimulated by electricity tariff incentives, setting tariffs higher for the smaller alternative energy producers.

19.1. Support the use of local energy resources.

19.1.1. In municipal planning of energy resource budgets, consider restrictions on forest and peat use in specific territories.

19.1.2. Make full use of wood production waste.

19.1.3. Promote planting of forests for energy, particularly on abandoned ploughed fields.

19.1.4. Conduct environmental impact assessment in regions supporting valuable wind resources, to determine territories where installation of wind generation can begin without restrictions, regarding effect on seasonal migrations of birds and bats.

19.1.5. Assess the efficiency of economic tools, and ensure that they do contradict State policy in other sectors (for example, fishery) and nature protection.

See also solution 23.2.1.

The rural landscape in Latvia is affected by electrical power lines, particularly those of low voltage. Trees are cut where right-of-ways have been planned through forest, separating forest stands. Right-of-ways are colonised by weeds, foreign species, and plants adapted to growth in human-formed habitats.

The larger proportion of common storks nest on electrical power line poles. Sometimes birds have been reported to be killed by the electrical power lines, but survey data is lacking.

19.2. Decrease impact of electrical power lines on biological diversity and landscape.

19.2.1. When conducting impact assessment of electrical networks, consider impact on biological diversity.

19.2.2. In planning and design of electrical power networks, utilise the least possible impact principle, combining various linear communication and forest right-of-ways.

19.2.3. Avoid as much as possible planning of electrical network lines through protected nature territories and the coastal dune protection belt.

19.3. Decrease common stork mortality due to electrical power line poles.

19.3.1. Promote instalment of nest platforms on alternative raised objects and electrical power line poles.

19.3.3. Regularly survey common stork and other large bird mortality due to electrical power lines.

Construction of large hydro-electrical power dams on the Daugava River has destroyed migration routes and spawning locations for various fish species, and has changed the relative abundances of fish populations. The P?avi?a hydro-electrical power dam flooded the only locations for three flowering plant species in Latvia, and considerable reduced the distributions of six very rare flowering plants and the fat dormouse. Similarly, several algae, moss and invertebrate species were affected.

19.4. Prevent destruction of habitats and fish migration routes due to construction of hydro-electrical power dams.

19.4.1. Conduct assessment of all aspects of biological diversity in reservoirs to be flooded by hydro-electrical power dams before granting construction permission.

19.4.2. During assessment of benefits and losses due to hydro-electrical power dam construction, take into account not only economic profit from sale of electrical power, but also consider maintenance of fish resources, changes in water table level, and maintenance of biological resources.

19.4.3. Re-establish and construct fish paths.

19.4.4. Ensure that the producer of electrical power compensates for ar tificial fish reproduction in locations where it is not possible to conserve valuable fish spawning migration routes.

20. Transport.

In recent years in Latvia, automobile transport intensity has considerably increased, wide-spread road reconstruction work has been planned, and construction of highways meeting international standard has begun.

Transport arteries and rail-lines promote the dispersal of foreign plant species. On rail and road right-of ways, unique warmth- and dryness-loving meadow and forest edge plant communities are frequently formed on slopes, moderately moist meadows on level ground, and wet meadow and bank communities occur in depressions. These communities frequently include also rare and protected species, and in many regions the right-of-ways are the only habitats for these species.

Regular monitoring of the effect of transport on biological diversity had not been conducted in Latvia. In small territories, short-term surveys of road-kill animals have been conducted, but they do not allow to make a general conclusion on the effect of transport on nature.

Animals are often killed by road vehicles. Bird road-kills increase in number during nesting. Bird mortality due to transport is higher in open landscapes and along winding road stretches. Young birds are more frequently killed. Hedgehog and amphibian losses on roads are frequently recorded. Larger animals may be killed on

rail-lines, and common stork on electrical power lines. Traffic accidents involving elk and roe deer are very dangerous for car drivers, and also the animal victims.

20.1. Decrease wild animal mortality on roads.

20.1.1. Conduct regular survey of road-kills along intensely-used traffic stretches, as well as in locations important for biological diversity.

20.1.2. Map migration paths and regularly monitor locations where they cross intensively used roads and rail-lines.

20.1.3. Assess the need to construct fencing and animal over- or under-passes on intensively used roads at sites of frequent road-kills and in important nature areas.

20.1.4. Erect warning signs to warn drivers of dangerous crossings and seasons.

20.1.5. Inform drivers of road-kill surveys and involve them in data collection.

Construction of roads and pipeline corridors destroys many natural habitats. Solutions given in Chapter 18 will help to prevent loss of rare habitats and locations of rare and protected species.

20.2. Prevent destruction of rare habitats during building of roads and pipeline corridors.

20.2.1. Conduct assessment of all aspects of biological diversity in planning of road and pipeline corridors.

In open areas, the cutting of shrubs and high vegetation in roadside ditches often leads to loss of the only refuges for many bird and insect species. This is particularly important on the Zemgale Plain, and in specific locations in the Coastal Lowland. Hedgerows are not planted, and where they occur, they are often not tended, or they are destroyed by road widening or by burning of old grass. During road reconstruction or for reasons of road safety, old tree rows along roads are often cut.

20.3. Along roads and road corridors, promote maintenance of habitats and creation of new habitats which are important for biological diversity.

20.3.1. Maintain shrub clumps and uncut roadside stretches in open landscapes.

20.3.2. Plant hedgerows along roads and rail-lines.

20.3.3. Renew and plant new tree rows and groups of trees along roads.

Harbours in Latvia are rapidly developing. The Small Harbour Development Programme has been created. Along the Latvian coast, harbours have been built usually in river estuaries. Ship travel and water pollution in harbours affects migrating fish. Harbour dredging and construction of protection jetties alters sediment flow along the coast. Sediments dredged from harbours are usually dumped at sea. The

above activities affect fish spawn locations. Changes in sediment flow create shore erosion in locations of previous sediment accumulation. As harbours develop, more and more new territories are required, and expansion often occurs at the expense of protected territories.

20.4. Promote sustainable harbour management, which does not affect the interests of other economic sectors and of environmental protection.

20.4.1. In harbour planning, conduct environmental impact assessment of all aspects.

20.4.2. In cases when harbour expansion is within the interests and needs of the entire society, compensatory activities are required for maintenance of natural value.

20.4.3. Regulate dumping of dredged sediments at sea, to prevent their effect on spawn areas and locations of fish young concentration.

20.4.4. Define restrictions for ship travel during the spawning period, as required in fish species protection plans.

20.4.5. Monitor water quality in harbours and ensure waste collection and bilge water treatment in port.

21. Urban environment and city management.

Almost half of Latvia's population lives in the six largest cities. The human-formed environment serves as a refuge for many species adapted to this habitat. Often, the artificially created habitats support also local wild species. Good conditions for survival of wild species can be ensured by maintenance of suitable microhabitats or by the creation of specially tended park territories. Large city territories are covered by semi-natural and natural ecosystems, which in Latvia are mostly pine forests, but city districts may include also dunes, wetlands and meadows. The remaining coastal meadows areas are almost fully within city boundaries. Many cities and urban areas are located by rivers and lakes. City territories and the surrounding ecosystems are impacted by increased levels of pollution and human visitation, in comparison with similar rural areas.

Regular grass cutting, removal of leaf litter, and removal of hollowed trees and dead branches decreases the potential habitats for species in cities. Such tended ecosystems contain low numbers of plant and animal species, and hence the food webs are simplified. The maintenance of biological diversity is relatively easy in large parks and in planning of new parks. However, attention should also be given to recommendations regarding improvement of biological diversity in public gardens of city centres by appropriate reconstruction or tending.

21.1. Improve habitats and microhabitats for wild species in parks and public gardens.

21.1.1. Maintain less-tended areas of large city parks: less frequently cut lawns with flowers, no removal of leaf litter.

21.1.2. Expand the variety of city green areas.

21.1.3. Plant moisture-loving herbs and shrubs along water shores.

21.1.4. In city forests and dendrological parks, as much as possible maintain hollowed trees and install bird houses.

The main cause of death of grand, old trees in cities is root damage by soil work, construction, or burning of stumps.

21.2. Enforce protection of grand trees in cities.

21.2.1. Consider grand tree protection zones in planning of construction.

21.2.2. Install information posts by grand trees, indicating their protection regulations.

The city environmental pressure on natural habitats is very high. City habitats are often polluted with household and industrial waste. Stress caused by recreation can exceed tolerance levels, changing habitats and decreasing their recreational value. Meadows no longer used for hay collection or pasture are rapidly overgrowing.

21.3. Abate undesirable changes in natural habitats of city territories.

21.3.1. Particularly consider natural ecosystem components in spatial and physical planning.

21.3.2. Maximally maintain natural habitats of city territories, to form a protected ecological network.

21.3.3. Develop nature protection plans for natural ecosystem complexes.

21.3.4. Prevent fragmentation of forest stands.

21.3.5. Promote use of natural habitats in environmental education.

21.3.6. Ensure use of meadows for hay collection or pasture.

21.3.7. Plan and regulate recreationer flows, and plan services in the most popular city forests and treed parks.

21.3.8. Develop and implement waste management systems in cities, and prevent illegal waste dumping

21.3.9. Plan and regulate intensity of recreationer flows, forming zones with variable intensity along river and lake shores, as well as on dunes and beaches; plan services in the most intensively used sections.

21.3.10. Decrease pollution loads to rivers and lakes.

21.3.11. Organise the removal of abandoned buildings with no value.

21.3.12. Promote the use of local tree and herb species for strengthening of dunes and territory landscaping.

Plants with colourful flowers are intensively collected in cities. In recent years, increasing numbers of wild species have appeared in the market and in stores, including evergreens, and also elements of floral displays (tree and shrub branches, mosses and lichens).

21.4. Protect resources of decorative and medicinal plants in natural habitats of city territories.

21.4.1. Restrict and control trade with wild species.

21.4.2. Enforce compliance to existing legislation regarding protection of species.

See also solution 11.4.8.

City and surrounding habitats are locations for intensive multiplication of foreign species.

21.5. Control spread of foreign species in cities.

21.5.1. Decrease the coverage of weedy areas: prevent illegal waste dumping and clean up the existing dump sites, plan landscaping of recent construction sites.

22. Mining of valuable minerals and structural materials.

Mining of gravel, sand, clay, limestone, dolomite and gypsum has decreased by 5(10 times in recent years, but a recovery in mining intensity is expected, as building raw materials are the basis for building construction. There are about 2500 quarries, covering about 0.1 % of the total area in Latvia. The largest impact from mining on biological diversity is by quarry development in territories with high numbers of rare habitats and species.

Important gravel deposits are found in ash tree-covered ridges, the southern slopes of which are the main or only natural biotopes for several plant and insect species. Such biotopes have been commonly destroyed by quarry mining. Calcifile plant communities containing several rarities of our flora, as well as the associated rare insect species, can be found over shallow limestone or dolomite bedrock. Quarries degrade the landscape, and they become dangerous for humans and domesticated animals if left abandoned. Quarry mining usually affects subsurface water and drinking water resources in a large area.

22.1. Prevent destruction of rare habitats and locations of rare species by development of new quarries or expansion of existing quarries.

22.1.1. Before quarry expansion or development, conduct environmental impact assessment including evaluation of biological diversity.

22.1.2. In physical plans, define the recultivation method for each quarry (quarry lake, forest, agricultural land, or other).

22.1.3. Ensure that recultivation projects required by physical plans are developed, and that current recultivation projects are improved and carried out.

22.1.4. Survey abandoned quarries to assess the need for their recultivation.

22.1.5. Study ecosystem development after recultivation and develop recommendations for improvement of recultivation methods.

22.1.6. Study population development of rare and threatened species in quarries and their population dynamics after recultivation.

22.1.7. In exceptional cases when mining of valuable minerals is allowed in areas important for biological diversity, plan compensation activities for maintenance of natural values.

23. Peat mining.

Peat deposits cover about 10.4 % of the area of Latvia. These deposits underlay not only bogs, but also many wet forests. The mined peat area covers 0.4 % of the country. Currently, about 25 % of the peat deposits prepared for mining are being utilised, and major development of new fields is not expected.

Peat resources are renewable, and the current increment now exceeds the harvested amount. In 1997, 632,000 tons of peat were extracted, which had fallen by about 5 times since the end of the 1980s. The extraction of poorly decomposed peat of raised bogs for plant substrate has significantly decreased, but export of this product has increased. After the closing of the Riga TEC I thermal electrical power station, the use of peat in energy has decreased. It is planned that the maximal peat harvest volume could reach about 1,000,000 tons annually.

Newly formed habitats in abandoned peat harvest fields are important bird nesting and resting locations.

The hydrological regime is significantly altered in peat harvest fields. Such changes affect plants and animals in a large surrounding area. Moisture-loving species disappear, including many species of the surrounding forests (rare grasses, sedges, orchids, mosses and invertebrates). Drained habitats support mostly common species, forming uncharacteristic communities for the environmental conditions.

23.1. Reduce impact on plant and animal communities in territories surrounding peat harvest fields.

23.1.1. Study the effect of changes in hydrological regime of peat harvest fields on surrounding ecosystems.

23.1.2. After termination of peat harvest in a bog or bog part, develop recommendations for modification of hydrological regime to improve renewal of maintenance of bog and surrounding territory wetland ecosystems.

Development of new peat harvest fields affects not only a large surrounding area, but also directly destroys the existing valuable habitats and locations for rare species.

23.2. Prevent destruction of rare bog and forest habitats due to peat extraction.

23.2.1. In the development or improvement of peat extraction and recultivation projects, conduct environmental impact assessment, including evaluation of biological diversity.

23.2.2. Continue peat extraction in existing peat harvest fields, and in fields prepared for extraction. Prohibit use of new bogs for peat extraction.

23.2.3. After termination of peat harvest in an entire bog or its part, ensure that the closure procedures regarding recultivation projects are carried out.

23.2.4. Study the natural regeneration of harvested bogs and develop recommendations for artificial renewal.

23.2.5. Define recultivation methods in physical plans for peat harvest fields.

24. Sapropel extraction.

Sapropel resources in lakes of Latvia are estimated at about 800 - 900 million m3 (170 - 190 million tons at moisture content 60 %). On average, a 1 - 2 mm thick layer of sapropel deposit is formed annually in lakes. Instalment of drainage networks on agricultural and forest land promotes accumulation of sapropel. At the end of the 1980s, more than 130,000 tons of sapropel were extracted annually. Sapropel is used for crop field fertilisation. Currently, its extraction has almost completely stopped since it is not economical, and an increase in use is not expected.

With continued organic matter sedimentation in lakes, the existing plant communities change. As the water depth decreases and decomposition of plant debris proceeds, oxygen concentrations become depleted, which in turn affects fish survival.

Extraction of sapropel slows overgrowth and returns lakes to a previous successional state. However, research on the impact of sapropel extraction on biological diversity is lacking.

24.1. Prevent unwanted effects on ecosystems in areas of sapropel extraction.

24.1.1. Develop an extraction and recultivation plan for each project, assessing impact on the environment, including evaluation of effects on biological diversity.

24.1.2. Conduct research on the impact of sapropel extraction on lake communities and their dynamics during the extraction period and subsequently.

24.1.3. Promote sapropel extraction in eutrophic lakes, improving their ecological condition.

25. National defence

Valuable nature territories are frequently located within army training bases. Since the army bases are off-limits, species not found in the surrounding area may be protected in many habitats which are sensitive to human-caused disturbances. However, in territories regularly crossed by army vehicles, species requiring a disturbance factor may multiply. Therefore, army territories have a role in protection of species and habitats.

25.1. Maintain biological diversity in army bases.

25.1.1. Conduct inventory of all aspects of nature diversity in army bases.

25.1.2. As much as possible, maintain natural habitats, forming an ecological network.

25.1.3. Develop a nature protection plan for army base territories.

25.1.4. Regularly survey the condition of ecosystems and rare species populations in army bases.

III. Environmental policy instruments and prerequisites of introduction of a strategy on biological diversity

Nature protection in Latvia has old traditions. The first protected area in Latvia was established in 1912, the Moricsala Reserve. During the first years of independence, the first legislation was passed on environmental protection. After World War II, the forest sector was responsible for nature protection, until the Environmental Protection Committee was formed, which later in 1993 became the Ministry of Environmental Protection and Regional Development (MEPRD). This Ministry is responsible for development and implementation of nature protection policy, and for development and harmonisation of legislation to be compatible with EU legislation. A stated in the Cabinet of Ministers Ruling No. 60 (10 February 1999) "On implementation of the 5 Jun 1992 Rio de Janeiro Convention on Biological Diversity", MEPRD co-ordinates the implementation of this Convention and supervises the development of the National Programme on Biological Diversity. The Ruling also stipulates the establishment of an inter-Ministry Commission headed by the State Secretary of the MEPRD.

26. Action plan

An Biological Diversity Action Plan has been developed for implementation of the National Programme On Biological Diversity, which is a component of the Programme (Appendix 1). The economical and social consequences of the programme have also been evaluated (Appendix 2). Presently, the Action Plan has been developed only for Part I (Nature Protection) and Part III (Instruments of environmental policy and prerequisites for implementation of the National Programme on Biological Diversity).

The Action Plan was developed by requesting information on questionnaires, and subsequent summary of the data in a database (which will be available in Internet). Information requesting in the questionnaire included: Part and goal, relation to which objective, responsible institution and possible executor, required finances, human resources and time schedule, possible financing sources, international commitments, and relation to integration in the EU.

As stated in Cabinet of Ministers Regulations, actions will be incorporated into the National Programme On Biological Diversity, which are necessary to achieve the identified objectives and solutions. The Action Plan will identify the responsible institution and possible executor, as well as the required finances and the desirable completion times.

To rationally plan resources and work, action priorities are being identified. Action priorities will be determined according to the following criteria:

- impact on public views,
- long-term impact on local employment and business development,
- effect on raising public awareness,
- improvement of skills of local residents,
- effect on co-operation between municipal governments,
- promotion of alternative regional development,
- relation to international commitments of Latvia (including integration into the EU),
- required amount of resources (including finances),
- future removal of required expenditures,
- prerequisite for implementation of another action.

Each year a report on implementation of the Action Plan is prepared and presented to the Cabinet of Ministers. The Strategy Section of the National Programme should be reviewed every three years, and if required, amendments should be presented to the Cabinet of Ministers for ratification.

26.1. Ensure implementation and control of the efficiency of the National Programme on Biological Diversity

26.2. Promote development of sector Action Plans and inclusion into the National Programme on Biological Diversity

27. Legal system

Since 1992, the legal system in Latvia has undergone rapid development. The past legislation (laws, decisions, regulations and instructions) had to be changed or re-accepted. The harmonisation of the legal system was closely associated with the 1995 agreement with the European Union. Currently, all State institutions are participating in the EU approximation process of legislation. The legal system requires further development: several Latvian SSR Council of Ministers legislative acts must be replaced to successfully transpose ES legislation, and new legislative acts are required. Many laws and Cabinet of Ministers regulations mentioned previously require modification. The following legislative act regulate nature protection:

- Law "On Environmental Protection"
- Law "On Specially Protected Nature Territories"
- Law "On the Northern Vidzeme Biosphere Reserve" and associated Cabinet of Ministers regulations
- Law "On the ?emeri National Park" and associated Cabinet of Ministers regulations
- Cabinet of Ministers regulations "On the Engure Lake Nature Park"
- Cabinet of Ministers regulations "On Protected Landscape areas"
- Cabinet of Ministers regulations "On Nature Parks"
- Cabinet of Ministers regulations "On Restricted Nature Territories"
- Latvian SSR Council of Ministers Ruling No. 25 "Regulations on Particularly Protected Nature Objects in the Territory of the Latvian SSR"

Therefore, it is necessary to:

27.1. Keep the existing Latvian SSR Regulation sections with the respective normative acts in force;

27.2. Harmonise the nature protection legal system.

28. Institutions

The environmental protection institutions are mainly subordinate within the Ministry of Environmental Protection and Regional Development structure. Most of them are directly or indirectly associated with nature protection. According to the Law on Municipalities, municipal governmental institutions are responsible for nature protection within their administrative borders. Protected territory administrations are structural organisations formed to manage or supervise protected nature territories and to involve residents in nature protection.

In view of the increasing need and EU demand for development of the legal system, the institutional system for nature protection must be developed. It is necessary to separate the functions and responsibility of the State Forest Service and the institution "Latvian State Forests" in protected territories, and to regulate the legal supervision of State land.

A successful National programme on Biological Diversity will require:

28.1. Creation of Department of Nature Protection and a Nature Protection Board to co-ordinate implementation of nature protection actions;

28.2. Create a network of regional nature protection institutions utilising the existing administrations of the particularly protected territories;

28.3. Increase responsibility of municipal governmental institutions in implementation of nature protection actions. Strengthen the ability of municipal governmental institutions to deal with nature protection problems.

29. Control

To ensure compliance with regulations in legislative acts, an effective control system is required. A function of regional environmental boards (especially protected nature territory administrations) must be control of nature protection. Compliance with legislative acts is enforced also by the State Forest Service, municipal governmental institutions, the police force, customs, and also public environmental protection inspectors. To involve the public, in the future, a community self-control function and increase in public awareness in a democratic society must be promoted.

Therefore:

29.1. Develop a unified environmental inspection system to ensure successful control of environmental protection legislative acts;

29.2. Increase qualifications of nature protectors;

29.3. Strengthen internal audit of the MEPRD;

29.4. Promote public awareness in a democratic society and public self-control functions.

30. Economic instruments for environmental protection

Economic instruments, for example, taxes, subsidies, credits, State guaranteed credits, administrative fees and fines, directly or indirectly play an important role promotion of environmental protection. Presently, the most important economic instrument is the Natural Resource Tax, which is levied for pollution emissions and use of natural resources. While the direct effect of the Natural Resource Tax on nature protection is small, it forms an important source of finances for implementation of actions.

The Natural Resource Tax contributions are divided between municipal finances for environmental protection (60%) and the Latvian Environmental Fund, from which funding is offered for environmental and nature protection under conditions specified in the Fund regulations and Council guidelines.

The Environmental Protection Fund also acquires payments from fines for environmental pollution, and from compensation for damage ensued to protected nature territories and to protected plants and animals.

Within the "Latvian Regional Development Plan for EU Pre-Entry Actions in Agriculture and Rural Development (2000-2006)", subsidies are expected for biological diversity and maintenance of the rural landscape. Presently, various projects are being developed in conjunction with the EU Regulation EEC 2078/92 "On agricultural production methods compatible with the requirements of the environment and the maintenance of the countryside", to prepare sample contracts, survey farms, and to begin discussion with land owners.

Economic interests are frequently in conflict with nature protection. To decrease social lack of acceptance of nature protection, a mechanism for compensation is required. One-time compensation may be offered for losses caused by protected animals, or for restricted use of land in protected territories, for example, regarding forest resource use. However, the effective use of economic instruments requires to:

30.1. Develop a legal and finance mechanism for compensation;

30.2. Determine compensation amounts to be offered for damage to species and habitats;

30.3. Promote implementation of land tax incentives and subsidies.

30.4. Develop model territories for protection of biological diversity on agricultural land, to aid farmers in obtaining subsidies.

31. Education and public information

The goals of maintenance of biological diversity can often be achieved by education and public information, as the public will actively respond to nature protection activities. Sociological surveys show that the society of Latvia highly regards the importance of nature protection activities. Presentation of well presented and timely information are activities which can used to avoid misinterpretation and negative reactions.

31.1. Regularly plan information programmes or directed information campaigns for the mass media;

31.2. Integrate the biological diversity theme into primary and secondary education, and regularly include school education activities for different ages;

31.3. Include courses on biological diversity in professional education programmes and higher education, particularly in fields directly or indirectly associated with natural resource use;

31.4. Produce and distribute simple booklets on current nature protection issues;

31.5. Produce and distribute informative displays at important nature sites and protected territories, as they aid in changing public awareness and action, helping to protect nature values;

31.6. Educate and inform interest groups, using also the newest mass media instruments.

32. Physical and spatial planning

Protection of biological diversity can be largely aided by proper planning of territorial land use. The importance of territories for biological diversity (landscapes, species and habitats) is an important part of planning of development. All territories important for biological diversity must be indicated in physical plans. Economic infrastructure development and building in such territories should be prohibited. When zoning a territory for recreation or tourism, the environmental tolerance of the territory should be considered. It is possible to maintain important territories for biological diversity by rational spatial planning, without impeding development.

A National development plan is presently being developed. This plan will create the basis for maintenance of natural diversity, and it is important that this fundamental information becomes available to municipal governmental institutions.

To ensure that the needs of nature protection are reflected in physical and spatial plans, it is necessary to develop criteria and methods for their integration into all levels of the planning, including also incorporation of all nature protection plans and species protection programmes:

32.1. Develop criteria and methods for integration of protection of biological diversity into all levels of physical and spatial planning;

32.2. Ensure that protected nature territories and species protection plans are integrated into physical and spatial plans;

32.3. Distribute to municipal governmental institutions information on methods to be used for protection of biological diversity;

32.4. Promote distribution to municipal governmental institutions of information regarding the fundamental issues of nature protection reflected in the National development plan.

33. Environmental impact assessment

The goal of the Law on Environmental Impact Assessment, accepted on 13 November 1998, is to prevent or minimise environmental the impact incurred by individuals or juridical persons.

The Environmental Impact Assessment (EIA) process applies to expected activities (such as, introduction, addition or modification of equipment and technologies; building, physical plan development; extraction or use of natural resources; and others) which can potentially affect the environment. During the EIA process, the potential impacts of activities on the environment are assessed, and means to prevent or minimise the impacts are recommended. EIA includes the assessment of impacts on flora, fauna, biological diversity, landscape, natural heritage, and other interrelated aspects. Unified criteria have been developed for EIAs to identify whether assessment

is required for activities not specifically listed in the Annex of the Law. In this way, activities such as cultivation of genetically modified organisms and large aquaculture projects are subject to EIA. Considered factors in EIA include:

- past land use,
- relative amounts, quality and regeneration potential of the existing natural resources
- tolerance of the existing environment, particularly considering wetlands, coastal belts, uplands and forested regions, and protected nature territories,
- territories in which the pollution levels are higher than environmental quality criteria and standards,
- population density in the territory,
- historically, archeologically or culturally/historically important landscapes, sites, or monuments

EIA clearly has a role in maintenance of biological diversity, but the successful application of EIA requires to:

33.1. Develop specific criteria for assessing the impact of various activities on biological diversity, and define the procedure of application of the criteria.

33.2. In nature protection legislation, include a requirement for EIA to be conducted in cases of activities which can negatively affect particularly protected nature territories or habitats of protected species.

33.3. Develop guidelines for assessment of impact on biological diversity.

33.4. Develop recommendations for compensation activities to be conducted regarding each expected activity.

33.5. Ensure public participation in the EIA process, as well as ensure accessibility to EIA reports.

34. Particularly protected nature territories

As mentioned previously, the first protected nature territory in Latvia was founded in1912. However, the system of protected nature territories began to form only after independence. In the first years, the protected territories were called natural monuments. The first list of protected territories was created in 1923. In 1939, the protected territories covered 40,000 ha. The first list of protected territories after World War II was accepted in 1952. However, a system of protected territories was in fact only created in 1977, which was expanded in 1987 (10 April) by the Latvian SSR Council of Ministers Ruling No. 25 "Regulations on Particularly Protected Nature Objects in the Territory of the Latvian SSR". Currently, in Latvia there are 246 particularly protected territories with a coverage of 8.7% of the total area. The Northern Vidzeme Biosphere Reserve, covering 475,326 ha, is a special case, forming a region to promote sustainable development and conservation of natural and cultural-historical values.

The creation and management of protected territories encompasses development of legislative acts, creation and maintenance of institutions, and provision of management activities and control. They are important in nature and environmental monitoring, scientific research, and in education of society. Protected territory administrations are important for institutions in environmental protection and elements of information systems, forming one of the significant prerequisites of implementation of the National Programme on Biological Diversity.

Territory administrations have been developed in the largest and internationally most important particularly protected nature territories (Sl?tere State Reserve, Tei?i State Reserve, Northern Vidzeme Biosphere Reserve, ?emeri National Park, Engure Lake Nature Park, Gauja National Park), to ensure management and enforcement of the protection regime, and to promote the use of economical, educational and mass media instruments in these territories.

Development of the system of protected nature areas in Latvia requires:

34.1. Improvement of the network of particularly protected nature territories. Develop criteria for determination of the territory boundaries.

34.2 Develop nature protection plans and specific regulations for protection and use, in order of priority. Ensure their implementation and control.

34.3. Consider possibilities to include more territories in lists of internationally important locations (for example, the list of Wetlands of International Importance).

34.4. Develop a concept of an ecological network, integrating into the EMERALD and NATURA 2000 protected territory networks.

34.5. Develop a section on Nationally important nature territories in the National Plan.

34.6. Improve the administrative system and ensure the required resources.

34.7. Gradually procure land with Particularly protected nature territories as State land.

35. Monitoring and research

Monitoring and research are prerequisites of environmental protection, including nature protection, and of development and implementation of policy.

Observation of processes in nature, the accumulated research data, and specific studies of species or ecosystems, can be used to justify nature protection activities, to develop and improve protection methods, and to focus the attention of State institutions on problems in the existing legislative acts and the associated economic instruments. If sufficient information is lacking on the natural processes, it is not possible to ensure optimal protection and management of species and ecosystems.

Review of scientific literature and new research can allow to assess all aspects of biological diversity, and to serve as the basis of nature education and popularisation.

Research on various aspects of biological diversity is conducted in departments of various universities and research institutes. To achieve the strategy objectives and solutions, science-related requirements are:

35.1. Develop a science council on biological diversity,

35.2. Develop a long-term programme for research in the field of biological diversity, strengthening the scientific potential of research institutions, as well as ensuring the financial and technological base of the research institutions.

Biological research requirements are:

35. 3. Promote the study of all systematical organism groups.

35. 4. Promote the study of living natural resources, there distribution and natural regeneration.

Long-term monitoring programmes have been developed for various species and habitats, which are conducted by different institutions, mainly by scientific institutes and non-governmental organisations, as well as by a few specialists working in protected nature territory. During the past 10 years, the amount of information collected in monitoring programmes has substantially declined. The monitoring methods utilised are very diverse and difficult to compare, the greater part of the collected data has not been analysed and reviewed, and is not available when developing nature protection plans or methods. The improvement of monitoring of biological diversity requires:

35.5. Development of a unified system of monitoring of biological diversity,

35.6. Improve monitoring of threatened species and communities, especially in relation to various management and protection methods,

35.7. Identify biological diversity indicators and develop their monitoring system.

To co-ordinate research and to review and analyse the research results, it is necessary to improve the system of recording, summary and analysis of information. Such a system can serve as an aid when improving or co-ordinating nature protection activities, or supplementing the used methods. The Convention On Biological Diversity defines the need for a biological diversity information processing centre. The technological su pport for storage of scientific information has improved substantially, and new data banks are being rapidly developed in research institutes and universities. However, in the last ten years, the number of published scientific monographs and papers in natural history has declined, and a scientific journal devoted to various fields of biological diversity or its protection is lacking.

35.8. Review information on the existing data banks and develop a unified system for exchange of information of biological diversity, which is related to international data bank networks,

35.9. Ensure accessibility of the basic information for scientific and nature protection goals,

35.10. Develop a unified system for recording of commercial species resources and their regeneration,

35.11. Establish a Biological Diversity Information Centre,

35.12. Support publishing of scientific literature on various aspects of biological diversity, including publishing of a scientific periodical.

36. International co-operation.

After the renewal of the independence of Latvia, co-operation also renewed with other nations and international organisations, for example, with the United Nations. During the 50 years when Latvia was not allowed self-determination, the environmental movement had developed globally, and numerous international organisations had formed and important international agreements had been signed. In a short time, Latvia had to regain the lost international connections and co-operation.

Presently, Latvia has joined the following international conventions: "On Biological Diversity", "On Wetlands of Internationally Importance, Particularly as Waterbird Habitat", "On International Trade in Endangered Species of Wild Fauna and Flora, and "On Conservation of Migratory Species of Wild Animals".

On 10 February 1995 Latvia became a member nation of the European Council and became involved in the work of this organisation. The Convention "On Conservation of European Wildlife and Natural Habitats" was ratified. Becoming involved in the process "Environment for Europe", Latvia has simultaneously become involved in the integration of the Pan-European Biological and Landscape Diversity Strategy", co-ordinated by the United Nations Environment Programme and the European Council.

The European treaty signed on 31 August 1995 between the European Union participating nations and Latvia was very important. After signing this document, work began on harmonisation of the legislation of Latvia with the requirements of the EU legislation, and integration of the EU legislation.

The Ministry of Environmental Protection and Regional Development has actively co-operated with neighbouring nations. Co-operation agreements have been signed with environmental protection institutions of Denmark, Sweden, Germany, Poland, Finland, Estonia, and Belarus.

Particularly important has been the co-operation with the Baltic countries, through the work of the Environmental Protection Committee of the Baltic Council of Ministers. A joint project has been developed, called the Baltic Environmental Forum, which aims to ensure co-operation and to realise important projects in all three nations

related to integration into the EU. In 1995, a three-way treaty was signed "On Co-operation in the Field of Environmental Protection", and in 1999 with Estonia "On Trans-border on Environmental Assessment Procedure". A treaty with Lithuania has been prepared for signing "On Co-operation in Environmental Protection".

36.1. Ensure harmonisation of National legislation with EU legislative acts;

36.2. Enter inter-nation treaties on co-operation regarding trans-border protection of protected nature territories and migratory species;

36.3. Ensure the effective participation of Latvian official representatives and experts in the work of international organisations;

36.4. Ensure the qualitative preparation of reports to international commissions and the European Commission;

36.5. Promote co-operation between municipal governmental organisations in management of trans-border protected nature territories.

International co-operation and friendly neighbour relations are also required for solutions 1.2.3., 12.1.4., 14.9.6.

37. Programme supervision, reporting and assessment

The National Programme is supervised by the responsible Minister for environmental protection. The implementation of the National Programme on Biological Diversity is co-ordinated by the Ministry of Environmental Protection and Regional Development. To achieve this goal, and inter-Ministry Commission or the Co-ordination Council (Cabinet of Ministers Ruling No 60, 10 February 1999) was created, which is headed by the State Secretary of the Ministry of Environmental Protection and Regional Development. At the beginning of the fiscal year, the head of the National Programme prepares a summary of the implementation of the programme during the previous year and presents a plan for the next year.

The summary includes an analysis of previous performance of the National Programme, the utilised financial and work resources, achieved results, and assessment of the present condition.

The work plan of the National Programme is discussed in the Co-ordination Council and presented to the Cabinet of Ministers for approval.

As required for participation of Latvia in international conventions, National reports are prepared and presented.

Footnote 1.

European Union Regulation (EEC 2078/92) "On agricultural production methods compatible with the requirements of the environment and the maintenance of the countryside" The regulation was accepted on 30 June 1992 to promote:

- agricultural practices which decrease the pollution effects of agricultural activity;
- environmental compatible, non-intensive farming;
- use of agricultural land use types which are compatible with the protection and improvement of the environment, agricultural landscapes, natural resources, soils, and species diversity;
- long-term fallow lands for environmental protection requirements;
- training of farmers in theory and practice of agricultural methods which are compatible with protection of the environment and traditional features of the rural landscape.

To achieve a positive effect in environmental and rural landscape protection, financial support is required for farmers who initiate activities to reduce use of mineral fertilisers and pesticides, or who are using, or ar beginning to use, biological farming methods. Support is required for farmers beginning to use agricultural methods which are compatible with protection of natural resources and maintenance of the rural landscape.

Footnote 2.

Establishment of the European Blue Flag system in Latvia

More than 10 European community countries have become involved in the bathing water and yacht harbour evaluation campaign BLUE FLAGS (BF) since 1987.

An award of a Blue Flag is a form of eco-certification that provides a guarantee to tourists that European standards are met for bathing waters and yacht harbour facilities. Blue Flags designations are awarded each year for beaches and yacht harbour facilities which meet criteria of water quality, safety and information. The non-governmental nature of the campaign allows to involve non-governmental organisations and members of the public in improvement of bathing waters and small harbours.

In 1997, the Ministry of Environmental Protection and Regional Development (MEPRD) initiated preliminary work towards participation in the Blue Flag movement, with the Environmental Protection Club (VAK) as the leading non-governmental organisation (accepted into FEEE in June 1998).

The long-term objectives of the BF campaign include:

- sustainable use of coastal resources;
- develop understanding of the need for integrated coastal zone management;
- develop understanding of the importance of the coastal environment;

- encouragement of governmental activity to ensure suitable water quality;
- integration of environmental issues into planning decisions of municipal governmental institutions and their partners.

The National Commission On Bathing Waters and Harbours was created, consisting of interest organisations and institutions. Before 2001, it is aimed to raise Blue Flags at least 3 bathing waters and 3 yacht harbours, while closing the gap for the remaining potential BF bathing waters and yacht harbours.

Footnote 3

Political plan to decrease contribution to climatic changes in Latvia

The Political plan to decrease contribution to climatic changes was developed as a response to the 1992 Rio de Janeiro UN "Convention On Climatic Change". The Convention came into force in 1994, with the aim to prevent an irreversible change in climate. Increasing concentrations of Greenhouse Gases (GG) have caused global warming of the earth surface and atmosphere, negatively affecting climate. The Saeima of the Latvian Republic ratified the Convention in 1995.

To reduce the contribution to climatic change, policy must ensure stable and sustainable development to meet today's needs, without threatening the needs of future generations. Climatic change policy must be integrated into economic sector strategies and policy, and public awareness of the issues must be increased.

Policy considers the possibilities to reduce GG gas emissions in sectors of the economy:

- In industry, policy is based on introduction of modern technologies, replacement of old equipment, avoidance of environmentally damaging fuels, and utilisation of waste-free processes.
- In agriculture, reduction of the GG emission sources requires to optimise livestock farming practices, ensure suitable conditions for storage of manure, and to develop research-based recommendations for use of nitrogen fertilisers on agricultural lands.
- In forestry, it is planned to increase the forest area to 48-52 % of Latvia's area during the next 20-25 years.
- Waste management must introduce a recycling system.

Footnote 4

Latvian Forest Policy

The general objective the Latvian Forest Policy is sustainable management of forests and forest lands.

Sustainable management is defined (by the Cabinet of Ministers) as regulation and management of forests and forest land in such a manner and level as to maintain its biological diversity, productivity, capacity for regeneration, vitality, and potential to perform important ecological, commercial, and social functions at local, national and

global levels, presently and in the future, and also, to avoid threats to other ecosystems.

Latvian forests may be owned by the State, municipalities, individuals, or juridical persons.

The commercial objective of the forest policy is to ensure sustainable development and financial profit of the sector, receiving the maximum possible gain from sales taxes.

The environmental protection objective is maintenance of biological diversity at the present level. To achieve this objective, it is necessary to observe the following principles:

- levels of forest use are nationally regulated, taking into account forest ecosystem productivity, potential for regeneration, and other significant factors;
- the impact of forestry on the environment is assessed;
- the protected area network is strengthened based on research, to ensure maintenance of ecosystems, species and genetic resources in forests;
- ensure maintenance of the diversity of species and their characteristic forest habitats;
- monitoring of forest health is required;
- it is recommended to choose forestry methods which mirror natural processes, to approach ecosystems having natural structure and elements which support biological diversity.

The social objective of forest policy is to balance public and forest owner interests in forest use, and to improve employment in the forest sector. Forests, regardless of ownership, are accessible to the public, excepting cases when legally declared as non-accessible.

Forest management considers the cultural-historical and landscape value of forests.

Footnote 5.

Code of Good Agricultural Practices

The Code of Good Agricultural Practices is generally a summary of practical hints and recommendations for farmers, orchard keepers, gardeners, and persons working in the agricultural service sector.

The objectives of Good Agricultural Practices are to decrease the impact of agricultural activity on the environment, to prevent loss of land, plant and animal resources and of rural landscapes, and to prevent non-rational use of resources.

The practical incorporation of the Good Agricultural Practices must be based on three balanced principles: economically acceptable, ecologically based and socially fair.

The European Union Directive 91/676 "Concerning the protection of waters against pollution caused by nitrates from agricultural sources" states the requirement for every member to develop their Good Agricultural Practices.

The development of Good Agricultural Practices in Latvia began in 1998 under the supervision of specialists at the Latvian University of Agriculture.

Footnote 6

Latvia's Tourism Development Concept

The objectives of Latvia's Tourism Development Concept are:

- identify the general long-term goals and tourism development basic principles of State tourism policy;
- provide the basis of a mechanism for co-ordinated activity between the State, municipal governmental institutions, non-governmental organisations and businesses;
- identify the main directions of tourism development.

The concept forms the State policy goals for tourism, the sectors basic principles and strategies for development, and the future objectives and actions.

The main State policy goal in tourism is to create a Latvia that is attractive for tourists and diverse in tourism activities, where the tourism sector is well organised, economically and socially efficient, environmentally friendly, and safe, which will raise the prestige of Latvia. Therefore:

- tourism development must integrate the principles and objectives of environmental protection;
- natural and cultural/historical heritage must be maintained and protected;
- the maintenance, protection and development of biological diversity must be promoted.

One of the main foundations of State tourism policy is to recognise and develop tourism as an economic sector which provides a significant investment to the National product and stimulates regional development as well as development of other sectors.