National Environmental Policy Plan for Latvia

Riga, 1995

Foreword

The development of modern environmental protection policies is a relatively new global phenomenon. They have grown out of the understanding that society must move from the protection of individual elements of nature and the careful use of resources to the comprehensive protection of ecosystems, the maintenance of the quality of the human environment, and the implementation of environmental policies that quarantee sustainable and balanced development. The principles of sustainable development were internationally accepted during the United Nations `Environment and Development` conference in Rio de Janeiro in June 1992 and enshrined in `Agenda 21`.

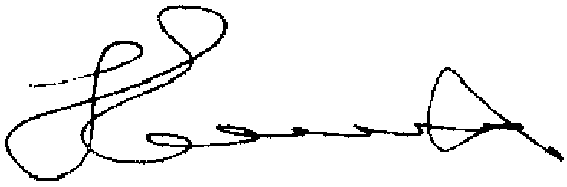
The National Environmental Policy Plan (NEPP) for Latvia has been developed and elaborated under the guidance of the Environmental Protection Department at the Ministry of Environmental Protection and Regional Development. It is the first such strategic document at the national level in the entire history of environmental protection in Latvia. The document sets out environmental protection policy goals for the coming decades, the principles adhered to while developing strategies, and lists the resources and mechanisms that may be used for the implementation of policies. During the course of policy development, priority environmental problems were analysed and measures for their resolution were suggested.

Special attention should be brought to the process of developing the policy plan. Workshops were organised for more than 80 specialists from numerous institutions, including representatives from the Ministries of Economy, Finance, Agriculture and Transport, universities and other research and environmental institutions, non-governmental organisations, and various organisations responsible to the Ministry of Environmental Protection and Regional Development. Consultations were also sought from the Ministry of Housing, Physical Planning and Environment of the Netherlands and experts from the Swedish Environmental Protection Authority. We were especially grateful to the Dutch Government for its support throughout this process.

At the beginning of the first workshop, the participants were surprised by empty flipchart sheets covering the walls of the seminar rooms. What followed were well-organised and democratic brain-storming sessions. With the professional and competent facilitation by Allen Hickling, consensus and unity was achieved from the initially diverse and contradictory viewpoints. The final product is this up-to-date strategy document that be used by various interest groups and sectors of the economy when preparing their plans.

In future, as Latvia develops socially and economically, the overall environmental situation will also change - priorities will change, possible or alternative solutions to problems will change: society, businesses and ministries that deal with economic questions will need to become more involved in the solution of actual problems. It will become necessary to modify, improve and supplement the NEPP.

The NEPP document will also be used without delay to begin the development of the next document in the series - Environmental Action Plan. In expressing my thanks to the collective authors of this plan for their productive efforts under the leadership of Valts Vilnitis, Director of the Environmental Protection Department, as well as to everyone else who participated in or supported the process, I hope that the NEPP has a long and influential working life.



Indulis Emsis, State Minister of Environmental Protection

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Introduction

> *Residents of the Republic of Latvia have the right to live in a quality human environment and to request that competent State institutions, legal entities and their officials, as well as physical persons, discontinue such actions or inactions that degrade the environment, harm residents' health or endanger their lives, interests and property.*
>
> The Law of the Republic of Latvia 'On Environmental Protection', Article 11

It is impossible to imagine an improvement of living standards in Latvia without an improvement in the state of the environment. When the quality of the environment is compromised, the national economy and society lose because environmental problems have adverse effects on human health, the stability of natural ecosystems, as well as the availability and quality of natural resources. A degraded environment also has a negative impact on public self-awareness in general. In order to reduce negative impacts on the environment, radical changes are necessary in national decision making and public attitudes towards the environment in general. A quality environment is a pre-requisite for sustainable development in Latvia.

Environmental protection, just as any branch of the national economy, needs a clear-cut development strategy. The National Environmental Policy Plan (NEPP) offers such a strategy, and its necessity was determined by several considerations. First, the NEPP formulates basic environmental policy goals for the coming 20 - 30 years, listing principles upon which the policy should be based, and instruments for its implementation. The NEPP also discusses and analyses priority problems. It should be noted that priorities have been set at different levels according to the effects of time and location.

Taking into account the fact that the system of government, the national economy and society in general in Latvia are in a transition period, clear environmental requirements can be incorporated into larger scale State administration reforms, new legislation, and implementation of relevant economic projects. Therefore, the NEPP could be used by separate ministries in drafting their strategies. The NEPP also gives serious investors an idea of the types of changes in environmental requirements that may be expected in the coming years.

Active public participation is necessary for the resolution of many environmental problems. Various public organisations, formal and informal interest groups, as well as individuals can find a point of impact/attack in the NEPP for the solution of environmental problems that affect them.

An environmental strategy is necessary not only for Latvia - it is an essential step in the establishment of a common European environmental system. The necessity for national environmental strategies and action programmes was emphasised at the conferences for the Ministers of Environmental Protection of Europe in Dobris (1989) and Lucerne (1993). Thus, adoption of the NEPP as the environmental strategy for Latvia is another step towards the integration of Latvia into Europe. Having signed the Lucerne Declaration, Latvia assumed responsibility for the development of a national strategy and action programme. Therefore, also the conclusions and principles of the Environmental Action Programme for Central and Eastern Europe (endorsed in Lucerne) were taken into account when elaborating the NEPP. The plan is also based to a large extent on conclusions of the UN Conference for Environment and Development (Rio de Janeiro, 1992) in regards to the need for sustainable development.

A cohesive environmental protection strategy is a strong argument to use in negotiations with potential investors, since it proves Latvia is a safe partner for co-operation

that knows what it wants. It provides opportunities to channel funds towards solving the most urgent problems, as well as for substantiating the necessity of projects.

In order to implement the NEPP and further elaborate environmental policy, it is necessary to:

- guarantee the integration of environmental policy into general national development policy
- achieve public participation in setting priorities and choosing the best practicable measures for the solution of environmental problems;
- set priorities for effective problem solving;
- select appropriate policy instruments for each problem situation and target group;
- involve target groups and all levels of government;
- when necessary, ensure that the State covers some of the environmental or rehabilitation costs;
- provide conditions for the promotion of environmentally-friendly activities.

The Environmental Protection Department of the Ministry of Environmental Protection and Regional Development (MEPRD), in co-operation with a number of other institutions and organisations, developed the NEPP. In all, more than 80 experts from MEPRD structural units and subordinated organisations, the Ministries of Economy, Finance, Agriculture and Transport, scientific and educational institutions, ECAT and the Latvian Fund for Nature worked on the plan. Valuable advice and comments were provided by the Regional Environmental Protection Committees. The advice and assistance of the Ministry of Environment, Environmental Planning and Housing of the Netherlands and the Environmental Protection Agency of Sweden lent substantial support to the development of the NEPP. While it would not have been possible to draft this plan at such short notice without international support, the contents of the NEPP were elaborated exclusively by Latvian experts.

In no way should the NEPP be considered the end of the process of environmental policy planning. It is the start of a process of continuous elaboration and implementation of environmental policy. As Latvian society and the national economy changes, so too will environmental problems and priorities. Accordingly, problem-solving measures will also change. Therefore an environmental strategy needs to be flexible - it must be able to deal with mistakes or errors of judgement, as well as possible changes in development trends - so that significant environmental quality improvements can be achieved with a minimum expenditure of time and resources.

2 Overviev of the present situation: Society and environment

Summary
This Chapter provides a short overview of the environmental situation in Latvia and the development of the system of environmental protection. As it is not possible to solve all environmental problems at once, some environmental problems were accorded a higher priority. An detailed analysis of these is offered in Chapter 5. Physical influences, including radiation and nuclear safety issues, are described in more detail in Appendix 3.

2.1. Development of the environmental protection system in Latvia

The initial development of environmental protection can be divided into several stages within the context of the history of nature protection in Latvia.

The first stage was connected with the worship of properties or manifestations of nature and the cosmos. It was based on a view that human beings are an insignificant element of nature. It was the pre-Christian era of respect and worship of naturalistic deities, which left a heritage of sacred springs, groves, caves and stones and a series of Gods such as *Mara*, *Jumis*, *Usins*. During this period, Latvian peasants developed a deep respect towards the land, the sun, water and all living things. Honour, respect and love for all aspects of the live-giving natural world were woven into the souls of these Latvian peasants, just as they wove their intricate patterns into the rich, colourful Lielvardes belt. This attitude, this pattern should be cultivated in our hearts today, where we should learn to read and understand it, and pass it on to future generations with patience and care.

Box 1. Noble trees of Latvia
There are 2554 noble trees in Latvia. 1269 of them are recognised to be of national importance. The majority, 71%, of all noble trees are oaks, pines, firs or junipers. There are 1502 noble oaks, the mightiest of the noble trees in Latvia; of which 642 are protected by the State. For the conifers, the figures are as follows: pine - 217 and 150, fir - 29 and 17, juniper - 74 and 45.

The second stage was connected with human understanding about the necessity for economy of natural materials in order to make them last for as long as possible or to let them regenerate, so that the needs of society could be guaranteed. Laws governing such practices appeared in Latvia as early as the 17th century, the so called `Swedish era', when limitations were set for hunting, and the cutting of deciduous hardwood trees used in shipbuilding and construction.

The third stage was connected with the understanding of nature protection as the preservation of elements of nature. Limitations were set in regards to specific objects, sites or territories - the so called monuments of nature. Protection of gene pools and rare plants has been organised in a similar way. We are proud of Moricsala State Reserve (declared in 1912), Slìtere and other State reserves, Gauja National Park, nature reserves and other territories, green belts and objects under special protection.

The fourth stage - modern environmental ideology - is relatively new. It is based on an understanding that it is necessary to make a transition from rational use of resources and protection of separate elements of nature to *an overall protection of ecosystems, a guarantee of human environments,* and an *environmental policy that will ensure sustainable and balanced development*.

Democratisation of society and the progress of environmental policy

There have been periods in the development of environmental policy in Latvia when significant and progressive changes have taken place in public understanding about nature and the environment. Historical progress in environmental policy has coincided with periods

of rapid democratisation of society, which in Latvia included regaining national independence. For example, during the first awakening of Latvian self-awareness at the end of the19th century, the Riga Natural Scientist Society founded the first nature reserves within the then czarist Russian empire: Vaikathe Island Reserve in Estonia in 1910 and Moricsala Reserve in Latvia in 1912.

The number, area and diversity of nature objects under special protection increased rapidly after the establishment of the independent State of Latvia in 1918 Forested lake islands, parks and tree-lined alleys were placed under the protection of the State, and Sigulda National Park was established. The Sigulda area is now one of the popular recreation areas within the Gauja National Park.

The third awakening and the environment

During the third awakening of Latvian national awareness at the end of the 1970s and beginning of the 1980s, the Environmental Protection Club (VAK) became a significant political force. Activities of the Club attracted public attention to the critical environmental situation in Latvia and other countries under the totalitarian regime. Under the cover of analysing environmental problems, a number of very important developments were carried out which assisted the re-establishment of national independence.

The struggle of informal environmental groups against the construction of a subway network for Riga gained huge public support. The public perceived the idea as being the entrenchment of Moscow's power and another measure to speed up the Soviet colonisation process. The opinion of the informal groups won, and the construction of an underground was never started.

The next `duel' between the central planning ideologists of the totalitarian regime and the guardians of nature was the large-scale public resistance to the construction of a hydro-power plant near Daugavpils. On this issue, the intellectual community was particularly active. Environmental and social considerations brought construction to a halt. These, and many other victories of informal groups and the intellectuals of Latvia in contests based on environmental and social problems, brought strength to the nation and contributed to the nation's belief that was possible to set and implement the idea of Latvian independence.

It is significant that the State Environmental Protection Committee, the first State environmental institution in Latvia's history, was established during this struggle for independence (March 17, 1988).

The logic behind the elaboration of modern environmental policy and sustainable development

At present, there are two groups of environmental problems to be solved in Latvia. The first group is connected with the grim heritage of the totalitarian period: inefficient, environmentally hostile, resource squandering State-owned industries; the agriculture, energy and transport sectors are presently being restructured; the environmental and public utility sectors are underdeveloped; the Soviet army left behind a legacy of badly polluted territories. As a result, accident risks are higher and environmental quality is lower in several regions.

The second group of problems is connected with the restructuring of the national economy towards a market economy. The amount of total investment is insufficient for a rapid improvement of the situation (0.8% of GDP). Lack of a clear direction in the development of branches of the national economy hinders the implementation of preventive environmental policy. An unfavourable legal environment exists due to the contradictory nature and insufficient number of laws.

At the same time, the significant benefits of the present situation should be stressed. In the course of production restructuring, it is possible to change the outdated production base with modern, environmentally-friendly technologies. There is a high biodiversity level in Latvia and relatively little environmental pollution in rural areas. The active support and assistance of developed countries is a fact that can be counted on. Global experience can be drawn upon to devise and implement the most effective national environmental policy.

At present, there is a unique opportunity to renew the national economy using a strategy of sustainable and balanced development. While we need to restructure the national economy in accordance with the doctrines of a market economy, it is possible to do it in a way that is balanced and sustainable for humans and the environment.

2.2. Short overview of the present situation

During the previous decades, the State administrative structure and system of management allowed the preservation of natural forests, meadows and swamps, where rich animal and plant populations are now to be found. Many of these species are on the edge of extinction in the western and north-western regions of Europe.

The majority of environmental problems are concentrated in the so called 'hot spots' - largest industrial centres, transportation crossroads or in territories abandoned by the Russian army. Only a few environmental problems are manifested in the country as a whole: eutrofication and degradation of water ecosystems, excessive use of several natural resources, transboundary pollution, accumulation of household and industrial wastes. Several serious problems have been created by excessive, and in many cases chaotic, urbanization.

On the other hand, Latvia can today be proud of its comparatively untouched nature; vast forest reserves, undeveloped beaches and low background pollution levels.

2.2.1. Natural conditions

Latvia is situated in a transitional area between northern coniferous forests and moderate zone broad-leaved forests - between the oceanic climate and the continental. Mixed forests are typical of this zone. The territory of Latvia contains many plant and animal distribution boundaries. Every change of natural conditions (climate, vegetation) over the last 13 000 years has left its marks - rare species, unique biotopes, relict nature monuments.

Table 1. Diversity of species and their protective status in Latvia

	Total species	**In the Baltic Red Book**	
		Number of species	**% from the total**
PLANTS			
Flowering plants	1600	256	16
Ferns	48	19	39.6
Mosses	485	203	41.9
Lichens	500	34	6.8
Algae	2680	-	-
Mushrooms	3600	38	1.1
ANIMALS			
Vertebrates			
Mammals	83	24	28.9
Birds	325	78	24
Reptiles	7	3	42.9
Amphibians	13	6	46.9

Fish	106	-	-
Cyclostomatia	3	-	-
		In the Latvian Red Book	
Invertebrates			
Insects	20 000	9	0.045
Spiders	430	-	-
Mites	15 000	-	-
Crustaceans	250	2	0.8
Worms	3 000	1	0.3
Molluscs	185	1	0.5
Others	200	-	-

2.2.2. Level of urbanization

As a result of urbanization (concentration of industry and population), 70% of the Latvian population now lives in towns, including 34% in the Riga agglomeration alone. Industrial towns have become large sources of air pollution, wastewater and solid waste, that in turn has led to the deterioration of the environment and the populations' health, not only in the towns, but also outside.

The urban environment is considered degraded if its establishment was based on a single concept (in the quantitative sense) of solving the housing problem during the time of hyperindustrialization and mass construction. It is an inadequate environment for human beings, an impersonal environment with low quality construction and infrastructure. There are too many such territories. In the Riga agglomeration alone, humanization is necessary for 15 housing districts or two-thirds of human settlements created during the last 50 years. This heritage is significantly influencing the consciousness of the population, creating additional social and environmental problems.

2.2.3. Quality of soil

Latvian soils can be considered relatively clean and should therefore be considered as part of the national wealth.

In the majority of Latvian soils, the heavy metal content is at natural background levels (see Box 2).

Box 2. Content of heavy metals in soils of different mechanical consistency in Latvia and the Netherlands (mg/kg)

Metal	**Sand**		**Sandy loam**		**Loam**	
	Latvia	Netherlands	Latvia	Netherlands	Latvia	Netherlands
Chrome	0.7-2.3	60.0	4.0-7.7	76.0	3.7-7.7	106
Nickel	1.0-3.2	15.0	2.1-4.2	23.0	3.0-5.0	33
Copper	0.9-3.3	19.0	2.3-3.4	24.0	3.0-4.5	38
Zinc	5.3-9.3	67.0	11-17	91.0	11-18	137
Cadmium	0.3-0.6	0.5	0.2-0.4	0.5	0.22-0.42	0.6
Lead	2.9-9.1	56.0	5.3-7.0	65.0	5.4-5.8	80

The area of arable land threatened by wind erosion is 230 000 ha or 14.7% of total arable land. Land subject to water erosion - 380 000 ha or 24.3%. Since agricultural production influences natural ecosystems significantly, and at the same time is an important branch of Latvian national economy producing up to 40% of GDP, sustained development of

this branch is the basis for both economic growth and the preservation of a natural and healthy environment.

2.2.4. Water quality

There are 777 rivers in Latvia with a length exceeding 10 km, but the total number of waterways is approximately 12 000. There are also more than 3000 lakes, 802 of them with an area exceeding 0.1 km2.

According to hydrobiological and hydrochemical data, 85% of all surface waters are either slightly polluted or polluted. Eutrofication is the biggest problem, created by biogenous substances, and it is growing rapidly. The main sources of biogens are untreated municipal wastewater and runoff from agricultural lands. In several places, pollution with hazardous substances has been determined (e.g. heavy metals, chloro-organic compounds, oil products), either from point sources or by slow accumulation. However, it should be stressed that since 1990, both the amount of untreated wastewater and agricultural runoff have decreased significantly, and correspondingly the total amount of pollution discharged into watercourses has decreased. This can be mainly attributed to the start of operation of Riga municipal and other wastewater treatment facilities, as well as the overall decrease in production in the country (Figure 1 and Figure 2). The volume of wastewater is not expected to increase in the foreseeable future.

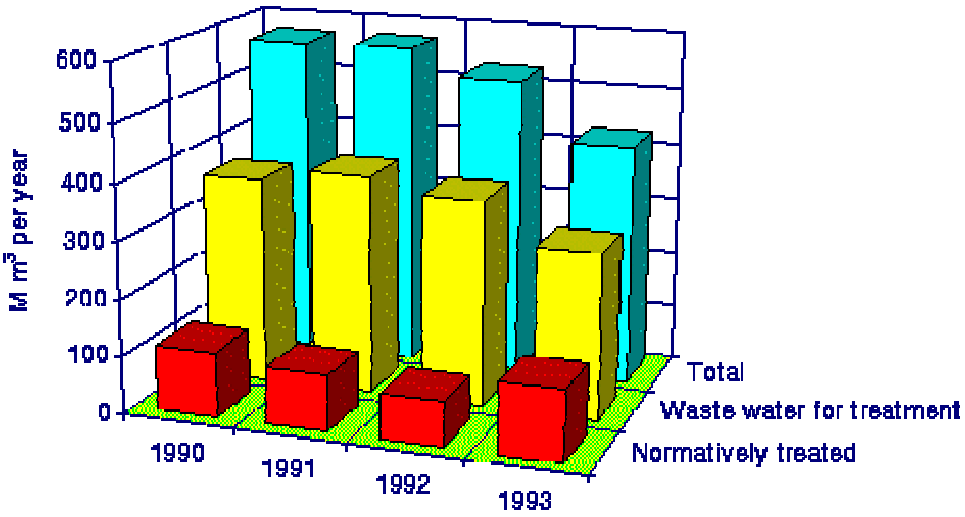

Figure 1. Amount of wastewater in Latvia 1990-1993 (source: MEPRD)

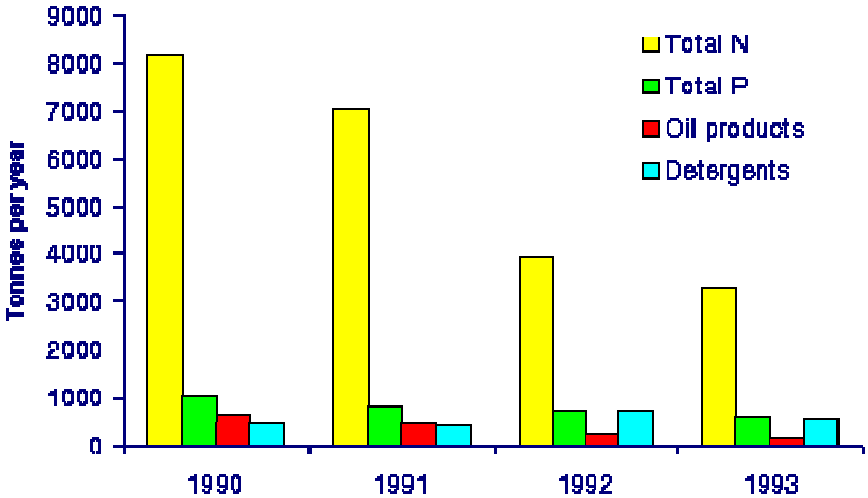

Figure 2. Amount of main pollutants in Latvian internal waters (source: MEPRD)

The situation in the Gulf of Riga and the Baltic Sea should be stressed in particular. The almost enclosed nature of the sea and the very large discharge from rivers into it means that anthropogenic factors are of particular significance in the Gulf.

An analysis of the data over many years shows that phosphorous and nitrogen pollution in the Gulf of Riga has increased continuously over the last 20 years. Changes in concentration of biogenous substances in the Gulf of Riga over the years may be considered a vivid example of water basin eutrofication (see Figure 3). Eutrofication causes a gradual decrease in the dissolved oxygen content of water during the summer months. However, over the last few years, due to favorable hydrological processes, as well as a drastic fall in nitrate pollution (that can be explained by decrease of nitric salts from rivers due to fall in agricultural production), a decrease of oxygen content in the Gulf of Rìga was not observed during summer.

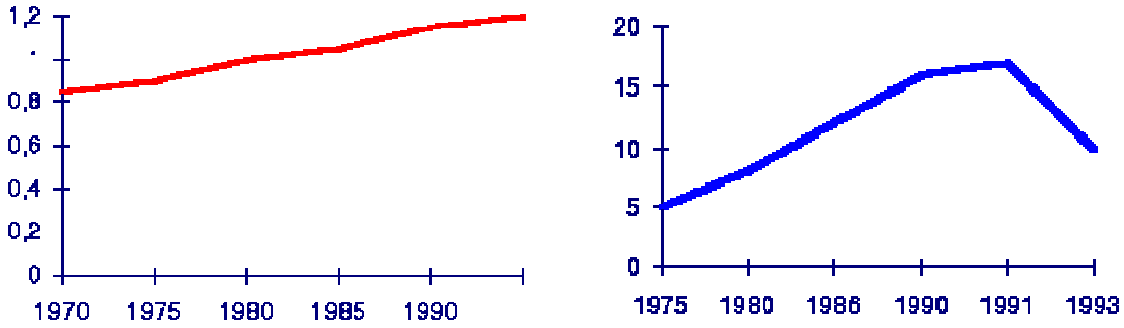

Figure 3. Total phosphate (left) and nitrate (right) concentration changes in the Gulf of Riga from 0-10 meters 1973-1993 February in mmol/l (source: Hydrometeorological Agency, Sea Monitoring Centre, 1994)

Observations of the variation in phosphorous and chlorophyll concentrations over the years show that eutrofication in the Gulf of Riga continues. An analysis of the changes in nitrogen and silicon concentrations allows us predict a significant decrease in eutrofication over the coming years, providing the influx of biogenous substances does not accelerate. The results of present hydrochemical and biological observations do not indicate any further development of eutrofication in the Latvian zone of the central Baltic.

At present, the waters of the Latvian economic zone in the Baltic sea are moderately polluted with some regions of elevated local pollution. Zones of ecological risk are coastal regions in the vicinity of river estuaries, municipal and industrial wastewater discharge sites, mineral extraction and gravel disposal sites, as well as regions around ports.

2.2.5. Air quality

The major part (65-68%) of the listed air pollution is created by transport (Figure 4). Compared to 1992, air pollution in 1993 caused by transport has increased by 11%. It can be explained by the fact that the number of registered vehicles in Latvia in 1993 increased by 48 000. The pollution caused by district heating has also increased - and this can be explained by the changes in fuel structure - more heavy fuels with a higher sulfur content are being burnt, and less natural gas.

95% of emissions from stationary sources in Latvia registered in 1993 were created by the following: sulfur dioxide (50.1%), nitrogen oxides (10%), carbon oxide (24%) and solid particles - ash (10.8%).

More than 200 other listed dangerous substances formed just 5%.

Figure 4. Distribution of emissions according to sources in 1992 and 1993 (source: MEPRD)

Box 3. Main problems of air pollution

Solid particles (ash, dust etc.) are dangerous for human health and the environment, particularly if they contain heavy metals and carcinogens.

Sulfur dioxide and nitrogen oxides promote acid fallout, increase the acidity of soil, and damage structures and houses, including architectural monuments.

When carbon monoxide is converted to carbon dioxide it contributes to the greenhouse effect. Together with nitrogen oxides and hydrocarbons, they contribute to smog in towns.

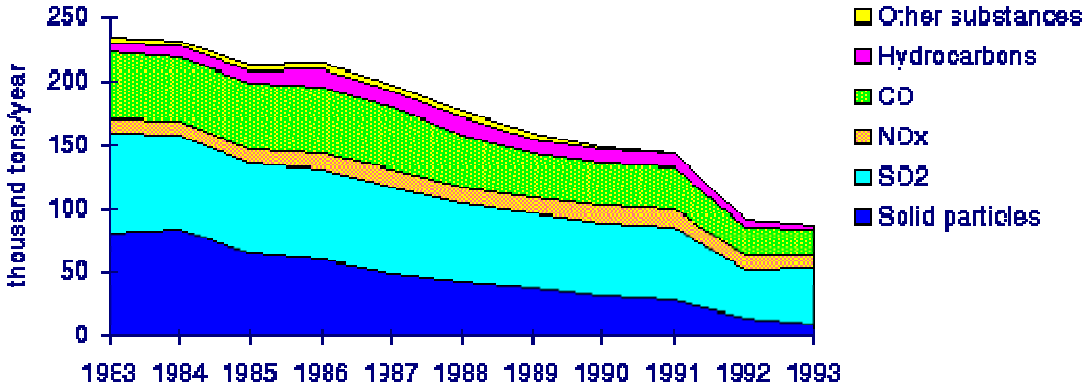

Figure 5. Emissions from stationary sources in 1983-1993 (MEPRD data)

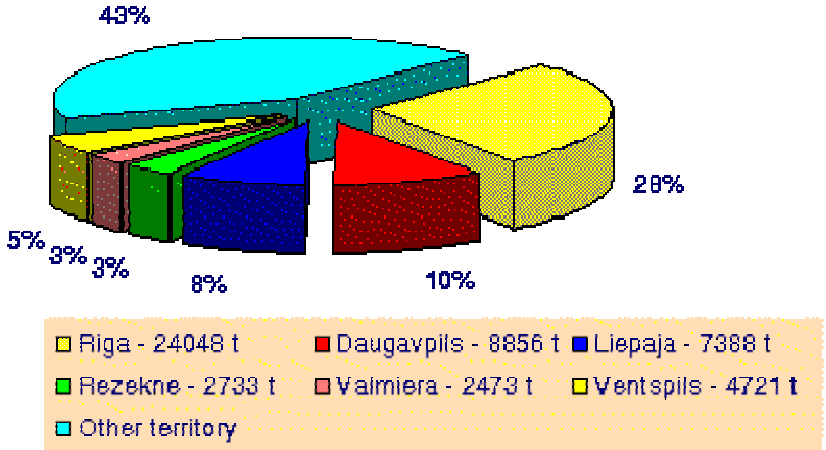

Figure 6. Air pollution from stationary sources in the largest industrial cities in 1993 (MEPRD data)

The six largest industrial cities account for more than half (57%) of the country's stationary source air pollution (Figure 6).

Here, Riga stands out in particular, for it alone accounts for close to one third of total emissions in Latvia. However, it should be noted that these figures exclude small boiler

houses and individual users. Calculations have determined that non-registered sources increase emissions of dangerous substances in Riga by another 18-20% - most notably particulate emissions are increased by 137% and carbon monoxide by 37%. A similar situation can be expected all over Latvia.

2.2.6. Waste

According to the data of the Environmental Protection Committee of the Republic of Latvia (1992), the Riga agglomeration generates about 266 000 tons of household waste a year or 240 kg waste per person. For the whole of Latvia the figure is 200 kg (Europe's Environment, 1995). Figure 7 shows a comparison between Latvia and other European countries.

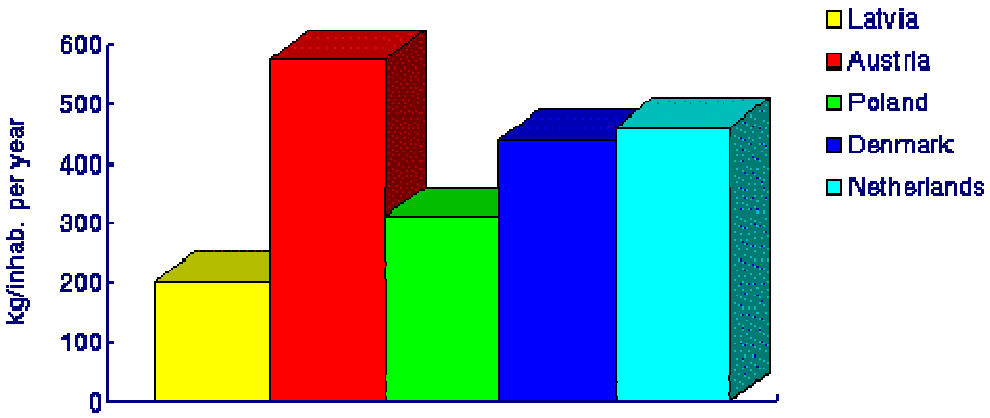

Figure 7. Relative amount of waste in different countries *(Europe's Environment, 1995)*

The volume of household waste generated is likely to increase over the coming years mainly due to the increase of western imports. In fact, the increased amount of packaging used on Western products will probably constitute the bulk of the increase in household waste generated. Another source is the decrease in recycling and the reuse of packaging brought about by changes in the State administrative and production structures during the last years. Latvia also lacks a developed household waste management system.

Hazardous wastes should be mentioned separately. Although they form but a small part of the total waste amount, they pose a particular risk to the environment and human health. Hazardous waste management is usually controlled by the State and not local governments. In 1989 and 1990 in Latvia, about 200 000 tonnes of hazardous wastes were generated annually. In 1992, this amount was 300 000 tonnes, in 1993 - 42 000 tonnes. For comparison: Sweden generates about 500 000 tonnes of hazardous wastes per year, but Denmark about 130 000 tonnes.

3. Goals, principles and pre-requisites of environmental policy

Summary

This chapter sets four long-term environmental policy goals:

- significant improvement of environmental quality in territories that pose an increased risk for human health, and the stability of ecosystems while sustaining environmental quality in the rest of the territory;
- protection of existing biodiversity and landscape characteristics of Latvia;
- sustainable use of natural resources;
- integration of environmental policy into all branches and fields of life (the national economy in general, and in the strategic plans of its various branches, in legislation and public awareness), thus establishing the basis for sustainable development.

This chapter also looks at the main principles and pre-requisites on which environmental policy in Latvia should be based. Some principles are specific to this country but most of them, such as the precautionary principle, the principle of best available technology, the substitution principle or polluter pays, are widely accepted all over the world and to a great extent determine environmental policy for other European countries.

An elaboration of environmental policy is hard to imagine without clear policy goals and principles to guarantee the consequent implementation of policy. A major reason for the preparation of the NEPP is to set long-term policy goals and co-ordinate planned activities with corresponding basic policy principles.

This chapter explains chosen goals and basic principles that form the basis for further development of the plan. This includes the choice and analysis of priority problems, measures and instruments, as well as pre-conditions that are of particular importance for efficiently developing and implementing environmental policy.

3.1. Policy goals

Policy goals have been set on the basis of two main considerations. First, the present quality of the Latvian environment is generally high in comparison to the majority of European countries. While several acute environmental problems do exist, these are mostly in large towns, industrial regions and territories abandoned by the Russian army.

Second, because Latvia is presently in transition toward a market economy, the following must be taken into consideration - resources are limited; living standards are comparatively low; there is an absence of future economic development forecasts; social structures are in a state of flux. As a result, the public is indifferent towards the environment and there is a tendency towards excessive use of already limited resources. Also legislative acts, regulations and effective implementation mechanisms are incomplete and rapidly changing, and there is an absence of organised target groups (see Box 6).

Thus, one policy goal is to:

- *achieve significant improvement of environmental quality and ecosystem stability in areas where it presents increased risks to human health, while at the same time preventing deterioration of environmental quality in the rest of the territory.*

A second long-term goal pertains to the protection of biological diversity in Latvia. Rapid changes in the course of land reform, the intensification of agriculture and forestry, the establishment of modern transportation systems, the usage of coastal zones and scenic areas for recreation and, in particular, for development, may lead to a rapid decrease in diversity of species and ecosystems, hinder migration of many species, as well as exhaust the

natural and cultural landscapes of Latvia. It could result in losses of traditional national cultural environments and national identity. Therefore another environmental policy goal is to:

- *maintain and protect the current level of biodiversity and landscape characteristics of Latvia.*

One current tendency in Latvia is to substitute the inefficient use of natural resources (characteristic of a socialist economy), with excessive use of existing resources during the transition period. For example, forests and minerals are often the only potential starting capital for land owners and local governments. This could lead to the exhaustion of natural resources before society as a whole has achieved a certain standard of living. Therefore another environmental policy goal is to achieve:

- *the sustainable use of natural resources.*

The state of the environmental in a country is a reflection of the level of development of its society as a whole. A low level of environmental awareness is characteristic for any nation that faces heavy economic problems, retarded development and a dominance of short-term interests over long-term goals. The concept of sustainable development is not familiar to Latvian society as a whole, and unfortunately, for the majority of decision-makers as well.

Box 4. Sustainable development
A popular definition of sustainable development, adopted by the World Commission for Environment and Development in 1987, is 'development that ensures satisfaction of present day needs without jeopardising the satisfaction of needs of future generations' (World Commission for Environment and Development, 1987)

It is impossible to imagine reaching any of said three goals without

- *the integration of environmental policy into all branches and fields of life (the national economy in general, and in the strategic plans of its various branches, in legislation and above all, in public awareness), thereby creating a basis for sustainable development in Latvia.*

3.2. Policy principles

The principles used for the elaboration of this environmental policy plan, and environmental policy in general, can be divided into two groups. The first group to be discussed includes general principles used to determine priority problems, to search for problem-solving measures, and to form the basis of primary policy instruments. The second group includes principles which can be used to formulate specific measures and choose appropriate policy instruments.

General principles for the elaboration of environmental policy include:

Maintenance of the balance between the environment and the national economy: This principle means that national economic development should take into account the capacities of ecosystems. Development should also be based on ecological cycles, such as the circulation of matter and energy in nature. This means that:

⇒ resources should be used in closed cycles;
⇒ savings of energy and material should be maximised;
⇒ the quality of goods and services should be more important than the quantity.

Pollution prevention at the source: More attention should be paid to the prevention of pollution rather than trying to alleviate the consequences of pollution after it has occurred. If earlier environmental action mainly focused on decreasing existing pollution by the use of treatment facilities or limiting production, now the causes of problems should be addressed. This does not mean that the use of treatment facilities or the clean up/containment of highly polluted areas should be discontinued. 'End-of-pipe'* abatement of pollution is beneficial, but it is a short term measure. Prevention of pollution is usually less expensive and more efficient in the long-run than end-of-pipe abatement and clean up of environmental problems.

Principle of individual responsibility: This means that everyone - individuals as well as officials - will take individual responsibility for the environment in which they live and change their behaviour accordingly.

Environmental protection activities shall be derived from historical experience, shall be acceptable to the nation as a whole and shall be suitable for implementation on a local scale: During the last 50 years in Latvia, decisions that were unacceptable to society as a whole were taken and subsequent activities were carried out. This is inadmissible in the future. In order to solve environmental problems successfully, decisions regarding the national economy should not be based on poorly prepared or unprepared material.

Principle of publicity: Everyone has the right to be informed about the environmental situation and to take part in formulating such decisions that may have an impact on the environment.

The second group of principles focuses on the formulation of specific measures and the choice of appropriate policy instruments. These principles are:

Integrated approach to problem solving: It is necessary to choose strategies that solve several problems at once and don't merely shift problems from one place to another. As several environmental problems are often created by the same source, it is necessary to take steps that can abate several types of pollution at once.

Box 5. Liepaja environment project

This integrated project includes reconstruction and modernisation of the water supply and sewage system in Liepaja, as well as planning the development of the coast of Western Kurzeme, with a focus on environmental issues and tourism. It is also a well-planned example of the mobilisation of national and international funding. Research funded by PHARE is followed by infrastructure developments funded by the national and Liepaja municipal budget, World Bank and NEFCO loans, as well as grants from Sweden, Finland and Denmark.

This principle envisages the mobilisation of all available resources and a concentration of efforts in order to solve a specific problem. An example of such an approach can be found in Box 5.

Decentralisation principle: Since environmental problems are often localised, environmental activities should be implemented at the local or regional level. The national government should intervene only in cases when a lower level administration cannot solve a specific problem, or the desired efficiency can only be achieved with the help of higher level administration.

The polluter pays principle: In a market economy, the prices of goods and services should reflect their overall costs of production (including the cost of any related environmental degradation). This real cost should also include a polluter's duty to abate or

* End-of-pipe pollution abatement is a counter-productive approach to avoiding waste which only considers the neutralisation of waste products after they have been discharged into the environment without looking for technological or other measures that would reduce the output of waste products in the first place. 'End-of-pipe' measures should be performed only in cases when there are direct threats to human health or the stability of ecosystems.

cease pollution and to cover all costs associated with it. Use of State budget funds for the total coverage of environmental costs is not desirable. During the transition period, if State investments must be used for the clean-up of highly polluted spots, for the abatement of pollution for which nobody can be proven liable, this principle cannot be applied in full.

Precautionary principle: This is the main principle in preventive environmental protection. If possible, the solution of environmental problems should already have started before complete scientific evidence of its causes has been received.

'From cradle to grave' principle: The trail of hazardous substances should be recorded from their initial production to the moment of their final disposal*.

The principle of the use of the best available technologies and application of the best practicable measures: Dangers to the environment should be prevented (voluntarily, and if necessary, by the application of laws), by modifying or altering technologies, and by the application of environmentally-friendly measures wherever possible. This principle also promotes the development and introduction of environmentally-friendly technologies.

The substitution principle: Wherever possible, substances and processes that are not environmentally-friendly should be substituted by ones that are. From the point of view of sustainable development, if the resources required for the manufacture of environmentally-friendly products are limited, they should be taken out of circulation and substituted by something else.

3.3. Policy pre-requisites

To develop and successfully implement environmental policy, three main prerequisites are necessary:

- a properly functioning information system,
- environmental institutions and organisations,
- public awareness.

3.3.1. Environmental information system. Monitoring

Adopting and implementing any environmental decision, as well as evaluating its results, is impossible without adequate information. The benefit of environmental policy directly depends on the quality of the information used to develop it. Therefore, Latvia needs a well-developed environmental information system that ensures information for decision makers and the public (see "3.2. Policy principles").

In order to develop a unified environmental data system in Latvia, it is necessary to compile information from the following major sources: science, monitoring of all types, data from statistics and cadasters.

Scientific studies have long-standing traditions in Latvia. As technologies develop and change and humans leave their impact on the environment, new problems appear, to which it would be necessary for science to react in an operative way and provide advice as to potential solutions for these problems. At present, fundamental scientific studies are funded by the State budget, international programmes and in a few cases by private sources. A programme for Latvian nature resources and ecological stability has been established to provide funding for applied research.

Co-ordination of fundamental (pure) and applied research in accordance with actual needs is very important, particularly so that limited financial resources and scientific staff

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* Final disposal - the method of neutralisation applied to each type of waste (incineration, biodegradation, dumping, etc.). The meaning of this term may change for different types of waste depending on the level of technology development.

may be utilised with maximum efficiency. The NEPP lists priority problems and possible measures for their solution, providing directions for scientific research. Science also provides the basis for the development and improvement of environmental education systems.

Monitoring falls into three functional blocks: monitoring of environmental quality, policy implementation monitoring and early warning monitoring.

Environmental quality monitoring involves the systematic observation of the natural environment in order to determine and evaluate changes created by natural or human processes. It also includes the observation of pollution emissions, their concentration and distribution, and the monitoring of ecosystems.

Goals of environmental quality monitoring are to:

- continuously observe the quality/state of the environment, thus creating the basis for performance of different types of research, and evaluation of environmental quality trends;
- evaluate the impact of pollution on human beings and the environment as a whole to determine possible cause-effect relationships.

Environmental quality monitoring by the State should be diverse yet unified, and responsibility for its management and efficient functioning should be united within one State institution. It is also important to develop local monitoring networks that would cover specific administrative or physio-geograhpical regions, in order to ensure detailed information about the total environmental situation.

Policy implementation monitoring is the systematic evaluation of changes in the environmental situation in connection with the operation of policy instruments, based on cause-effect relationships: anthropogenic impact on the environment - changes within the environment - reactions of society (including those of State administrative institutions). Thus, environmental quality monitoring is one of the main elements used in the development of environmental policy and the evaluation of its efficiency.

Early-warning monitoring is an environmental policy instrument whereby any dangerous changes in the environmental situation may be determined at the earliest possible point in time. Its functions are to provide operative information for immediate action and the preparation of short-term forecasts (see "4.7. Early warning monitoring").

In addition to the sources mentioned above, resource registers (cadasters), information on the State’s socio-economic situation and development trends (provided by State statistics) and public opinion surveys are also important sources of information for the development and implementation of environmental policy.

Adoption of decisions that are appropriate for an actual situation and effective from an environmental perspective are only possible when all this information is analysed in total.

3.3.2. Environmental institutions and organizations

Taking into account the fact that environmental problems concern each and every level of State administration, every branch of the national economy, every enterprise, organisation and individual resident, the solution of environmental issues will only be successful when integrated into all aspects of the nation’s economy and social spheres. Thus, some form of union of evironmental institutions and organisations is necessary - and this is a pre-requisite for the development of cohesive environmental policy. Such a union should include State administration institutions (see "4.2. Environmental infrastructure and institutions"), non-governmental environmental and nature protection organisations, and other intermediate organisations that deal with the solution of separate problems or groups of problems.

State administration institutions cannot set tasks for NGOs, but it is the duty of NGOs to provide information about the environmental situation, and possibly to point out major problems and directions for work.

Environmental organisations/structures alone cannot achieve a significant improvement in the environmental situation, since users/ target groups play the decisive role (see Box 6).

Box 6. Target groups

A target group is a section of the public referred to in a specific case, united by some common interests (industrialists, farmers, consumers etc.), and that as a whole in some way influences an environmental situation as a unified force. A single person may belong to different target groups simultaneously (e.g. a farmer may also be a consumer). Depending on how diverse a spectrum of common interests is relevant, wider (e.g. energy) or narrower (e.g. chemical industry or fishermen) target groups may be selected. As the State cannot solve environmental problems alone, co-operation with all the target groups is important for it, i.e. co-operation with decision makers representing the interests of a certain group, while at the same time representing the interests of the government in the group. Policy goals may be achieved only when all groups in the society support the policy.

Co-operation with target groups is problematic in a transitional society. Many important groups (e.g. industrialists, farmers, housewives, consumers) are not yet organised enough to be represented on the national level. Thus policy makers do not have adequate discussion partners with whom to discuss problems, measures and activities.

3.3.3. Public awareness

Public awareness is another pre-requisite for the development and implementation of environmental policy, since efficiency of environmental measures is directly dependent on the level of knowledge, understanding of situation and sense of responsibility of all the persons involved in the process. Therefore general environmental education and the development of public awareness is of the utmost importance. The higher the level of public awareness, the wider and more effective will be public participation in the elaboration and implementation of environmental policy.

The main instruments for building public awareness are environmental education and communication (see "4.10. Environmental education", "4.11. Communication").

4. Environmental policy instruments

Summary

Policy instruments are tools to implement desirable changes and achieve certain goals. They are generally grouped as follows:

- the legal system,
- environmental protection institutions,
- economic instruments,
- environmental control,
- environmental impact assessment,
- territorial planning,
- early warning monitoring,
- national programmes,
- environmental education,
- communication systems.

This Chapter briefly describes each group of policy instruments, their practical application in the past and present, as well as necessary activities for improvement of the present system.

Polluters, that is producers and consumers, should be responsible for the environmental pollution they cause. It is possible to use policy instruments to change the activities of these target groups so that they do less harm to the environment. It is the responsibility of the State administration system to implement them.

The spectrum of policy instruments is wide, so when applying them it should be ensured that they are relevant to the targeted groups or environmental situations. A combination of instruments is often used to minimise obstacles that hinder solutions. In order to evaluate which instruments should be used, the following criteria apply:

⇒ efficiency (such instruments should be selected that solve several environmental problems simultaneously);
⇒ cost effectiveness;
⇒ acceptable to both decision-makers and the public.

4.1. The legal system

Legislation is one of the most important instruments for implementation of environmental policy. As in any other field of law, environmental law may be divided into two parts:

- umbrella laws that sanctify general policy goals;
- subordinate legislation, rules, regulations, etc., that specify norms, codes and the functions of government agencies.

The Constitution (Satversme) has a higher legal standing than any other law. Unfortunately, since it was adopted quite some time ago (in 1922), it does not include any provisions directly pertaining to the environment. In the constitutional law of the Republic of Latvia on ‘Human and civil rights and duties’ (1991) there is the following provision: ‘The protection of nature, cultural environments, landscapes, historical and architectural monuments and the environment shall be the duty of every individual, the general public and the State. Laws shall provide the general framework for environmental protection in Latvia, which shall then be further specified in other enactments (Cabinet decisions, regulations, orders etc., orders issued by the Prime Minister, other enactments issued by public

administration institutions within the scope of their competency, local government enactments, etc.)'

As in the rest of the world, Latvian environmental law was initially closely connected with the regulation of the use of natural resources. Therefore many doctrines of environmental protection are found in laws/acts/regulations that regulate the use of natural resources. The most important of these are the following:

- On the Use of Land and the Organisation of Land Use (1991)
- Code on the Use of the Earth's Sub-surface Resources (1976) (a new law On the Use of the Earth's Sub-surface Resources is presently being drafted)
- Water Code (1972)
- On the Use and Managment of Forests (1994)
- On the Use and Protection of Animals (1981)
- On Protection of the Atmosphere (1981)

During the 1990s, work has been undertaken on drafting laws necessary for the solution of specific environmental problems. To date, the following laws have been adopted:

- On Environmental Protection (1991)
- On the State Ecological Expertise (1990)
- On the Environmental Protection Committee (enacted in 1990, but revoked in 1993 due to the establishment of the Ministry for Environmental Protection and Regional Development)
- On the Natural Resources Tax (1990)
- On Hazardous Wastes (1993)
- On the Particularly Protection Natural Territories (1993)
- On Radiation and Nuclear Safety (1994)
- Regulations on the Republic of Latvia's State Environmental Protection Inspection (1990)

For a short commentary on the above laws refer to Appendix 1.

A very important group of laws are those which are not directly connected with environmental protection, but are necessary to administer the enforcement of other laws. These are:

- Administrative Liability Code of Latvia (1984)
- Criminal Code of Latvia (1961)
- The Civil Law (1937) was restored in 1992. It specifies the fundamental principles of civil liability. In it, liability is apportioned as determined by other enactments, e.g. Cabinet regulations and decisions. However, sanctions, fines, rates of compensation, etc., for crimes against the environment are not mentioned and therefore the law needs to be amended.
- Labour Code of Latvia (1972) and Cabinet regulations 'On Disciplinary Penalties for Public Servants' (1994).

In order to solve environmental issues more efficiently, the above listed laws are not enough. Inclusion of environmental requirements in other enactments has been performed in part. It is particularly necessary for laws governing entrepreneurial activity, for example, in the laws 'On Entrepreneurial Activity' (1990), 'On Procedures for Staying the Operation of Enterprises, Institutions and Organisations' (1991), as well as enactments governing privatisation, e.g. in the law 'On Land Reform'.

At present, many environmental issues are not regulated at all by legislation or the existing laws are outdated and in need of redrafting. Work has commenced on drafting the following laws:

- On the Use of the Earth's Sub-surface Resources (draft concept approved by the Cabinet of Ministers)
- On the Protection of Species and Biotopes
- On Chemical Substances
- On Air Protection
- On Protection Belts (draft adopted by Cabinet is presently being discussed in Parliament (Saeima))
- On Mandatory Liability Insurance for Damage to the Environment
- On Household Waste

The following laws are very necessary, however work on their drafting has not yet been started:

- On the Use and Protection of Water
- On Industrial Waste
- On the Rational Use and Protection of Land Resources
- On the Protection and Maintenance of Landscapes etc.

Along with those laws pertaining directly to environmental protection, there are also a number of legal norms that touch upon the field indirectly, such as the law 'On Regional Development' (concept being drafted), 'On Tourism' (being drafted), 'On Food' (being drafted), 'Construction Regulations' (adopted by the Cabinet in 1995, currently being redrafted into a law).

Many specific environmental problems are tackled by enactments adopted in the past by the Council of Ministers or presently by the Cabinet of Ministers. They cover environmental protection, hunting, fishing, water protection, pollution, forest protection, hazardous sites/risk objects. Decision No 107. adopted by the Council of Ministers of the LSSR 'On particularly protected nature objects in the territory of the LSSR', dated April 10, 1987 in one example of this. This decision approves lists of territories and objects under special protection, lists of species under special protection, the fundamental provisions for the protection of the said territories, objects and species, and regimes of coastal protective zones along the Baltic Sea and the Gulf of Riga.

In the near future, it is planned to draft new Cabinet regulations on the issues of radiation and nuclear safety, on environmental monitoring, on nature objects and territories under special protection, and more.

It is important to note that until they are revoked or superseded, the legislation of the Latvian SSR still apply, provided they are not contrary to the Republic of Latvia Constitutional Law of 1991 'On the national status of the Republic of Latvia'. This is provided for by the Decision of the Supreme Council of the Republic of Latvia 'On the application of legislation of the Latvian SSR in the territory of the Republic of Latvia' dated August 29 1991, as well as by the Declaration of the Supreme Council of the Latvian SSR 'On the restoration of independence of the Republic of Latvia' dated May 4 1990.

Standards and norms of the Latvian SSR and the USSR are also applicable until new ones are drafted or the existing ones are explicitly revoked pursuant to Decision No 337 of the Council of Ministers of the Republic of Latvia 'On the application of norms and technical standards in the Republic of Latvia' dated August 14 1992. The drafting of new standards is time consuming and expensive, therefore change needs time.

In accordance with the political orientation of the Republic of Latvia towards the European Union, it is planned to co-ordinate enactments (including standards and norms) with EU directives. By 2005, the EU system of standards and normatives should be completely introduced in the Republic of Latvia. Thus, the necessary standards and norms need to be developed and existing ones improved. Where Latvian standards and norms are

stricter than those applicable in the EU, it will be necessary to determine whether they should remain as they are or modified in line with EU standards.

Box 7. Standards for the quality of sludge produced by waste water treatment facilities

The standards for sludge quality in wastewater treatment facilities are much stricter in Latvia than in the EU and Germany: Ni standards are 3 to 4 times stricter; Cr exceeds German standards by 4.5 times; Cu exceeds EU standards by 2 to 4 times; Cd exceeds EU standards by 1 to 3 times. The relaxation of these standards is not envisaged.

Latvian environmental legislation is influenced also by signing of international agreements. Latvia has become party to several conventions and several others are signed and prepared for ratification. A list of international environmental conventions ratified or prepared for ratification is given in Appendix 2.

Convention requirements have also been included in Latvian laws. If an international agreement provides for different requirements than legislation of the Republic of Latvia, provisions of the international agreement apply unless Latvian laws provide for stricter requirements.

Latvia has also signed bilateral and multilateral international agreements on environmental co-operation. Such agreements have been signed with Germany, Sweden, Finland, Estonia and Belarus. Work in underway regarding bilateral agreements with Lithuania, Kazakhstan, Russia, Poland, as well as on a trilateral agreement between Estonia, Lithuania and Latvia.

While the system of environmental legislation has been established in part, some laws still require the development of supporting rules, regulations, standards, etc., in order to implement all the provisions within the law. Also, for the effective application and enforcement of laws, proper guarantees are necessary, such as a system of State environmental administration institutions, material and technical support (e.g. guaranteed budget funding), environmental education, State and other types of environmental control, etc. Therefore, while laws are without doubt a good foundation for the implementation of environmental policy, they cannot guarantee it. Therefore, other environmental policy instruments need to be applied together with legislation.

4.2. Environmental infrastructure and institutions

`Overview of the present situation` gave a brief overview of the background of the establishment of environmental institutions in Latvia. In 1993, the Ministry of Environmental Protection and Regional Development was established in order to bring environmental issues closer together with issues of development and the national economy, and to unite instruments for the implementation of environmental policy with those of other sectors, such as territorial planing, to promote the sustainable development of the nation. The Ministry has a well-developed system of subordinated organisations and a network of regional administrative institutions. However, changes are still required in institutional structure and operational mechanisms. The following are considered priorities:

- co-ordination of operation of all sectoral institutions in accordance with environmental requirements: efficiency of environmental policy may be ensured only by goal-oriented co-ordination between sectoral institutions, to prevent the setting of general economic targets irrespective of their environmental impacts;
- improvement of the structure of the Ministry for Environment and Regional Development, and increasing its efficiency;
- establishment of a unified environmental data system, paying particular attention to the improvement of the system of environmental pollution control laboratories;

- decentralisation of environmental protection, with increased environmental involvement by local government structures and other organisations;
- co-operation of environmental institutions with NGOs, including the establishment of public and private consulting structures.

4.3. Economic instruments

Parallel to the application of legal and administrative instruments in environmental policy implementation, application of economic instruments is increasing. In many cases they are more efficient, since they have an immediate effect on a polluter's budget. The importance of economic instruments is increased by the growth of production and consumption, as well as the increase of pollution abatement costs.

The goal of economic instruments is to reduce pollution by ensuring that polluters and consumers make the best choices for the environment voluntarily. In fact, they establish financial feedback links between polluters and the public. Without economic instruments, it would be necessary to provide additional funding for the implementation of environmental projects.

The main principles for choosing economic instruments should be the following:

- the polluter pays;
- they should promote activities to abate pollution;
- they should be simple and flexible;
- they should be fair towards different polluters;
- amounts collected for pollution should be used for environmental investment in regions that suffer due to a specific polluter;
- amount of financial compensation to be paid by the polluter should be determined on the basis of measurements, not theoretical calculations.

The natural resources tax was introduced in 1990 to conserve natural resources and limit environmental pollution, as well as to accrue funds for financing environmental activities. The tax consists of two parts: a base rate for the use of natural resources and for permission to pollution within specified limits; and penalty rates for excessive pollution and use of resources.

To date, the tax has not promoted pollution abatement and resource conservation because the rates have devalued, even though revised several times. The tax revenues are also inadequate to compensate damage to the environment. It is cheaper for a polluter to pay a fine for excess pollution than to invest funds to avoid it.

At present, due to inadequate pollution monitoring technology, taxes and fines are based on calculations instead of measurements. These calculations often don't reflect the actual situation.

A new law on the natural resources tax has been drafted. In the new law, taxes will be paid for abstraction (use) of natural resources, emission of pollutants into the environment, environmental or resource degradation, and the sale or import of goods and products harmful to the environment.

The draft also provides for the application of several new economic instruments.

- An expansion of the notion of use of natural resources, introducing the expression *goods or products harmful to environment*; use of such products and services is subject to excise tax. Such goods include fuels (coal, liquid fuel, gas, peat), gasoline, batteries and accumulators, ozone-depleting substances, fluorescent lamps, different types of packaging, etc.
- The increase and better preparation of tax rates for the use of natural resources and environment pollution

- The introduction of emission licences, investment tax credits and a CO2 tax to be collected as excise on fuel.

Apart from the natural resources tax, the following economic instruments are available and often used in Latvia:

- Subsidies, e.g. budget subsidies, subsidies by the Environmental Fund or different foreign donors, soft loans.
- State loan guarantees - the State extends guarantees for loans necessary to implement such projects that solve State priority environmental problems, provided the respective local government is capable of implementing the project (this is also supported by the environmental policy principles regarding projects that are nationally acceptable and locally practicable).
- Tax relief for environmental investments not provided for by the present taxation system.
- Administrative charges for issuing permits and licences.
- The State Environmental Fund to make payments for environmental damage.
- Compensation for environmental damage.

Besides the natural resources tax, compensation for environmental damage is one of the most widely applied economic instruments. It is also one of the forms of liability for environmental violations. Compensation for damage is usually set in accordance with specific calculation rates for losses that are determined taking into account the notional value of natural resources, costs for their renewal or clean-up, including a fine as a penalty for the element of violation. Rates for loss calculation are set by Cabinet decisions or decisions or orders of specific ministries. Compensation of losses is usually applied together with other forms of liability for environmental violations, but in the case of damage to the environment, losses have to be compensated irrespective of whether the person has been held liable in any other form. The guilty party may compensate losses voluntarily, otherwise they are collected by enforcement measures following a court order.

In the future, prices of goods and services should include environmental costs, which is not the case at present. Methods for determination (calculation) of environmental protection and remediation should be developed and elaborated. In general, the importance of economic instruments will continue to grow.

The main goal for Latvian environmental investment policy should be to promote environmentally-friendly investment, including public and private, domestic and foreign. The main focus should be on solving local problems, while keeping in mind regional and international problems.

4.4. Environmental control

4.4.1. State environmental control

State control over compliance of environmental protection and regional development requirements in the territory of the Republic of Latvia is performed by the State Environmental Inspection (SEI), the regional Environmental Protection Committees, as well as the administrations of nature reserves under special protection. SEI implements State control over the use of natural resources and construction in the territory of the Republic of Latvia, its continental shelf and the economic zone of the Republic of Latvia in the Baltic Sea. The main function of SEI is enforcement - to ensure that all legal entities and physical persons observe the environmental enactments of laws providing for the use of natural resources and construction requirements, as well as to ensure that legal entities and physical

persons fulfil their commitments to public programmes, plans, projects, the use of natural resources and construction.

4.4.2. State environmental expertise

The function of the State Environmental Expertise is to evaluate the environmental impact and permissibility of economic or other activity, and to perform assessments of construction projects. Not only projects concerning choice of location, construction, reconstruction, etc. of objects of economic activity are subject to this assessment, but also drafts of legal documents governing economic activity, different sectoral and territorial development plans, research programs, etc. that may have an impact on the environment. When considering design or reconstruction plans, the preservation of landscapes and historic structures is taken into account.

State Environmental Expertise performs a comprehensive assessment with respect to a specific situation and submits their recommendations. These recommendations form an impact assessment from an environmental and construction point of view. At present, the State Minister for Environment approves the final recommendations on the environmental impact of a project. The public also has the legal right to express its opinion about prospective projects. However, it does not always make use of these rights.

A maximum term of three months is allocated for performance of an Expertise assessment. At present, post-project assessment is not yet performed. For proposed sites of economic activity, of project documentation is checked for compliance with the ecological target set before the start of design, and for compliance with existing laws.

4.4.3. Other environmental controls

Local governments may also exercise control over compliance with environmental requirements in their administrative territories. In the future, local government control may be quite significant, especially if they are delegated the responsibility to solve environmental problems in their territories.

Self-control by polluters (of emissions, technologies, products) is of great importance. It is expected to increase in the future along with the growth of public awareness and orientation towards the standards of the European Union. Involvement of the public and individuals in control is also very important.

4.5. Environmental Impact Assessment (EIA)

An EIA attempts to determine the potential impact of some economic activity upon the environment, biodiversity, human health and society. EIAs can be used to evaluate ‘projects’, such as new constructions or renovations, as well as proposed policy changes. The result of an EIA should be an impact assessment and comparison of alternative scenarios, leaving the decision making to local governments or the national government. A significant role in the EIA process is allocated to public participation in the course of design and assessment of the final project.

In the future, the government plans to establish an EIA institution, by licensed experts and designers, to perform EIAs, co-ordinate projects (i.e. current practice) and control compliance with EIA requirements and recommendations. Establishment of such an institution would be provided by a new ‘Law on EIA’ which should also provide that EIAs evaluate possible impacts on human health, the social consequences of projects, as well as the effects of any past and planned environmental protection activities.

4.6. Territorial planning

Territorial planning, which is a part of development planning, involves the elaboration of a plan for a specific territory, taking into consideration forecasts based on social and economic development programmes. In a territorial plan drafted at a national, regional or local level, present land use, natural characteristics, economic characteristics, requirements for environmental protection, as well as environmental impact of every planned activity within the territory are subject to a balanced evaluation.

Thus, territorial planning is an instrument for implementing environmental policy, which attempts to regulate the interaction of the public and the environment, and set requirements and provisions for solving specific environmental problems. It is of particular significance in connection with such priority environmental problems as the reduction of biodiversity, landscape degradation and unsustainable use of natural resources. In this respect, territorial planning is closely related to EIAs for new projects (see "4.5. Environmental Impact Assessment"). Territorial planning performs preventive environmental protection functions.

Within existing capability, it is necessary to develop territorial plans for the territory of Latvia as a whole, for its separate regions, towns and pagasts (the smallest rural administrative unit).

The procedures for territorial planning are provided by the Cabinet regulations ‘On Territorial Planning’ (1994).

4.7. Early warning monitoring

Monitoring can be functionally divided into three types: environmental quality monitoring, policy implementation monitoring and early warning monitoring. Only early warning monitoring can be considered a policy instrument. The remaining types are environmental policy pre-requisites (see "3.3. Policy pre-requisites").

The main objective of early warning monitoring is to ensure responsible institutions and the public with prompt information and short-term forecasts about hazardous changes in the quality of the environment in order to allow for the effective abatement of threats to human health and ecosystem stability, and even the consequences of previous environmental mismanagement.

At present, early warning monitoring in Latvia is generally based on the environmental monitoring system. It is necessary to develop transboundary pollution monitoring systems to a greater extent, as well as local monitoring networks in dangerous areas and at hazardous sites (see "5.1. Transboundary pollution". and "5.3. Risks created by economic activities").

Monitoring in areas of increased danger is an instrument of vital importance to reduce the possibility of accidents or mitigate their consequences.

4.8. Covenants

In developed countries, covenants (or voluntary agreements) are increasingly being practised in the environmental sphere between two or more interested parties; such as between a local government and a local landowner or two private landowners. Covenants offer several benefits towards achieving environmental goals.

If a covenant is signed under circumstances when the system of standards governing provisions for the solution of a specific environmental issue is in good order, it provides the opportunity to accelerate implementation of the necessary activities for reaching the set goals.

If a covenant is signed under circumstances not fully governed by the system of enactments, it provides the opportunity to take the necessary steps quickly by direct involvement of the interested parties (e.g. implementation of provisions of EU directives). Under such an agreement, interested parties can also be involved in the setting and implementation of standards. In such a case, politicians become responsible only for the setting of environmental for specific target groups. Responsibility for achieving those goals is assumed by the interested parties.

From the legal point of view, the status of a covenant is not fully clear yet. Latvian laws do not provide for the application of this instrument at present, but there are several cases when it has already been used, e.g. in agreements between a land user and local government on land management in protected areas. Another successful example of a covenant is the protocol signed in March 1995 on the protection and development programmes for the Abava valley.

The importance of this policy instrument may increasingly grow in the future.

4.9. National programmes

The Republic of Latvia's Cabinet of Ministers' Declaration of 1993 provides for the development and implementation of national programs for the country's gradual realization of its economic plans.

Also, the Republic of Latvia's Cabinet of Ministers' Declaration of 1994 refers to national programs as the main instrument for development promotion. Therefore, this policy instrument should be applied also in the future.

The concept of national programs elaborated by the Ministry of Economy provides that 'national programs are developed in order to achieve the most important goals of the government's economic policy'.

The following programmes are currently under elaboration:

- National programme for the development of rural areas of Latvia, providing for the reduction of unemployment, and development of infrastructure and industries derived from production.
- National environmental program for the Baltic Sea, with the aim to mobilize by the year 2000 local, national and international intellectual, financial and material resources to implement projects complying with recommendations and requirements of the Helsinki Commission and EU in at least ten point sources of pollution that present the greatest hazards to the environment and human health in the basin of the Baltic Sea.
- Public investment program: At present, economic reform in Latvia is aimed at the development of the private sector, but this is impossible to achieve without well-developed infrastructure. In order to plan, co-ordinate and evaluate prospective allocations of public investment, taking into consideration resources available and the development priorities of the national and sectoral economies, the Public Investment Department at the Ministry of Economy, on the basis of sectoral strategies elaborated and projects submitted by sectoral ministries, has elaborated the Public Investment Programme.
- National indicative programme: The aim of this programme is to gather information about the supply and demand for foreign technical (non-refundable) assistance, and to ensure its efficient and purposeful use in accordance with the priority development directions set by the government. The programme for 1995-1997 has been elaborated by the Ministry of Finance's Department for Foreign Economic Relations in co-operation with sectoral ministries, in accordance with the priorities set by the government.

In the future, programmes may develop into one of the main forms of environmental policy implementation, as it is in many countries, where a specific programme is developed for the implementation of every political goal or the solving of a priority problem, with a specific plan of activities, organizational structure, timetable and regular State budget funding.

In Latvia, such programmes might be the following:

- environmental protection of watercourses in the Baltic Sea basin,
- air protection,
- waste management,
- protection of biotopes,
- promotion of clean technologies,
- reduction of production risk,
- abatement of transboundary pollution,
- environmental education,
- use of the Earth's sub-surface resources.

4.10. Environmental education

Education is one of the main instruments for the raising of public awareness, both within the government and parliament, as well as within the general population. As an environmental policy instrument, education is necessary in order to:

- increase the level of public knowledge about environmental processes and trends;
- increase public interest and knowledge about problems associated with environmental protection and remediation;
- increase the public's sense of responsibility;
- increase practical public support for the solution of problems associated with environmental protection and remediation by responsible State institutions;

Existing education programmes should provide enough environmental knowledge for students at schools and higher educational establishments whose speciality is not directly related to environmental issues. Qualified staff are necessary for teaching environmental issues. Careful planning for the preparation of environmental specialists is necessary.

At the same time, it is necessary to seriously consider in-house training of officials at all levels on environmental issues.

The goals of environmental education are to:

- promote sustainable public development - balance the spiritual and material needs and interests of society;
- increase public responsibility and active public involvement in environmental protection and remediation;
- educate the general public about environmental issues by increasing their level of knowledge and broadening self-education possibilities;
- involve responsible organisations, education institutions, experts and activists in the process of environmental education and support local initiatives.

4.11. Communication

The Republic of Latvia law 'On Nature Protection' provides that residents of the Republic of Latvia have the right to receive complete and truthful information about the actual quality of any environmental medium - the Earth's surface and sub-surface, soil, water, forests, air, etc., within the Republic. It also defines the legal rights of the public and public organizations with respect to the implementation of environmental activities.

Communication is a continuous, mutual exchange of information between decision-makers and the public at large. It is a very important policy instrument of major significance to the whole process of policy implementation. In every stage of policy development and implementation, the role of communication is different, but each stage should be interconnected.

The functions of communication are:

- to make information available to the public;
- to focus public attention on separate problems or groups of problems, making them policy priorities;
- to involve the public in the discussion and solution of specific problems;
- to inform the public about new developments in different fields, thus promoting the exchange of opinions and knowledge;
- to influence changes of public behaviour and attitude.

The public should have a central role in the elaboration and implementation of environmental legislation and policy. Through the experiences of individuals, the public perceives the environment and its problems on a wider scale than do public administration institutions.

Environmental protection is a process that requires the co-operation of all involved parties - different levels of public administration, the national economy and residents. Public involvement can benefit any of these groups, as well as society in general.

The benefit of public involvement in environmental is the possibility for individual residents to take part in decision making. Most significant is the belief that each and every individual can influence the decision adopted.

Public participation requires enterprises to offer a detailed account of their production processes and sources of pollution. Public participation can help industrial enterprises discover drawbacks in production techniques and inefficient uses of raw materials or energy, which when rectified may lead to significant cost reduction and make it unnecessary to install expensive pollution reduction facilities. Another significant benefit for producers is wider information about the requirements of consumers and potential markets.

Public administration institutions also benefit from public involvement in environmental protection processes. When public groups exchange opinions about processes near homes, the government obtains more accurate information, which allows it to avoid making poor environmental decisions. Public involvement in environmental activities also helps to establish environmental lobby groups.

The sooner the public starts to participate in policy elaboration, the sooner and better public opinion will be observed. By involving the public, more and more diverse aspects of an issue appear. Even if the final decision does not agree with public opinion, the public would at least understand why the decision was made. Even if public involvement may slow a decision, it provides the opportunity to save time and money in the future by avoiding long and painful discussions after a decision has been adopted.

It is easier to ensure public participation by working together with specific target groups (see Box 6).

5. Overview and analysis of priority environmental problems

Summary
This chapter discusses and analyses in detail priority environmental problems. Three criteria have been used for their selection:

- the problem poses a serious threat to human health;
- the problem may create irreversible changes in ecosystems, thus reducing biodiversity or degrading the landscape;
- Latvia's international obligations foresees the taking of active measures to solve the problem.

While 45 problems were identified when analyzing Latvia's environmental situation, the following were found to be of priority importance:

- transboundary pollution;
- eutrofication of water courses and the degradation of aquatic ecosystems;
- risks caused by economic activity;
- impact of wastes on the environment;
- impact of transport on the environment;
- impact of agriculture on the environment;
- depletion of biodiversity;
- landscape degradation;
- inefficient use of natural resources;
- low quality of drinking water.

For each of those problems, several possible solutions are offered and policy instruments are suggested for their implementation. Appropriate time frames have also been suggested (short term - up to 5 years, medium - 5 to 15 years, long-term - over 15 years), as well as the most appropriate level of policy elaboration and implementation - international, national or local. Problems have been arranged in order from long-term and international to short-term and local.

Environmental problems in Latvia are various, interrelated, and quite complex (see Box 8). However, since it is not possible to solve all environmental problems in a country simultaneously, priority environmental problems which should be tackled without delay and on which the government should concentrate all its attention, effort and funds, have been singled out.

The following criteria were used for the determination of priority problems:

- the problem poses a serious threat to human health;
- the problem may create irreversible changes in ecosystems, thus reducing biodiversity or degrading the landscape;
- Latvia's international obligations foresees the taking of active measures to solve the problem.

Box 8 Environmental problems
Here and hereinafter, environmental problems are defined as undesirable changes in the environment resulting from human activity, that have a negative impact on human health, ecosystems or the capability of the environment to perform the functions necessary for human beings.

With the help of these criteria, ten priority environmental problems have been determined. An analysis of each problem will follow further in the chapter.

Analysis of each problem is followed by a description of applicable solutions. Some solutions are oriented towards causes and therefore are the most effective. Others are oriented towards effects and are therefore considered additional measures, to be applied only in cases when their application is inexpensive and produces a significant result.

Radiation and nuclear safety cannot be considered priority problems, since Latvia does not have a nuclear programme and there are no large nuclear sites in its territory.

However, taking into account the considerable public interest in these issues, as well as the amount of necessary capital investment, a detailed overview of them is provided in Appendix 3.

5.1. Transboundary pollution

Though environmental problems are often of local origin, they usually manifest themselves over a much wider territory, and in the long run sometimes transform into regional or even global problems. Examples of this would be marine pollution, eutrofication, acid rain, climate change and ozone layer depletion. Of course, solving such problems would have global, regional and local impact. Therefore, when solving a specific problem, internal national interests should be co-ordinated with international ones; reasonable economic and environmental policies should be elaborated with an emphasis on local problems, but at the same should also consider limiting transboundary pollution from Latvia.

In this section, groups of problems connected with transboundary air pollution (including global climate change and ozone layer depletion) and transboundary water pollution are discussed.

5.1.1. Transboundary air pollution

Target:
to abate the formation of potential transboundary pollution and its transfer between Latvia and neighbouring countries.

Transboundary air pollution influences air quality not only in our country, but also in neighbouring countries, impacting on human health and ecosystems. First and foremost, two global problems that attracted profound international attention should be mentioned: depletion of the ozone layer and climate change caused by the greenhouse effect. Both these problems have been created by human economic activity.

5.1.1.1. Ozone layer depletion

At present, ozone layer depletion is one of the most serious global environmental problems. During the mid-70s it was observed that the layer of the Earth's atmosphere which absorbs the sun's ultraviolet rays that are harmful for human health and environment, stratospheric ozone layer, was being rapidly depleted. It is now considered that chemical substances synthesised by man are the cause for ozone layer depletion.

Possible consequences of ozone layer depletion are decreased rate of photosynthesis, damage to flora and fauna, increased risk of skin cancer, and the activation of air pollution problems associated with photo-chemical processes.

In order to protect the ozone layer, a convention 'On the Protection of the Ozone Layer' was signed in Vienna in 1985, in which the member states undertook an obligation to implement the necessary political, scientific and technical measures to abate further depletion of the ozone layer.

In 1987, a protocol 'On Substances Destroying the Ozone Layer' was ratified in Montreal. The protocol listed ozone layer depleting substances, as well as terms for the exclusion of the named substances from products.

In 1994, in order to implement the requirements of the Montreal Protocol, MEPRD started elaborating a national programme 'On the Exclusion of Ozone Layer Depleting Substances (OLDS) from Economic Activity'. At present, the programme has been drafted

and it will be adopted by the Cabinet of Ministers. It is expected that Latvia will join the Vienna Convention and its Montreal Protocol in 1995.

The only measure for solution of the problem of ozone layer depletion is the *exclusion of ozone layer depleting substances from economic activity*. The following instruments are applicable for implementation of this measure:

- a direct ban (preferably, a gradual one) on the use and sale of OLDS (OLDS are not produced in Latvia). Such a ban is provided for by aforementioned international agreements;
- changes of technology that would allow abandoning the use of OLDS. International agreements provide that such technologies should be transferred to countries in transition on preferential terms. When a country in transition joins the Montreal protocol, international sources of financing become available to it. The Latvian government has also provided that part of the costs necessary for the substitution of OLDS with substances not harmful to the ozone layer will be covered by the Nature Resources Tax;
- involving consumers - a public information programme, and promoting the popularity of products not containing OLDS.

Box 9. Use of OLDS in Latvia

Ozone layer depleting substances (OLDS) listed in the Montreal protocol of the Vienna convention are widely used in Latvia. OLDS are particularly used by Latvian producers of aerosols (factories LARS-M, AEROSOLS and ALAT) and compressors (KOMPRESORS). As well as this, OLDS are also used in refrigerants, the production of foam-rubber and foam-plastic, the fumigation of grains, the recharging of fire-extinguishers and in solvents.

According to 1993 data, the majority of OLDS in Latvia is used for the production of sprays (about 75...80%), refrigeration equipment (15...18%) and production of hard and flexible foam (foam-rubber) 3...5%. (Source: MEPRD).

5.1.1.2. Climate change caused by the greenhouse gases (GG).

Atmospheric gas particles - both of natural and anthropogenic origin - that absorb and re-emit infrared rays are called 'greenhouse gases' (GG). It is considered that the increase of such gases in the atmosphere causes a natural greenhouse effect that leads to additional warming of the Earth's surface and its atmosphere, and leaves a negative impact on natural ecosystems and mankind: changes of temperature directly influence precipitation cycles, wind direction and oceanic currents.

Box 10. Greenhouse gases (GG)

The following are greenhouse gases: water vapour, carbon dioxide (CO2), methane (CH4), dinitrogen oxide (N2O) and tropospheric ozone (O3), as well as carbon monoxide (CO), nitrous oxides (NOx), non-methane volatile compounds (NMVC), and CFCs that form greenhouse gases as a result of chemical reactions.

The UN general convention 'On Climate Change' has been developed with the aim to reduce emissions of GG. It is aimed at achieving stabilization of GG in the atmosphere to a level posing no dangerous anthropogenic influences on climatic systems.

Targets[*]: from December 31, 1994 onwards, the level of NOx emissions produced in the

* Targets are formulated on the basis of the Geneva Convention of 1979, 'On Long Range Transboundary Air Pollution' and the UN Rio de Janeiro General Convention 'On Climate Change'.

country and the level of transmitted pollution entering the country should correspond to the levels of 1987; from the year 2000 onwards, the total amount of sulfurous oxides emissions should be below the level of 1980.

Measures for the solution of climate change problems caused by GG will be discussed together with the problems of regional transboundary air pollution.

5.1.1.3. Regional problems of transboundary air pollution

According to the reports of the Co-operative Programme for Monitoring and Evaluation of the Long Range Transmission of Air Pollutants in Europe Meteorological Synthesising Centre (EMEP MSC - EAST) - in 1991, the amount of transboundary emissions of sulphur and nitrogen oxides entering Latvia was double the amount produced in Latvia; in 1992, transmitted emissions exceeded pollution produced in Latvia by four times.

Approximately 80% of sulfurous oxides and 90% of nitrous oxides that are emitted to the atmosphere are transported to neighbouring countries: the Russian Federation, Lithuania, Estonia, Sweden, Belarus and the Ukraine, as well as to the Baltic Sea.

Targets: By 1999, the annual emissions of volatile organic compounds should be at the level of 1988;
By 2000, reduce the level of anthropogenic emissions of CO2 and other greenhouse gases not listed in the Montreal Protocol to the levels of 1990.

There are several possible solutions for this problem, such as:

Energy saving policy and efficient use of energy resources. Initially, the organisation within the energy sector should be improved, as well as the use of energy resources. New energy saving technologies and equipment should be implemented in production, commercial and domestic situations. Energy demand should be specified and regulated.

In order to implement this, it is necessary to

in energy sector:

- achieve *optimisation of energy streams*;
- *reduce losses* in energy production cycles, networks and economic activity;
- use *modern and cost-efficient technologies, equipment and materials* when undertaking new energy sector projects and when renovating existing plants;
- *use the heat potential of existing boiler houses* for the co-production of energy as well (if it is technically possibilities and economically feasible);

in heating:

- *improve the technical condition of existing heating networks* by reducing heat and water losses;
- *optimise and operate heating systems under optimum regimes, provide systems and individual users with heating meters and regulatory equipment;*
- *elaborate and implement new standards* for housing construction and heating network construction;
- *develop the production of heat-insulating materials*.

Transition to heating materials that produce less hazardous emissions as a result of the incineration process.

Transition to alternative energy sources. The use of wind generators and hydro-power plants on small rivers of Latvia should be further investigated. The sustainable use of local fuel resources should be considered for heating. However, in implementing this measure, the considerations of subchapters `5.2. Eurtofication of water cources and degradation of water ecosystems`, `5.7. Reduction of biodiversity` and `5.9. Non-sustainable use of natural resources` should be taken into account.

Implementation of efficient treatment facilities. Energy power plants should have equipment installed for the detection and treatment of SO2 and NOx.

Introduction of early warning and efficient response systems. Air monitoring systems should be combined with early warning systems to improve the reaction time for potential accidents.

To implement these measures, the following policy instruments are necessary:

- international co-operation and agreements:
  - ⇒ implementation of the UN Framework Convention 'On Climatic Change';
  - ⇒ becoming party to four protocols of the Geneva convention 'On Long Range Transboundary Air Pollution' (see Appendix 2);
  - ⇒ international environmental agreements with neighbouring countries, Lithuania in particular. Treaties should also include a section on air pollution problems.

Box 11. The Geneva Convention

In order to solve transboundary air pollution problems that are topical for many countries all over the world, the convention 'On Long Range Transboundary Air Pollution' was adopted in Geneva in 1979. Latvia joined the Convention in 1994 and is now obliged to adopt the requirements of international environmental policy and reduce air pollution in its domestic territory. Heat and energy production is one of the main sources of air pollution. As Latvia imports 30...40% of its energy from abroad, we can conclude that pollution created by the production of energy used in this country is emitted abroad, mainly in Estonia, where energy is produced by burning oil-shale.

- national legislation, including:
  - ⇒ law on energy (drafting and implementation);
  - ⇒ differentiated nature resources tax;
  - ⇒ differentiated tariffs on use of energy;
  - ⇒ law on air protection (to be drafted).
- monitoring.

5.1.2. Transboundary water pollution

Latvia's largest rivers have their origins in neighbouring countries, such that 53% of the discharge of Latvian rivers into the Baltic Sea comes from beyond its borders, thus carrying also the pollution produced in neighbouring countries and posing a direct threat to the health of Latvia's residents in case of large industrial accidents.

The following are Latvia's largest transboundary water courses: the Daugava (29% of its catchment area is located in Latvia), the Lielupe (50%) and the Venta (50%). These rivers are included in the list of Europe's largest transboundary water courses elaborated by the UN/ ECE (United Nations Economic Commission for Europe).

The source of the Daugava is in Russia, but it is while flowing through Belarus (See Box 12) that it receives most of its pollution load. There are large production facilities (also chemical production) located in Vitebsk, Polock and Novopolock in Belarus that discharge their wastewaters and other dangerous substances into the Daugava. This same water is then used for drinking water supply in Latvia.

Box 12. Novopolock accident

In November 1990, an accident occurred when filling a railroad tank in a chemical plant 'Polimir', Novopolock (Belarus). As a result, water of the Daugava was polluted with the very toxic substance, ACH and its decomposition products - cyanides. According to the assessment of Latvian experts, 128 tons of ACH leaked into the river. Due to the pollution, mass fish deaths were observed in the Daugava from the Belarus border to Koknese. In order to guarantee the health of the population, water supply from the Daugava was interrupted from November 6-9 in Daugavpils, and November 8-15 in Riga.

Latvia claimed damages from Belarus for the sum of 13.3 million roubles (1990 prices). The amount of compensation received has been 0.58 million roubles (1990 prices). The case has been adjourned for now, since there is no procedure for compensation of damages in cases of transboundary pollution. Even the bilateral agreement between Latvia and Belarus does not provide for such instances.

Significant amounts of wastewater from the Mazeikiai oil refinery, other industrial enterprises, small towns and runoff from intensive agriculture in Lithuania leak into the watercourses of the Venta and Lielupe catchment areas.

It should also be noted, that coastal pollution from Lithuania (Klaipèda, Palanga) enters Latvia's territorial due to the dominant currents and winds, and has a negative influence on the biotopes of the Kurzeme coastal waters. In this regard, the decision of the Lithuanian government to construct an oil terminal at Butiðåe should be mentioned. Implementation of this project will significantly increase the risk of ecosystem degradation and destruction.

Since Latvia is situated on the Baltic Sea, we are responsible for pollution emitted into the Sea from its territory, 50% of which consists of transboundary pollution. Latvia ratified the Helsinki Convention on the protection of the Baltic Sea environment and signed a convention 'On the protection and use of transboundary watercourses and international lakes' that is being prepared for ratification. These conventions are very important for Latvia. They also place an increased obligation on our neighbours in Belarus and Lithuanian for the protection of transboundary watercourses, monitoring and public information.

Main solution measures for the above problem could be as follows:

reduce transmission of pollution from other countries into the territory of Latvia, thus protecting internal waters of the country and the Baltic Sea. Possible instruments for implementation include:

- co-operation between regional administration institutions located in one catchment area, but in different countries;
- ratification and implementation of the Helsinki Convention of 1992 'On the Protection and Use of Transboundary Watercourses and International Lakes';
- bilateral agreement with Lithuania on the Venta and Lielupe river catchment areas;
- bilateral agreement with Belarus (or a trilateral agreement - with Belarus and Russia on the Daugava);
- bilateral agreements with Estonia and Russian on small rivers and lakes.

Increase the safety of the population of Latvia in case of accidents in neighbouring countries that substantially increase pollution of Latvian waters. Basically, the instruments listed above may be applied, as well as

- establishment of an automatic monitoring post in Piedruja on the Daugava on the Belarus border;
- international early warning system;
- establishment of transboundary water monitoring system;

- transition to use of groundwater for the supply of drinking water.

Reduce pollution leakage from the territory of Latvia into the Baltic Sea. For implementation of this measure, practically all instruments listed in the following part (`5.2. Eutrofication of water courses and degradation of water ecosystems`) can be applied, especially

- establishment of regional administrative institutions for water courses;
- formation of international working groups according to river catchment areas; and
- elaboration and implementation of a national programme for protection of the Baltic Sea environment.

5.2. Eutrofication of water courses and degradation of water ecosystems

Intensive human activity on the shores of rivers and lakes, and in catchment areas significantly increases emissions of biogenous substances into Latvian lakes and rivers, and therefore into the Gulf of Riga and the Baltic Sea, thus accelerating the course of natural eutrofication.

Box 13. Eutrofication

Eutrofication is the enrichment of watercourses with biogenous substances. Water transparency is reduced, the production of organic substances increases, sedimentation increases, oxygen concentration decreases, composition of species changes (perennial algae are replaced by annuals, such as blue-green algae and green algae, the composition of benthic species is depleted, the food base for fish changes and correspondingly so does the composition of fish species), and rapid choking of water courses with vegetation takes place. The situation cannot be improved in hypertrophic watercourses without radical activities in their aquatic zone.

Since the second half of the 1950s, the eutrofication rate in Latvia has increased significantly. Emissions of non-treated municipal wastes from towns and villages (main source of phosphorus) into surface waters, point and diffuse-source polluted run-off from the agricultural practices on collective farms, and incorrect and uncontrolled use of mineral fertilisers (main source of nitrogen) were the main reason for this increase, together with a lack of responsible management of water courses, their estuaries and adjoining coastal zones. Additions of nutrients from these sources not only increased the nutrient concentration discharged into the Baltic Sea, but also created huge storages of biogenous substances in waterplants and sediments that caused secondary pollution in inland waters.

About 5% of total freshwater watercourses discharge into the Baltic Sea comes from the territory of Latvia. This water, however, accounts for more than 10% of the total phosphorous load into the Baltic Sea and for up to 10% of the nitrogen load. Taking into account that the Baltic Sea is an almost closed, shallow sea with brackish water with an exchange rate of 30 years, the reduction of biogenous substances is of particular significance. Increase of the anthropogenic burden observed during the last decade has led to disturbances in the ecological balance and an acceleration of the eutrofication process in the Baltic Sea. Therefore, the solution of this problem has become a central issue in national environmental policies of the Baltic Sea states and on the level of the Baltic Sea region.

Latvia's natural aquatic ecosystems have suffered severe damage due to ruthless and careless economic activity. Eutrofication is only one of the causes of degradation.

Major harm to Latvian natural aquatic ecosystems and habitats have been significantly harmed not only in their aquatic zones, but also in their littoral and riparian zones by hydro-construction and melioration activities. A classic example of this was the construction of the Daugava hydroelectric power station cascade, which destroyed natural biotopes in huge areas both in the Daugava, and its ancient river valley. Dams have

completely blocked migratory paths for salmon, eel, and lamprey, since fish ladders were not included in the design of dams (except for Æeguma HEPP, where the fish ladder lost its significance after the construction of Riga HEPP downstream). Moreover, large numbers of plankton and baby fish perish when sucked through filters and into the turbines of power plants. Water plants, benthic organisms, fish spawn and baby fish are also often killed by water level fluctuations. The same problems can be observed to a lesser degree in small HEPPs, the reconstruction of which has started recently. Construction of the Daugava HEPP cascade has also created other serious environmental problems:

- washing away of the shores of watercourses in areas that have not been strengthened (50% of the total shore lengths);
- flooding, and fluctuation of groundwater level in adjacent territories;
- the formation of ice dams during spring floods on the Daugava at Jekabpils and Ogre;
- increased risks to Riga and to the levees and other protective structures around Ogre.

Another cause of destruction to Latvian aquatic ecosystems and biotopes was the campaign of the 50s and 60s to regulate and straighten small and medium-size rivers, during which a large number of small rivers were turned into ditches and canals. This destructive practice was amplified by widespread, and in many cases, poorly-planned and low quality land reclamation for agriculture and forestry. In 1986, the total length of regulated rivers was 2,814 km, but the total length of drainage ditches, regulating canals and trunk canals was 66,350 km. (For comparison, the total length of Latvian rivers is 37,500 km.) As a result, natural aquatic ecosystems were destroyed en masse and their self-purification potential was significantly diminished.

The problems of watercourse eutrofication and depletion of aquatic ecosystems in Latvia can be solved by a number of specific measures that are divided into two groups - cause-oriented measures and effect-oriented measures.

Cause-oriented measures:

Reducing the burden from household pollution. A group of measures that reduces mainly the phosphorous and nitrogen loads, at the same time limiting discharges of detergents, heavy metals, oil products and other dangerous substances into water.

Target: By 2010, reduce the total nitrogen emission into water from point sources by 50%.

This group of measures includes:

Improvement of household wastewater treatment/ management technologies and the technical condition and operation of sewerage networks. The main instruments for solution of these problems are policies supporting investments and loans; setting prices for water supply and wastewater services in accordance with the real costs of these services; improving the administration of water supply and wastewater services, which may also include change in ownership status.

Construction of new wastewater treatment facilities and expansion of sewerage systems. The above-mentioned instruments should be applied together with construction and expansion of facilities. An integrated approach would be of greatest benefit, which can be ensured by correct territorial planning (law ‘On territorial planning’) and a comprehensive EIA for choosing discharge sites and the most appropriate wastewater treatment technologies.

Water resource saving and reduction of consumption in the production, services and domestic sectors. This can be implemented by using instruments such

as the Natural resources tax, pricing policy connected with use of water, as well as education of population (consumers), i.e. formation of public opinion.

Introduction of environmentally-friendly technologies and household products into the services and domestic sectors. Particular attention should be paid to custom duty policy, the certification of domestic chemical products, the use of the State Environmental Expertise, as well as the influencing of public opinion.

Reduction of diffuse pollution. A group of measures, the implementation of which would reduce diffuse emissions of biogenous substances (nitrogen, phosphorous, organic substances) into watercourses from agricultural lands and fertiliser storages, diffuse pollution from transport that enters watercourses as rainwater runoff from highways and roads, as well as air (local and transboundary) pollution.

This group of measures includes:

reduction of agricultural pollution (see `5.6.* Environmental impact of agriculture`);*
reduction of transport pollution (see `5.5.* Environmental impact of transport`);*
reduction of air pollution (see `5.1.* Transboundary pollution`);*
introduction of coastal protective belts and associated requirements;
reorganisation, improvement and environmentally-friendly operation of melioration systems.

Reduction of industrial pollution. A group of measures for the reduction of toxic emissions from industrial sources.

This group of measures includes:

introduction of environmentally-friendly technologies on the basis of the 'best available technology' and substitution principles. This can be achieved by the application of appropriate investment, loan and tax policies, customs duties on environmentally-unfriendly raw materials and production certification;
treatment and pre-treatment of industrial wastewaters, as well as the practical utilisation or environmentally-safe storage of toxic sludge;
practical utilisation or environmentally-safe storage of industrial wastes (see `5.4.*Environmental impact of waste`).*

Reduction of the hydro-technical burden. Theses are measures to mitigate the negative impacts of hydro-technical constructions on water quality and aquatic ecosystems, including the redrafting of regulations and standards for the design, construction and operation of hydro-technical installations, strengthening EIA requirements, guaranteeing fish migration paths, and the implementation of environmentally-friendly operational regimes.

Sustainable use of biological water resources, ensuring the interests of resource users, and avoiding the destabilisation of ecosystems and degradation of biotopes (see `Reduction of biodiversity`. and `5.9.Non-sustainable use of natural resources`).

Effect-oriented measures

A group of measures for the rehabilitation of natural watercourses and increasing the self-purification ability of aquatic ecosystems:

restoring the natural course of straightened rivers;
removal of heavily polluted sludge and sediment from the beds of watercourses;
rehabilitation of overgrown lakes;

maintenance of watercourses and their riparian zones (removal of sludge, harvesting of aquatic plants, regulation of overgrowth, restoration of benthic and littoral zone biodiversity, restoration of fish spawning and feeding grounds).

5.3.Risks created by economic activities

As a result of economic activities, new and complex environmental problems have appeared, that cannot be characterized by any one specific environmental quality indicator. In order to characterise the essence of these problems, two terms have been introduced: hazard and risk.

Box 14. Risk
Hazard is a feature characteristic to a substance, source of energy or situation, with the potential to cause adverse consequences.
Risk is the probability of an adverse course of events during a certain time period caused by human activity or natural processes, and the potential consequences of such events. The possibility of an accident exists always - the degree of risk is never zero.

The elaboration of national 'risk' concepts, improvement of legislation and introduction of risk assessment in Europe was promoted by the requirements of EU directives. However, there is no unified approach to risk assessment yet. No unified concept has yet been developed in Latvia, nor have risk assessment procedures and methods for application been established yet. At present, the determination of hazard and the control of hazardous objects is carried out by various institutions within the scope of their duties.

In 1992, Latvia signed the convention 'On Transboundary Impacts of Industrial Accidents'. The Convention provides that all member states will take the necessary steps to reduce the risk of industrial accidents.

There are three types of risk:

⇒ risk of industrial and transport emergencies, or accident risk;
⇒ risk of accumulated pollution;
⇒ risk of transboundary pollution.

In Latvia, the main causes of risk caused by economic activity may be divided into the following groups:

⇒ old, worn-out, and therefore unsafe equipment, technologies, transport vehicles, infrastructure and industrial installations;
⇒ stocks of raw materials, by-products, pesticides, artificial fertilisers and other chemical substances left without control during the course of privatisation of land and production enterprises;
⇒ wastes left by the Soviet army;
⇒ lack of automatic warning systems and control equipment;
⇒ low level of individual responsibility;
⇒ lack of information about the dangerous impact of various substances, as well as about the potential consequences of disregarding technical processes;
⇒ transboundary impact of industrial, transport and nuclear accidents, and general transboundary pollution.

General measures:

Elaboration of the concept of controllable risk. This includes the elaboration of risk assessment procedures, the choice of appropriate methods for risk calculation, and the adoption of risk criteria.

Gathering of information about the source of risk or hazardous objects and the allocation of specific responsibilities.

Instruments for implementation of this measure:

- law 'On Chemical Substances' (being drafted);
- laws 'On Environmental Protection', 'On Prohibiting the Operations of Enterprises, Institutions and Organisations';
- regulations 'On Procedures and Criteria for Risk Calculation', standards, norms (to be elaborated);
- law 'On Hazardous Wastes';
- registration, system of permits, monitoring;
- risk assessment, safety reports;
- implementation of the requirements and recommendations of international agreements;
- State Environmental Expertise, EIA.

Implementation of 'good housekeeping' activities (see Box 17).

Enterprises should assume the major responsibility for their actions, however, respective legislation and tax policy are necessary for the promotion and implementation of this measure. The most important instruments are:

- information, and educating enterprise management and staff and local governments.

Increasing local government responsibility for gathering information on sources of risk.

Introduction of modern technologies and equipment, replacement of old equipment, and substitution of hazardous raw materials with less hazardous materials. This is one of the most efficient measures, since it combines both technological improvements and decreases the risk of pollutant emissions and accidents. The necessary instruments could be:

- enactments, regulations, standards and norms that would promote the introduction of new technologies and the replacement of out-dated equipment;
- favourable tax policies, soft loans;
- government subsidies for urgent upgrading of equipment and technologies for enterprises that are economically important and when the existing system poses an increased risk to a larger area;
- in planning for a new enterprise, the principle of 'best available technology' should always be applied;
- risk assessment;
- EIAs for new equipment and enterprises. (see `4.5.Environmental Impact Assessment (EIA)`)

5.3.1. Risk of industrial and transport accidents

Box 15. The Ventspils experience

The largest accident risk for the population of the city of Ventspils is created by the storage, loading and export of ammonia (two storage tanks of 30,000 cubic meters each) within the Port of Ventspils industrial estate.

The following hazardous substances are also transported, stored and reloaded within the city limits: acrylonitril, isobutanol, methylethylketone, 2-ethylhexanol.

Integrated risk assessment has been performed in Ventspils using the experience of the Netherlands and Britain.

Measures for risk abatement and mitigation:

Establishment and improvement of early warning systems, as well as the introduction of automatic security systems for hazardous installations (see also `4.7.*Early warning monitoring*`)

Establishment of a civil rescue service and the introduction of protection devices for individuals. The need for better material and technical support in case of chemical accidents, as well as means of individual protection in such instances should be stressed in particular. Also, the operation of local governments, their emergency services, and civil defence initial response services and other special services require attention.

Establishment of a system for the minimisation or elimination of consequences arising from chemical emergencies:

- *establishment of a special service for the minimisation or elimination of consequences arising from chemical accidents (on a national scale);*
- *establishment of special on-site brigades and the performance of preventative activities at hazardous sites for the avoidance of accidents or the minimisation/elimination of their consequences in an enterprise.*

Instruments for implementation of the above-mentioned measures are the following:

- laws ‘On Civil Defence in the Republic of Latvia’ and ‘On Fire Safety’. The owner or manager of a hazardous installation is liable for the implementation of on-site security measures.Special response and rescue services for local residents in case of emergencies should be the responsibility of local governments, the Centre for Civil Defence and the Fire Safety and Rescue Department;
- national and local government subsidies;
- improvement of procedures for informing the public;
- regular reports on the safety status of hazardous enterprises;
- special education of public;
- risk assessment.

Introduction or widening of protective belts around high-risk sites. Measures for implementation of this measure:

- law ‘On Protective Belts’; the Cabinet regulations ‘On Territorial Planning’ and other normative documents;
- territorial planning and design (zoning) in accordance with the results of risk assessment.

The consequences of transport accidents should be seriously considered since they happen more often than large industrial accidents and their risk management is more complicated. In Latvia, transport accident risk is associated with the transit and reloading of hazardous cargoes, as well as the transportation of hazardous cargoes within the country, e.g. about 1 million tons of ammonia are transported by rail every year (approximately 120 tanks per day).

Measures that may be used specifically for the mitigation of transport risks:

Restriction of routes of hazardous cargoes through populated areas or protected territories. Necessary instruments:

- temporary instruction of the Ministry of Transport ‘Carriage of Dangerous Cargoes by Road’,

- adoption of respective European norms (ARD, RID)* and the London principles **

Elaboration of the concept of compulsory ecological insurance.
Training of transport drivers for operations with hazardous cargoes.
Improvement of road surfacing.
Establishment of an insurance system for hazardous cargoes.

5.3.3. Risk of accumulated pollution

Different chemical substances (pesticides, mineral fertilisers, growth stimulators, dyes-stuff, stabilisers, products of destruction of monomer and polymer degradation products, etc.) enter circulation of substances as a results of economic activity. Many of them are accumulated in soil, plants and other living organisms. Continuous influence of those substances may cause disturbances of human health , increase sensitivity to different diseases, as well as degradation of ecosystems. When international trade in chemical substances and technologies is increasing, uncontrolled their use may cause negative impacts that is hard to forecast.

Box 16. Accumulation of metals in the human body
In the State enterprise 'Latvijas keramika', where lead compounds are emitted in environment during the work process, production processes, increased lead content was found in bodies of workers - in their blood, urine, hair. In hair, lead level exceeded the average for Jelgava population about four times, and 6 times the average for the population of Stalgene. For specific professions, the lead content in blood exceeded the norm by 1.5 to 2 times. For 38% of persons working in harmful circumstances, increased lead content in urine was found (exceeding the norm even for 10 times).
Increased content of heavy metal - mangan and chrome - was found in tissue and secretion of people working in production of construction materials. This is caused by the increased penetration of chrome-containing cement dust and welding aerosols into human body from work environment.
Accumulation of metals in the human body was found in regards to workers of printing, ship-yard and depots. Pathologies caused by metals accounted for 2% of professional diseases in 1992.

In Latvia, gathering information about the risk of accumulated pollution has just started. There are no major production facilities, hewever, continuous violation of environmental and health requirements increases the risk associated with accumulated pollution.

The problems of acculumated pollution is the me most appropriate level of policy elabobation and implementation - international, national or local. Problems have been arranged in order from long-term and international to short-term and local.

Specific measures:

Assessments of the 'harmfulness' and 'hazardousness' of substances, as well as certification using internationally available information and results of studies.

Gathering information and assessment of risk sources. Recording and evaluation of hazardous objects are necessary, as well as gathering information on content of hazardous substances accumulated in human body, plants, soil, water, as well as its impact assessment.

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*ARD - European Agreement concerning the international carriage of dangerous goods by road RID - European agreement concerning international carriage of dangerous goods by railway
** London Guidelines for the Exchange of Information on Chemicals in International Trade, 1989

Sanitation of polluted areas and abatemant of spread of pollution.

Other measures are more connested with health care. They are the following:

Improvement of working conditions and timely diagnostics of diseases.
Reduction of the pollution level in work premises.
Determination of environmental factors harmful to human health.
Performance of epidemiological studies of environmental health.
Evaluation of cause-effect links between the data on environmental pollution and the diagnoses of registered diseases (in case of necessity organizing studies in areas where the data analysis indicates a possibility of risk).
Establishment of data base to forecast impacts of harmful factors before they cause pathology in human body.
Elaboration of programme of environmental health.

5.3.3. Risk of transboundary pollution

Procedures regarding the avoidance of industrial accidents, or the timely notification and clean up of them, are governed by the 1992 Helsinki Convention 'On the transboundary impact of industrial accidents', while issues connected with transboundary pollution and its risk minimisation are governed by other conventions (see Appendix 2).

A detailed overview of this problem, mandatory solution measures and implementation instruments are discussed in section `5.1.Transboundary pollution`.

High risk sources of transboundary pollution for Latvia are nuclear power plants in neighbouring countries, particularly Ignalina in the Republic of Lithuania. Nuclear power plants in Russia ('Sosnovij Bor' near St. Petersburg), Sweden, Finland, the Ukraine etc. are also considered hazardous, since Latvia is situated within their spheres of associated risk (see Appendix 3). The main measures are:

International agreements on the exchange of information and co-operation in case of a possible accident.

Education and training for emergency situations of the inhabitants of neighbouring regions.

5.4. Environmental impact of waste

The quantity of household waste is increasing due to the increase in imported goods with their elaborate packaging. Since the production capacity of Latvia is expected to increase in the near future, a corresponding increase in the quantity of hazardous wastes is also expected. However, since production development forecasts are not yet available, it is also not possible to forecast the increase in the amount of hazardous waste.

Waste storage sites are significant sources of localised water, air and soil pollution. The quality of life of local populations is decreased and, in many cases, drinking water is polluted (see`5.10.Low quality of drinking water`). Landfills are usually very poorly planned and equipped, and are mostly overburdened. Since the dumping of waste is not properly controlled, hazardous wastes are often dumped in addition to regular household wastes.

Uncontrolled waste dumping in the territory of Latvia is a serious concern. It pollutes forests, degrades landscapes and creates hundreds of illegal local waste dumps containing wastes of unknown composition and origin. Old landfills that are closed continue to pollute groundwater. This process may continue for many years unless necessary measures are undertaken to rectify the situation (see `5.3.Risks created by economic activities`).

Liquid industrial wastes, including toxic wastes, are often discharged into domestic sewerage systems, thus damaging water treatment facilitates and highly polluting the water

(see also `5.2. Eutrofication of water courses and degradation of water ecosystems` and `5.3. Risks created by economic activities`).

During the course of privatisation of industrial enterprises and territories, stockpiles of raw materials and by-products, pesticides, artificial fertilisers, and other chemical substances have been left without control. The same refers to many materials abandoned by the Russian army. In most cases they can be considered waste, often hazardous waste. Their storage conditions are often unacceptable and may present direct threats to human health and ecosystems.

Waste is a loss of useful materials that it would be better to recycle or reuse.

There are several causes to problems connected with waste, the most significant of them being:

- lack of policies for waste minimisation and reuse;
- underdeveloped waste management systems and a lack of associated infrastructure;
- heritage of a socialist national economy in production, agriculture and municipal systems.

As the problems are of complex origin, several groups of measures should be taken into account.

Waste minimisation:

A group of measures directed at the cause, that should produce substantial and lasting results. For decreasing the amount of household/domestic waste, long-term solutions are necessary; but shorter-term measures are necessary for minimising hazardous wastes (it should be noted that new enterprises will lay a major role here). This group of measures is divided according to type of waste:

Household waste minimisation can be implemented by:

- Education of the public, often using mass media or NGOs. State administrative institutions should provide NGOs with the appropriate information, since these organisations are in a good position to undertake meaningful activities and disseminate this information further to the mass media etc.
- Local governments to bear the responsibility for waste collection. If the real costs of waste collection and treatment were passed on to the public, consumers may be inspired to change their attitude towards waste.
- Natural resources tax on packaging, and extra cost for packaging on top of product cost.

Industrial waste minimisation:

As industries are the main source of hazardous wastes which present particular threats to human health and ecosystems, industrial waste minimisation should be a priority. The best applicable measures in this group are the following:

Introduction of new technologies and equipment:

Substantial discussion of these measures can be found in sections `5.1.Transboundary pollution`, therefore only the most important instruments will be stressed here:

- Pilot and demonstration projects.
- Soft loans with local and regional government guarantees on such loans.
- Plans for the construction of new facilities; designs should be based on the best available technology principle.
- Public investments (in exceptional cases).

Transition to the use of less hazardous or cleaner raw materials (see the principle of substitution).

Establishment of a system of incentives for the minimisation of waste generation:
Instruments:

- Payment for the final disposal of waste. This instrument should be applied to enterprises that specialise in the recycling or final disposal of wastes;
- Tax relief for cleaner production;
- 'Good housekeeping' approach provides significant savings for producers, and is an investment in the improvement of the quality of the environment. Education and information also play a significant role here.
-

Box 17. 'Good housekeeping'
Comparatively cheap and very efficient win-win activities that increase the productivity of enterprises and minimise damage to the environment. These include careful management of buildings, repair of leaks/minimisation of losses, improvement of treatment facilities, setting stricter standards for building management and economic activities etc.

Imported wastes:

The issue of imported hazardous wastes is legally solved by the law 'On hazardous wastes' that prohibits the import of any hazardous wastes. Environmental management administrative structures should pay particular attention to enforcement in order to avoid the illegal import of wastes in this category.

The issue of imported household wastes is partially discussed in the section 'Household waste minimisation'. However, it is possible to import household wastes in Latvia for reprocessing or final disposal.

Therefore, it is necessary to draft a law 'On household wastes' as soon as possible, to create significant obstacles for the import of such wastes.

In regards to industrial wastes that do not fall into the category of hazardous wastes, a law 'On industrial wastes' should be drafted.

Reuse of waste

These are measures directed both at causes and consequences, that can be implemented in the short to medium-term at all levels, from national to local, usually relating to the reuse of glass and hard plastic containers, polyethylene products, car tyres, scrap metal, paper, etc.

The reuse of glass containers (bottles and jars) was reasonably well organised until the beginning of the 90s. With the dramatic increase of imported goods and new packaging technologies, the reuse system has practically disappeared. It is necessary to take steps that would reestablish this system as soon as possible.

Targets: By 1998, reestablish the packaging reuse system, such that up to 75% of used packaging can be reused.

- This measure is mainly based on economic incentives. The major principles should be included in the law 'On Natural Resources Tax' (see `Economic instruments`);
- Household information - why and how to reuse household items. This would be best carried out by NGOs, mass media and local governments.

This measure can also be applied to sludge derived from wastewater treatment processes, by using it as fertiliser - provided it is possible to control the heavy metal content.

Final disposal of waste. Includes several measures that significantly minimises wastes, and accordingly minimises its negative impact on the environment. The best measures are:

Waste recycling. Cause and effect oriented measures. In regards to hazardous wastes, it is also necessary to consider the possibilities for co-operation with the other Baltic states. This can be implemented by several instruments:

- Tax relief for enterprises engaged in waste recycling;
- Tax relief for recycled goods;
- Support from regional and local government enterprises engaged in waste treatment;
- Public education/information to promote the separation of household wastes before collection - paper, glass, organic substances (see also Establishment of separate waste collection systems.

Biological treatment that would include composting, biological water treatment, the use of organic waste as food for domestic animals, production of biogas, etc.

Establishment of separate waste collection systems is the first step necessary for any waste recycling scheme. It was partly used before 1990, when food scraps were separated and used as cattle-feed, and can be applied both in household and production situations. The necessary instruments are:

- standards and norms for industrial wastes;
- 'good housekeeping' practices in enterprises;
- informing and educating the public in regards to the separation of household wastes. This should be overseen by local governments, but local and national NGOs could be involved in its implementation.

Incineration. Quite a successful measure for decreasing the total volume of waste. However, other problems are created, such as air pollution and secondary physical wastes (slag and ash). Incineration could be used in addition to all the above-mentioned measures, and only when there is significant volume of waste, e.g. in towns.

Incineration of household and industrial wastes should be managed by local governments, that would also be responsible for all the incineration by-products. However, this principle could also be adopted by individual enterprises or groups of enterprises. Incineration of hazardous wastes should be managed the State. To introduction a waste incineration system, the following instruments are necessary:

- subsidies from local budgets;
- loan guarantees;
- soft loans from national and international sources;
- application of Western experience.

Organised waste dumping. This measure should be implemented over the medium to long-term, since it requires large investments for the construction of new, well-equipped waste-collection depots, the reconstruction of existing collection depots, and the development of an integrated collection system.

The collection of household and non-toxic wastes should be carried out at the local and regional levels, while the collection of hazardous wastes should be carried out mainly on a national level. Several policy instruments are applicable here, the most appropriate being:

- regulations, standards and norms for the development and redevelopment of landfills, as well as waste disposal systems, in order to ensure control over the use of landfills by environmental management administrative structures and local governments (for a more detailed discussion see section `4.4. Environmental control`);
- territorial planning at various levels;

- planning measures, the practical application of geological data and studies for siting and establishing new landfills, in order to avoid problems like the dispersal of hazardous substances (see `5.3.Risks created by economic activities`), decrease in biodiversity, landscape degradation (`5.7.Reduction of biodiversity`, `5.8.Landscape degradation`) and low drinking water quality (`5.10.Low quality of drinking water`);
- covenants and co-operation between different levels of administration (with respect to hazardous wastes, between national and local authorities; in regards to landfills for household waste between the different levels of local governments);
- development of a unified national system for the collection and dumping of hazardous wastes;
- EIAs for waste disposal sites;
- when establishing new landfills, local government investment funds should be used. These landfills should be managed by local government enterprises, but should allow the possibility to transfer management to private enterprise. In such cases, soft loans or local government guarantees could be extended to the private enterprises (in the case of hazardous wastes - State guarantees);
- payments for dumping waste to be used to cover costs of waste management and the construction or redevelopment of landfills; these payments should be high enough to promote waste minimisation and recycling;
- compilation of an inventory of sources of waste.

Clean-up of old landfills. This is an important group of measures that also provides a solution for problems that are discussed in sections `Risks created by economic activities`, `Landscape degradation`, and `Low quality of drinking water`. Implementation of this measure is usually the task of local governments, but in exceptional cases, a task for the national government (in case of a serious threat to human health and ecosystems, or if local governments cannot resolve the issue.) Here, the main measures are biological recycling (production of biogas), minimisation of pollution dispersal, incineration, etc. The most significant instruments are the following:

- monitoring,
- EIAs;
- local or national government financing.

5.5.Environmental impact of transport

Transport plays a significant role in the development of the national economy and in raising the standard of living of the population. High quality transport infrastructure helps form a good basis for the development of the national economy.

As a bridge between the East and the West, Latvia should promote the efficient operation of its transport infrastructure (roads, bridges, railways) and transportation service. However, large volumes of transport flow can present significant dangers to human health and ecosystems, especially in large cities. In general, transport systems are known to have a negative effect on the global environment (see `5.1.Transboundary pollution`, `5.7.Reduction of biodiversity` and `5.8.Landscape degradation`).

At present, environmental standards for transport infrastructure, transport vehicles and cargo transport processes in this country do not correspond with those adopted by developed countries. This is illustrated by the decrease in air quality and increase in noise levels recorded in areas of intensive transport activity. In such places, the levels of nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compounds (VOC) and lead have substantially increased, and occasionally exceed maximum allowable concentrations (source: Centre for Environmental Pollution Assessment, Hydrometeorological Agency).

Table 2. Changes over time of the main types of transport vehicles in Latvia:

No. of vehicles (at end of year.)	1990	1991	1992	1993
sea transport vessels	111	111	107	129
trucks (thous.)	67	71	75	85
buses (thous.)	12	13	18	20
cars (thous.)	283	328	350	391
railway locomotives	484	471	431	411
trolley buses	416	401	365	360
trams	402	421	406	403

From this table we can see that the number of transport vehicles with internal combustion engines (cars, trucks and buses) has increased during the last years, but the number of electrically driven vehicles (trams, trolley buses) has decreased. It is also expected that the number of internal combustion vehicles will continue to increase rapidly.

Measures and instruments

In order to minimise the damage to the environment and human health from transport, the following is necessary:

Development of transport infrastructure:

- Use of all levels of territorial planning for the planning of road networks and other transport infrastructure;
- EIAs for transport infrastructure developments;
- Establishment of effective links between institutions that adopt decisions on design of transport infrastructure developments;
- Open public participation in analysing and solving transport problems.

Regulation and optimisation of types and flows of transport :

In order for the transport system to develop with the least impact on the environment and human health, several measures are possible:

- *improvement of public transport systems;*
- *promotion of environmental friendly modes of transport (bicycles, electric vehicles, etc.) and provision of incentives to increase their numbers;*
- *limitation of individual transport vehicles in towns;*
- *limitation of transit through densely populated areas;*
- *improvement of pipeline transport systems;*
- *improvement of telecommunications as an alternative to the use of transport.*

For implementation of these measures, the following instruments are applicable:

- territorial planning;
- standards, limitations and prohibitions;
- taxes, licenses and penalties;
- subsidies and investments;
- public information and education, and public involvement in decision making.

Emission of hazardous substances and reduction of noise from transport vehicles:

- strict quality standards that would require the use of high-quality fuels, and efficient enforcement of standards;
- strict technological and environmental standards for the storage and use of fuels, lubricants and other chemicals used in the operation of transport vehicles;
- penalties for the sale of lower quality fuels and other chemicals used in transport operations;

- application of taxes to promote the use of environmentally friendly transport, clean fuels (unleaded petrol), and the use of catalytic converters;
- general information to and education of the public on the use of products that are less harmful to the environment;
- implementation of standards for gas emissions and noise levels corresponding to EU standards, and their effective enforcement;
- implementation of standards for the design and operation of transport vehicles (including pipeline transport) corresponding to EU standards and their efficient enforcement; for public transportation, also the introduction and enforcement of hygiene standards;
- introduction and enforcement of the Cabinet regulations 'On the Technical Condition of Transport Vehicles'.

Implementation of a system for the final disposal of chemicals (lubricants, coolants, etc.) and spare parts used in the course of vehicle operation (see also `5.4.Environmental impact of waste`).

To implement this measure, the following instruments are applicable:

- territorial planning;
- standards, limitations and prohibitions;
- subsidies and investments;
- public information and education, and public involvement in decision making;
- becoming party to international conventions (see Appendix 2);
- adherence to the legal environmental and transport provisions of the EU.

Minimising the risk of transport accidents (see `5.4.Risks created by economic activities`*)*

5.6. Environmental impact of agriculture

Agricultural production constitutes a significant proportion of the national economy. Therefore it substantially influences the environment and causes a large number of environmental problems:

⇒ soil pollution and erosion;
⇒ water pollution, both inland and the Baltic Sea; organic pollution leading to eutrofication and pollution with pesticide residues and heavy metals.
⇒ reduction of biodiversity and degradation of rural landscapes.

During the present stage of national economic development, it is important to balance environmental requirements with the development of modern agricultural practices. Therefore environmental policy in the agricultural sector should be co-ordinated with national agricultural policies and national programmes for rural development.

Since the collapse of the socialist mass-production system of agriculture collapsed in 1990, total production has fallen by 50%. Its effect on the environment has also correspondingly decreased (see Box 18).

Box 18. Percentage of potential agricultural pollution vectors in 1994 compared to 1986

Use of mineral fertilisers	40
Use of organic fertilisers	30
Use of pesticides	13
Number of cattle	42

5.6.1. Soil pollution

In order to guarantee stable and high agricultural yields, intensive production methods and substantial amounts of organic and mineral fertilisers, pesticides and other agricultural substances are used. If these methods are not correctly applied from an agro-ecological point of view, soil degradation occurs.

Targets:
By 2010, reduce the losses of nitrogen, phosphorous and other biogenous substances from fertilisers used on arable lands by up to 50% of the amounts lost in 1994.
Avoid further agro-chemical and biological degradation of soils.

Cause-oriented measures:

Elaboration and implementation of a scientifically substantiated system of forecasts and recommendations for use of fertilisers for cultivated plants and integrated crop protection:

Necessary instruments:

- comprehensive study programme to determine the agro-chemical and ecological status of soils;
- development of a system for forecasting the dosage and application methods of environmentally-friendly fertilisers and crop protection preparations ('Soil-Crop' system);
- development and implementation of balanced crop nutrition models;
- establishment of system of standards and controls for the application of fertilisers and crop protection preparations; development of soil standards;
- improvement and development of the system of crop selection and crop farming;
- implementation of HELCOM requirements;
- elaboration and implementation of the national programme 'On the Protection of the Baltic Sea Environment;
- Law 'On the Sustainable Use and Protection of Land Resources'; standards and norms (to be elaborated);
- State funding and foreign investment for the improvement of the present scientific and technical knowledge base;
- integration of professional agricultural and environmental education into all facets of education, including the education of farmers.

Optimisation of the circulation system of fertilisers and agricultural chemicals:

- *development and implementation of environmentally friendly agricultural methods;*
- *substitution of outdated technologies and equipment with modern technologies and equipment corresponding to environmental requirements;*
- *reconstruction of outdated fertiliser and agricultural chemical storage facilities and premises, and the construction of new buildings;*
- *optimisation of the number of cattle, in order to set a limit per unit of arable land.*

Instruments for implementation of these measures:

- regulations for the import, sale, transportation, storage, use and final disposal of fertilisers and agricultural chemicals;
- adherence to HELCOM recommendations;
- development and implementation of a national programme for rural development and a national quality assurance programme;
- law 'On Plant Protection';
- law 'On Food';
- standards, certificates and norms;

- tax incentives;
- penalties, controls and accounting;
- information and education.

Effect-oriented measures:

Minimisation of agricultural pollution, preventing its discharge or emission into watercourses (including the Baltic Sea), air and food:

a system of activities to increase the productivity of soil and its buffer capacity;
introduction of soil liming and a system of environmentally friendly melioration activities;
remediation and recultivation of soils heavily polluted with agricultural chemical residues;
design and installation of riparian protection belts along rivers and water basins;
provision of equipment with low pollution emissions to enterprises using intensive agricultural practices;
final disposal of stockpiled unused or outdated agricultural chemicals.

Instruments:

- ratification of the 1992 Helsinki Convention 'On the Protection and Use of Transboundary Watercourses and International Lakes';
- adherence to HELCOM recommendations;
- law 'On Protection Belts';
- law 'On Food';
- law 'On Melioration';
- enforcement, accounting, penalties;
- information and education.

5.6.2. Soil erosion

Using agricultural techniques, heavy machinery and crop rotations that are unsuitable to soil characteristics, physical relief and climate conditions, leads to soil degradation:

⇒ agrotechnical and technological erosion,
⇒ wind erosion,
⇒ water erosion.

As a result of soil erosion, the productive upper layer of soil deteriorates, the landscape is degraded, biodiversity is reduces, and the nutrient-enrichment of waterbodies which leads to eutrofication occurs.

Cause-oriented measures:

Elaboration and implementation of a system of scientifically substantiated anti-erosion measures:

improvement of anti-erosion crop rotation and plantation structure;
elaboration and implementation of appropriate fertilising and crop protection systems;
implementation of suitable technologies and soil cultivation equipment.

Instruments necessary to carry out these measures are:

- law 'On the Sustainable Use and Protection of Land Resources' (not yet drafted)

- the Cabinet regulations 'On the Sustainable Use and Protection of Eroded Soils' (not yet drafted)
- guidelines and standards for the sustainable use and protection of eroded soils (not yet drafted)
- establishment of a monitoring programme of eroded soils
- education.

Effect-oriented measures:

mitigation of erosion and reclamation of eroded soils:
elaboration of a system of measures to increase the productivity and buffer capacity of eroded soils;
improvement and control of melioration and hydrotechnical activities;
planning and arrangement of rural landscapes.

Instruments for implementation these measures include:
- State budget funding, soft loans;
- tax incentives and foreign investments;
- recommendations and planning;
- education.

5.7. Reduction of biodiversity

*Biodiversity, the composition of Latvian plant and animal populations and ecosystems was formed after the last Ice Age over a period of approximately 12 000 years. Humans also became involved in this process several thousand years ago; initially as a consumer of available natural resources, and later by introducing animal husbandry and plant cultivation. Population centres developed, and fields, meadows, pastures, roadsides, etc. were created. Apart from plants under cultivation, weeds and opportunistic species increased in abundance. Over the centuries, in accordance with the historical situation, the human population, its distribution, density and intensity of impact on nature and the surrounding landscape varied. The proportions of arable and non-arable land also fluctuated.

Box 19. Biodiversity
Biological diversity can be defined as the variability among living organisms in all ecological complexes, including terrestial, marine and other aquatic ecosystems; this includes diversity within species, between species and of ecosystems.*

Decrease of biodiversity or natural diversity is a priority problem since:
- national self-awareness and the culture of nation were formed in a diverse nature environmenta and cultural landscape;
- disappearance of any of species create a chain reaction of hard-to-predict negative changes in nature as a whole;
- no generation has a moral right to reduce the level of biodiversity it leaves for the coming generations.

In deciding for protection of biodiversity, close ties between cultural and natural heritage bring forward ethical, esthetic and moral

Box 20. Observation data of the black stork*.
At present, there are 900...1300 black storks nesting in Latvia, 300...400 in Lithuania, one pair in Denmark, none in Sweden and the Netherlands.

* Convention on Biological Diversity, Rio-de-Janeiro, 1992.

arguments. Under the socio-economic system present in Latvia since 1940, when part of the territory was intensely used, but the rest was used inefficiently or abandoned, ecosystems and biotypes and species were retained that have become extinct elsewhere in Europe, or are very rare. This fact increase international responsibility of Latvia for preservation of biodiversity from the continental perspective*.

The main reasons for the depletion of biodiversity are the following:

- *depletion and disappearance of habitats*. Due to intensive agriculture, forestry and urbanisation, natural biotopes - old forests, swamps, floodplain are substituted with areas designated for uniformly intensive use. Meadows and pastures cultivated tradicionally disappear rapidly, and related species of plants and animals together with them (corn-crakes, partridges etc.);
- *isolation of populations*. The disappearance of biocenozes isolates plant and animal populations from each other. The exchange of genes between species populations is interrupted leading to decreases in the internal genetic diversity of species, and accordingly, the ability of species to adapt and survive;
- *disruption of migratory paths.* Changes of ecological conditions related to feeding, nesting, feathering and resting sites of migratory birds may lead to the disappearance of these species over a wide territory. Problems may also be created by the disruption of the migratory paths of birds and bats with the ill-considered placement of wind generators. Blocking the fish ways with hydrothechnic installations have already caused larges losses to fishery in Latvia.
- *pollution of air and water*. Increase of biogenetic substances in water ecosystems creates qualitative and quantitative changes in biocenozes. Species with a narrow ecological amplitude and limited competitiveness are ousted by widely distributed and expansive species. For example, in the beginning of the century, *Isoetes* and *Lobelia dortmanna* were quite widespread in olygotroph lakes with a sand bottoms. At present, these species have either fully disappearedin several lakes, or their populations are very small. Lakes have overgrown with *Phragmites*, *Scirpus* and *Typha* species.
- *discharge of toxic substances into water* kills animals in masses, it also causes accumulation of toxic substances in food chains and the weakening of populations.
- *air pollution with nitric and sulfur combinations* causes acidification of precipitation, creating direct damage to plants, especially coniferous as well as changes in soil reaction and soil microorganism composition;
- *introduction of alien species*. Import and introduction of acclimatized aild animals have created considerable losses in populations of native species. For example, raccoon dog, American mink. As to its spread in wild, the American mink has ousted the European one.*Heracleum sosnovski* was initially brought in as an ornamental honey plant, when entering the wild, it has spread in meadows, lawns, thus becoming a hard-to-fight weed. It creates burns of skin and mucuous membrane, endangering children in particular. Due to ignorance and negligence, many more dangerous weeds and pests have been released in wild nature.
- *lack of records and information*. Local Latvian races of cultivated plants and husbandry, as well as microorganisms are a significant breeding material for the future. Obtaining information on this genetic fund is the basis for complecting its collections and ensuring its preservation.

Measures for the preservation of biodiversity in Latvia:

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* Tucker, G.M., Health, M.F. (1994) Birds in Europe: Their Conservation Status, Cambridge, U.K.: Bird Life International (Bird Life Conservation Series Nr. 3)

1) protection of species:

protection of species in situ

Protecting of biodiversity of species of plants and animal should be ensured both by tested methods, such as creation of protected territories, and by introduction of new methods, as protection of species outside protected teritories. Instruments to ensure protection of species might be the following:

- the law of the Republic of Latvia 'On the Protection of Species and Habitats' that will provide general principles for protection of wild plants and animals, as well as regulations for the trade with these species, and integrate the requirements of international conventions in legislation of Latvia:
- the regulation of the Cabinet of Ministers 'On Particularly Protected Nature Territories and Objects' to provide general regulations for management of locations of protected species, as well as to approve new lists;
- signing of contracts and contractual commitments on localities of protected species between local governments and land users, and the control of implementation of these documents;
- introduction of tax relief in order to provide incentives for land owners to protect values of nature;
- establishment of a regular inventory and monitoring system for threatened species in order to work out methods for their protection
- regular revision and editing of the Red Data Book of Latvia in accordance with the changes in nature and national economy;
- ratification of the Convention on the Conservation of European Wildlife and Natural Habitants, and introduction of its requirements into the law 'On the Protection of Species and Biotopes' and the law 'On Hunting';
- ratification of the Convention on Conservation of Migratory Spieces of Wild Animals, and implementation of its requirements;
- ratification of the Convention on International Trade in Endangered of Fauna and Flora, and implementation of its requirements, improving the procedure for issuing permits, introducing registration, documentation and marking of world-scale rare species of plants and animals;
- ratification of the Convention on Biologicall Diversityy and implementation of its reguirements by including the principles of the Convention into National Environmental Policy Plan and by establishing of an inter-ministerial task force;
- teaching of caring and understanding attitude towards nature, starting at the pre-school level institutions, revision of curriculums of schools and hirher educational establishments and inclusion of principles of conservation of biodiversity into curriculums (especially for professions connected with agriculture, forestry, energy);
- preparation of specialists in nature protection, including into curriculums the latest information about management of biotopes and preparation of economically-substantiated management plans. Providing structures of local nature protection institutions with qualified staff.
- public awereness building, involving the mass media.

protection of species ex situ

Together with the protection of endangered species *in situ*, a protection system should be created for that part of the genetic fund not to be found *in situ*, or whose protection it is possible to ensure with special methods only (husbandry, cultivated plants or cultures of

microorganisms). Reitaining the achievements of selectionists of previous generations, we ensure the basis for the work in the future. Here different protection instuments should be used in accordance with the specifics of objects:

- recording and evaluation of cultivated plants, domestic animals and collections of microorganisms, certification of national collections and ensurance of funding for their maintenance;
- preparation of a list of rare and threatened with extinction weeds, creation of exemplary farms;
- ratification of the Convention on Biological Diversity, and implementation of its requirements;
- preparation of legals norms for protection of collections and to ensurance preservation of husbandry species;
- drafting of legislation for protection against pollutionn with genetically modified organisms. These legislative acts should be drafted in cooperation with the Ministry of Welfare in accordance with the directives EU;
- support involvement of botanical and zoological gardens of Latvia in international programmes for protection of species.

2) protection of habitats:

In order to ensure protection of the diversity of species in nature, it is very important to ensure the protection of natural and seminatural habitats. In order to be successful in this field, Latvia should use the following instruments:

- elaboration and implementation of sustainable of management methods in forestry and agriculture;
- preparation the classification of classification of habitats and the list of endangered habitats, or the Green Book of Latvia;
- identification of endangered habitats, and preparation of instructions for their management for the needs of land measurers, users, owners and environmental officials;
- signing of contracts and contractual commitments between local governments and land users, and control over their implementation, introduction of tax relief in order to ensure proper management of endangered habitats;
- the law ‘On the Protection of Species and Habitats’ to provide procedure to single out protected habitats and ensure responsibility for their protection and proper management;
- the law ‘On Territorial Planning’ and ‘Regulations for Territorial Planning’. These legal norms should provide the legal framework for inclusion of protected habitats in territorial planning, irrespective of the size and location of the object to be designated;
- ratification of the Convention on Wetlands of International Importance, Especially as Waterfowl Habitats, and implementation of its principle on `wise use` of wetlands in Latvia;
- adoption of the "Habitats directive` of the EU and its integration into the legislation of the Republic of Latvia;
- coordination of educational and teaching effort and the latest scientific findings and changes in national economy.

3) protection and restoration of migratory paths:

Latvia and the Baltic as a whole is a territory of particular importance on the Paleo-arctic migratory way of migratory birds, bats, butterflies and dragon-flies. International responsibility to ensure migration in Europe and Africa makes us to pay a particular attention to maintenance of the environmental quality and biotopes in Latvia. On the other hand, retention of migratory ways of fish and ensurance of water quality is an important factor in the development of national fishery in the future, including that of the Baltic region as a whole (Box 21).

Box 21. Death of salmon fingerlings
The salmon population of the Baltic sea has been seriously endangered during the last years by the M-74 syndrome, or mass death of salmon fingerlings. Pollution accumulated in the south-western part of the Baltic sea is considered to be the likely cause. Thus preservation of salmon populations in the eastern Baltic, which includes the sea around Latvia, has acquired a particular importance for the protection of this species of fish that is also important for our national economy.

It is no less important to preserve the wholeness of migratory ways of plant species in order to ensure continuity of natural florogenetic processes.

The following instruments should be used to ensure migratory ways:

- mapping of migratory ways of animal species, determination of locations of intersections and their protection;
- mapping of the migratory ways of plant species and the protection of important river vallies and sea coastal zone;
- ratification of the Convention on Conservation of Migratory Species of Wild Animals and implementation of its requirements;
- ratification of the Convention on Wetlands of International Importance, Especially as Waterfowl Habitats, and implementation of its requirements;
- the law 'On Protection Belts' providing protective belts for the coastal zone of the Baltic Sea and the Riga bay, as well as the procedure for setting protection belts for water bodies and water cources, and their status. This law is of particular importance in preservation the habitats of migratory species and ensurance the continuity of migratory ways, as well as preservation of water quality. It will also containtions on permitted and prohibited activities in the above-mentioned belts;
- elaboration of the concept of network of ecological corridors (the ECONET) for Latvia, and its introduction in territorial planning;
- the law 'On Territorial Planning' and 'Regulations for Territorial Planning' that should provide for design of protected zones and ecological corridors when elaborating territorial or general plans for any territory;
- distribution of information of specifics of biology of migratory animals during migration and regulations to be complied with for population of neighbouring areas. Involvement of local population, especially schoolchildren, in registration work

Box 22. Recording of the white stork
The registration of the white stork organised by the Society of Ornithological of Latvia, also rural general education schools, forestries and postal staff take part besides specialists and amateur ornithologists.

4) improvement of the network of protected territories:

6.8% of the territory of Latvia is presently occupied by protected territories of different categories, established over nearly half-century. Different objects are taken under the state protection with different aims of protection.

- drafting of the Cabinet regulations 'On Especially Protected Nature Territories and Objects' to adopt general management regulations of protected territories;

- evaluation of the present protected territories, determination of research and management priorities;
- preparation and implementation of individual management plans for protected nature territories;
- signing of contracts and contractual commitments between local governments and land users, and control over their implementation;
- introduction of tax relief to provide incentives for land owners and users to protect values of nature;
- optimisation of the network of protected territories, including a scientifically substantiated revision of the present territories and their borders, as well as the establishment of new territories.

5.8. Landscape degradation

Box 23. Definition of landscape
Landscape is both a physio-geographical complex, and the embodiment of traditions, customs and aesthetic qualities of historical and cultural heritage with a definite structure and definite functions. It is evidence of both the historic and modern relationships between humans and the environment.

There is a twofold connection between humans and their environment:
- through the circulation of energy and matter, using food, materials and energy as required;
- through emotions and thoughts, reflections of physical landscape elements in the conscious mind provide information and spiritual energy.

Human economic activity alters the natural circulation of matter and energy. There are practically no primeval, untouched natural landscapes in Latvia. Landscapes have developed in parallel with human social and economic systems. The characteristic mosaic of the Latvian landscape was historically formed. Traditional land uses and methods of agriculture, forestry and fishery have slowly elaborated and enriched landscape elements over the centuries. The Latvian landscape was the environment in which the nation's spiritual and material culture and national consciousness were formed. Recognition of these historic roots is an important precondition for the planning of sustainable development and the elaboration of individual responsibility.

During the post-war period, when huge collective farms were formed in rural areas, and towns (especially the Riga agglomeration) grew rapidly, traditional landscape structures were destroyed. Industrialised society, with its characteristic standardisation, high concentration of technological processes in a limited space, and mass production and consumption, rapidly degraded the determining qualities of landscape, since it:
- reduced natural spatial diversity;
- changed natural flows of energy and matter;
- decreased the opportunities for informative and aesthetic experiences.

Landscape degradation in Latvia was most significantly influenced by changes in rural areas, where farmers were detached from their traditional, extended family, small farm style of living and concentrated into villages or at collective sites of production. People were alienated from the land and therefore from their historic roots.

Degradation of landscape elements and processes, together with pollution and mundane uniformity, compromises the individual's ability to perceive and observe and creates stress. This, in turn affects society's health and its ability to adapt to change.

Essentially, the basis for all these negative manifestations is poor economic management - poor planning and poor implementation - and this affects the level of responsibility and cultural development of all persons involved.

Effect oriented measures:

clean-up and regeneration:

Landscape degradation is most clearly observed in our polluted water basins, low quality land reclamation drainage networks, abandoned gravel-pits and territories abandoned by the Russian army.

- responsibility of land users and owners for the property under their management;
- involvement of local governments in the regeneration of landscapes, developing local regulations, allocating sites for waste disposal, organising waste collection (see `5.4.Environmental impact of waste`), providing a system of financial discounts and penalties;
- subsidies (including foreign grants) for the development and implementation of recultivation projects, especially in territories abandoned by the Russian army;
- inventory of degraded landscapes, setting priorities;
- inventory of protected territories of natural and historic value within urban environments, setting priorities;
- landscape planning;
- elaboration and implementation of remediation projects.

humanisation of the human environment:

- programmes for the humanisation of the human environment and the development of urban and municipal projects;
- elaboration of the concept of human settlements in accordance with policy directions set by the Rio de Janeiro Conference for Environment and Development regarding human settlements.

Cause-oriented measures:

balancing economic activity

- amendment and improvement of legislation regarding the economic rights and responsibilities of national and local governments, legal and physical persons;
- efficient control over land use;
- elaboration and implementation of development planning and territorial planning systems;
- ensuring territories have territorial plans as the basic instrument for regulation of their economic activity;
- ensuring public participation in territorial planning, drafting of development projects and EIA processes.

retention and optimisation of landscape structure

Retention of the mosaic pattern of the landscape is important for the preservation of human emotional perceptions, psychological well-being and the satisfaction of aesthetic needs, and for the maintenance of biodiversity in the territory (see `5.7.Reduction of biodiversity`). Only in a mosaic landscape may the spectrum of biotopes that provides habitats for many organisms be retained. The preservation of geological and geomorphological structures and is also important.

- elaboration of a law ‘On Regional Development’, which provides for the management and preservation of landscapes characteristic to each of Latvia’s regions;
- elaboration of the concept of networks of ecological corridors for Latvia and its implementation in territorial planning;
- sustainable use of scenic resources, especially for the satisfaction of recreation and tourism needs (see `5.9.Non-sustainable use of natural resources`);
- development of proposals for sectoral ministries.

protection of typical and unique landscapes and landscape elements:

Since 1977, five areas within Latvia have been declared protected landscapes because of their aesthetic and traditional rural cultural values. Unfortunately, some protected values have been lost even in these territories during the last decades.

- elaboration of criteria for determining scenic values;
- development of a classification system for protected landscapes, and establishment of a network of protected landscapes;
- development of a classification system for ecological and historic landscape elements;
- development of management plans and regulations for protected landscape areas;
- drafting of instructions and handbooks for the regional staff of environmental institutions;
- law of the Republic of Latvia ‘On regional development’, which should provide for landscape protection and the retention of landscape elements;
- ensuring the registration and protection of protected ‘noble’ stones, ‘noble’ trees and geological objects.

reduction of integral pollution (see `5.1.*Transboundary pollution`, `5.2.Eutrofication of water courses and degradation of water ecosystems`,`*5.3.*Risks created by economic activities`, `5.5.Environmental impact of transport`, `*5.6.*Environmental impact of agriculture`)*

5.9. Non-sustainable use of natural resources

The very existence of human society, especially its economic activity and level of welfare, is related to the use of natural resources. The limited nature of resources and their uneven geographical distribution has historically been the cause of many of political, social and economic changes - co-operation, competition, as well as the extinction of countries, nations and peoples. The reasonable use of natural resources is the basis for the national independence and sustainable development of a country. Latvia is not rich in resources and will always be dependent on other countries, especially for the supply of oil, natural gas, coal, metals and minerals.

Box 24. Natural resources

Non-exhaustable natural resources are those which are abundant and the quantities of which are not reduced by their use - but their qualities change. The most characteristic example of such a resource is water.

Exhaustable natural resources are those that are reduced in quantity by their use. They, accordingly, fall into the categories of non-renewable, partly renewable and renewable resources.

Non-renewable natural resources include mainly minerals - oil, coal, gypsum, dolomite, clay, etc.

Partly renewable natural resources are some resources of organic origin, e.g., soil, peat, sapropel. The time required to regenerate these resources is at least several centuries.

Renewable natural resources are plants, animals and other biological resources that

renew both quantitatively and qualitatively, if they and their associated species have not been taken to the limit of extinction. Use of plant and animal resources are allowed only within the limits of regeneration of these organisms.

The use of natural resources can be discussed from the viewpoints of the national economy and the environment.

Many sectors of the national economy are based on the use of non-renewable and partly renewable resources and are therefore completely dependent on the supply and quality of resources.

The economic extraction of non-renewable and partly renewable resources is associated with radical interferences in natural environmental structures that create significant changes in biogeocenosis, including their total extinction - changes of the groundwater regime, accelerated soil erosion, the formation of karst limestone. It should be noted, that such environmental changes are usually irreversible.

The excessive use of a renewable resource leads to its depletion, or destruction of its ability to regenerate. As a result, the supply this resource is rapidly reduced, and it is possible that it will totally lose its natural regeneration capacity. Moreover, the excessive use of one natural resources may have a negative impact on other natural resources, i.e. a biological balance is destroyed and economic conflicts arise.

Measures to ensure the sustainable use of natural resources:

Establishment of a resource management system. This can be achieved by the application of the following instruments:

- establishment of the State cadaster, highlighting technical and information support. The State cadaster should objectively reflect the current situation of all natural resources. To achieve this, it is necessary to establish a stable and all-inclusive system of monitoring and inventorisation, which will require legislative amendments and financial investments;
- quotas and limits of resources. For non-renewable and partly renewable natural resources, annual quotas and limits are more or less stable, so resource reduction depends mainly on the potential to introduce new and more efficient technologies. For renewable natural resources, annual quotas and limits are flexible and depend mainly on economic activity;
- a sliding-scale natural resources tax should be introduced;
- customs duties for renewable natural resources. These should be flexible, depending on the status of a specific natural resource, and the potential to use or process it in Latvia. A positive example of this is the system of customs duties elaborated by the Ministry for Forestry, and revised every three months. The amount of customs duty to be paid for the export of timber depends not only on the possibilities of local processing and use, but also on current prices in world timber market. It is also necessary to develop or elaborate customs duties for other renewable natural resources.
- adoption of the law ‘On the Use of the Earth’s Sub-surface Resources’ and subordinated legislation. This directly influences the use of non-renewable and partly renewable natural resources;
- promotion of the regeneration of renewable natural resources and searches for and assessment of new supplies of non-renewable natural resources;
- include environmental requirements in laws connected with the use of natural resources, for example, ‘On Fishing’, ‘On Forestry’, ‘On Hunting’;
- development of territorial plans at various levels, together with inventories of natural resources, including spatial and recreational resources.

optimization of production structures and elaboration of sectoral programmes, that include economising on resources, substituting exhaustable natural resources with non-exhaustable, e.g. alternative energy sources. The recycling or reuse of raw materials is also an important economic measure (see `5.4.Environmental impact of waste`). The optimisation of production structures significantly influences the development and implementation of a national resource management system. Measures listed below are applicable to the use of all natural resources, with the exception of the recently introduced 'Green Certificate' system, that applies to the use of renewable natural resources only (Box 25).

Box 25.'Green Certificate'
A product is issued with a 'Green Certificate' if it has been manufactured without adversely harming the environment. Major criteria for issuing certificates include the retention of biodiversity, landscape mosaics and reserves of natural resources. In the near future, it will be difficult to obtain export licenses for products that have not been issued with Green Certificates.

- efficient extraction and processing technologies;
- promotion of the regeneration of renewable natural resources and licensing for the extraction of non-renewable natural resources; exploration for and evaluation of new sources of raw materials;
- subsidies for technologies that require less raw materials, substitute for non-renewable resources or recycle materials;
- soft loans for the acquisition of environmentally friendly technologies;
- elaboration and introduction of the 'Green Certificate' system of product labeling.

promotion and introduction of environmentally friendly consumption:

- promotion and clarification for consumers of the importance of resource saving and Green Certificates;
- development of new teaching programmes for the entire education system.

5.10. Low quality of drinking water

Latvia is endowed with adequate water resources to fully provide its population with drinking water. Therefore our main objectives are to ensure that drinking water is of adequate quality and that water resources are sustainably used.

An average of 95% of the population in Latvian cities, and an average of 50% in towns, receive their drinking water from a centralised supply system. Both surface water (53%) and groundwater (47%) are used for water supply.

In a centralised water supply system, the main threats to drinking water quality are presented by:

1. Use of surface water polluted as a result of human activity. Surface water is used to supply part of the drinking water for Riga, Daugavpils, Ventspils, Olaine and several other towns.

Large facilities for the treatment of drinking water have been constructed in these cities, where surface water undergoes pre-chlorination, coagulation, filtration, sedimentation and secondary chlorination. However, even this cannot fully safeguard the populations against chemical pollution of their water supply, especially if that pollution is of an accidental or transboundary nature.

Apart from this, water treatment facilities also pollute water to a certain extent, when they discharge large volumes of used coagulants. The effects of chlorination on drinking water quality and the consumer is also an unresolved issue.

2. The poor technical condition of water supply systems and equipment, together with their sometimes negligent and irresponsible operation, adds the threat of bacterial pollution to those already mentioned.

Latvian groundwater characteristically has a high iron content and insufficient fluorine. If evaluated according to these indicators, about one third of all existing wells fail to meet the existing standards.

Overall, groundwater is unpolluted, of satisfactory bacterialogical quality, and disinfection is not necessary. Whether or not water should be treated prior to its supply to consumers should be evaluated separately for each locality.

As a result of the intensive use of groundwater, depression funnels have formed in several regions. In the vicinity of Riga, the water-bearing layer is 7 m lower than the norm. Around Liepâja, it has dropped by 15 to18 m thus allowing the intrusion of sea water. There are also local depressions in water abstraction zones near Ogre, Tukums, Jelgava and Sigulda.

The main sources of drinking water for individual consumers that are not connected to communal water supply networks (i.e. on farms, rural properties, some dwellings in villages and towns, also areas of summer houses and garden houses) are dug wells or shallow drillholes. The majority of wells are 2...6 m deep.

The water from such wells or shallow drillholes generally has a high organic content, that is connected with waterlogging or the leaching of humic substances. The high concentration of nitrogen compounds in such wells should also be particularly noted. This is generally due to incorrect well construction techniques and the untidiness of adjacent areas. Biological pollution is considered a serious problem - high concentrations of unicellular organisms, algae and micro-organisms have been found in well-water. In all, 15...20% of wells can be considered polluted, and use of this water may have adverse impacts on human health.*

The following measures may be used to improve drinking water quality:

transition to the use of groundwater for centralised water supplies, while at the same time ensuring its sustainable and efficient use. Necessary instruments:

- State and local government financial investments;
- foreign loans, with State guarantees in some cases;
- optimisation of tariffs for water use.

improvement, completion and expansion of water supply systems. Necessary instruments:

- optimisation of water tariffs;
- improvement of permit system for water abstraction;
- foreign loans;
- financial investments by local governments;
- local development planning;
- application of the natural resources tax to water users not connected to centralised water supply systems;
- elaboration of national drinking water standards in accordance with EU requirements.

protection of drinking water abstraction sites.

Necessary instruments:

- implementation of the law ‘On Protection Belts’ and ensuring the enforcement of its protective provisions;

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* Study of water of wells in Latvia, University of Latvia, 1994, Riga.

- information and education of the public;
- administrative penalties.

improvement of individual and local water supply systems and the protection of upper layers of groundwater against pollution. Necessary instruments:

- programmes for the development of local water supply systems;
- information and education of water consumers;
- territorial planning;
- local government subsidies and soft loans;
- decontamination of local groundwater pollution sources, pollution minimisation.

6. Proposals for the development of an environmental action programme

The Environmental Action Programme for Central and Eastern Europe (EAP), which was used as a partial base for the development of Latvia's NEPP, is a broad spectrum document that includes both strategic approaches and specific actions for the solution of specific problems. EAP sets easy-to-achieve short-term goals, but appropriate care has been taken to ensure that these activities would complement the goals of long-term economic, social and environmental special-purpose programmes.

When elaborating the concept of the NEPP, it was decided to draft two separate documents, i.e. one to discuss long-term goals, policy principles and measures for the solution of priority problems - the National Environmental Policy Plan, and another to discuss measures for the solution of specific problems - the National Environmental Action Programme (NEAP). Such an approach was deemed necessary, since this was the first attempt to formulate environmental policy, even though much had already been achieved in practical environmental protection. In order to start reassessing required actions, it was first necessary to agree on strategic goals, principles and basic directions.

Strategy and specific action are inseparable. To implement a strategy, specific actions are necessary. However, to be able to choose the optimal actions, a strategy is needed.

As inferred by its title, the NEAP considers only environmental problems and measures for their solution that improve environmental quality. However, action is often connected with the need for changes in legislation, the establishment of new institutions or reorganisation of existing agencies. In NEAP, the following three types of action will be discussed separately:

- Actions directly solving environmental problems: usually, one measure involves multiple actions (e.g. construction of treatment facilities, changes of technology, establishment of protected territories etc.).
- Implementation of environmental policy instruments: listing the laws, standards, norms, etc., together with the measures for solution of priority problems; improvement of different economic instruments; discussions with representatives of target groups.
- Establishment of pre-requisites for environmental protection: enforcing the use of environmental monitoring system, scientific studies for more information on individual environmental problems, or the development of public awareness.

In order to formulate a clear action programme, several tasks need to be undertaken.

First, the present or planned actions should be co-ordinated with solutions as provided by the NEPP. Simultaneously, it should be determined which problems are to be addressed, what targets are to be aimed for and what the expected results should be. The preferred structure, specific measures and flexibility of the action programme should be understood. Possibilities for action outside the scope of MEPRD's operations should also be studied and possibilities of involving other ministries, regional structures and other organisations should be considered. Results of such activities might offer good insights for other present and future environmental activities, and it could provide a good basis for future co-operation.

Second, the method of implementing the environmental policies formulated by the NEPP should be clearly defined. Before undertaking planned activities, an assessment should be made of other desirable or necessary activities, their possible implementing agencies, possible results, timelines and approximate costs. Agreement should also be reached on the criteria used to determine priorities within the scope of total possible actions. This basically refers to activities that were less popular before, e.g. public education, 'good housekeeping' activities by industries, or consumer participation.

It can be seen that a mechanism needs to be created to connect the rather theoretical NEPP to specific environmental actions in order to promote the sustainable development of Latvia even more.

The NEAP will be reviewed during each current fiscal year, as well as every 2-3 years. This is necessary in the first place to enable the more efficient use of existing environmental protection funding, channelling it to most urgent activities, and secondly, the NEAP can be used as a substantiation for requests for further budget funding and foreign assistance.

Since the first step in developing a NEAP is the gathering of information and assessment of present activities, the programme will be elaborated mainly by MEPRD specialists. Over time, more and more interested parties should become involved in the elaboration and implementation of NEAP: representatives of other ministries, industry and agriculture, target groups, NGOs etc. Thus, NEAP would reflect the interests of all society.

By solving urgent priority problems and improving the system of environmental protection in the country, it would be possible to pay more attention to measures for reaching long-term targets. Thus, over time, the need for two separate documents - NEPP and NEAP - will be reduced, and they will be substituted by a single, comprehensive plan for environmental protection.

Appendix 1
A SHORT OVERVIEW OF THE LAWS ADOPTED FROM 1990-1994

- The law 'On Environmental Protection' (1991): can be considered the base law for environmental protection. It includes basic provisions and programme guidelines on the rights of the population to a quality human environment, information about the condition of the environment, measures for the solution of many environmental problems, control of environmental protection, liability for environmental violations, international co-operation in environmental protection, the division of responsibilities in environmental protection, and other issues. This law first refers to several new instruments for environmental protection: mandatory ecological insurance and ecological certification. However, mechanisms for the implementation of these instruments has not yet been elaborated.
- The law 'On the State Ecological Expertise' (1990): governs the procedures for the performance of ecological expertise by the State, its goals, objectives and other basic regulations. This law has helped the establishment of a very significant and powerful environmental policy implementation instrument. Now it is no longer possible to implement many plans, programmes, construction projects, etc. without the prior approval of the State Ecological Expertise.
- The law 'On the Environmental Protection Committee of the Republic of Latvia' (passed in 1990, but revoked in 1993 due to the establishment of the Ministry for Environmental Protection and Regional Development) established the legal basis for many rights and instruments of environmental protection for State administration institutions (receiving information, the right to visit any site or object in the territory of Latvia for the purpose of ensuring adherence to environmental requirements, disallowing the operations of industrial and other entities, etc.) The law was revoked by the establishment of the Ministry for Environmental Protection and Regional Development, but many ideas included in the law did or still do influence the activities of environmental protection institutions until the adoption of new legislation.
- The law 'On Natural Resources Tax' (1990): with the introduction of this law, a special tax for the involvement of natural resources in economic activity and environmental pollution was first established in Latvia. A natural resources tax is one of the most efficient economic instruments for environmental protection. At present, a new law 'On Natural Resources Tax' is being drafted, which will extend the types of natural resource use subject to taxation, as well as introduce a natural resources tax on the consumption of goods and products hazardous to the environment (for more details, see 4.3.).
- The law 'On Hazardous Wastes' (1993): regulates the procedures for operations involving hazardous wastes. The provision of this law banning the import of hazardous wastes has turned out to be very important for Latvia.
- The law 'On Particularly Protected Nature Territories' (1993): lists the categories of protected territories, the procedures for their establishment and protection etc. The law also governs the rights of land ownership and land use in protected territories, and is therefore the basis for protection of these territories during the present period of land reform which includes the re-establishment the private ownership on land.
- The law 'On Radiation and Nuclear Safety' (1994): at present, this is the newest environmental law, as well as the first Latvian law in this field. The law regulates the procedures for operations involving sources of ionising radiation (licensing of entrepreneurial activity, procedure for receiving permits, as well as the performance of other operations involving sources of ionising radiation), as well as the performance of other associated activities that ensure the preservation of human life, health, property and the environment.
- Regulations 'On Environmental Protection State Inspection' (1990); regulates the rights, duties, and level of competency required by the State's environmental protection inspectors. The regulations also partially govern the procedure for receiving permits for the use of many natural resources.

Appendix 2
INTERNATIONAL ENVIRONMENTAL CONVENTIONS RATIFIED OR BEING PREPARED FOR RATIFICATION

International environmental conventions ratified by Latvia:

Basel Convention of 1989, 'On the Control of Transboundary Movements of Hazardous Wastes and Their Final Disposal' (1992)
Helsinki Convention of 1974, 'On the Protection of the Marine Environment of the Baltic Sea Area' (1994)
Helsinki Convention of 1992, 'On the Protection of the Marine Environment of the Baltic Sea Area' (1994)
Vienna Convention of 1963, 'On Civil Liability for Nuclear Damage' (1994)
Vienna Joint Protocol of 1988, 'On the Application of the Vienna and Paris Conventions' (1994)
Vienna Convention of 1985, 'On the Protection of the Ozone Layer'
- Montreal Protocol of 1987, 'On Substances Depleting the Ozone Layer'
Rio de Janeiro United Nations General Convention of 1992, 'On Climate Change' (1995)
Ramsar Convention of 1971, 'On Wetlands of International Significance, Especially Waterbird Habitats' (1995)

International environmental conventions being prepared for ratification:

Gdansk Convention of 1973, 'On Fishing and the Protection of Living Natural Resources in the Baltic Sea and Coastal Zones'
London International Convention of 1973 (1978) 'On the Prevention of Pollution from Ships' (MARPOL Convention)
Washington Convention of 1973, 'On International Trade in Endangered Spieces of Wild Fauna and Flora'
Bern Convention of 1979, 'On the Conservation of European Wildlife and Natural Habitats'
Bonn Convention of 1979, 'On the Conservation of Migratory Species of Wild Animals'
Geneva Convention of 1979, 'On Long-range Transboundary Air Pollution'
- Protocol 'On Sustainable Funding of the Joint Programme for Observation and Assessment of Long-range Transboundary Air Pollution in Europe' (EMEP Protocol), Geneva, 1984;
- Protocol 'On the Reduction of NOx emissions or Their Transboundary Transport', Sofia, 1988;
- Protocol 'On the Reduction of Emissions of Volatile Organic Compounds (VOC) or Their Transboundary Transport', Geneva, 1991;
- Protocol 'On the Further Reduction of Sulphur Emissions' (2nd Sulphur Protocol), Oslo, 1994.
Convention on Environmental Impact Assesssment in a Transboundary Context, Espoo, 1991.
Convention On Biological Dioversity, Rio de Janeiro, 1992
Convention on the Protection and Use of Transboundary Watercourses and International Lakes, Helsinki, 1992

Appendix 3
PHYSICAL INFLUENCES

1. From sites of nuclear activity

1.1. Potential radioactive pollution from accidents

Accidents are possible during operations at nuclear installations, which may result in the emission of radioactive nuclides into the environment as gases or aerosols. The probability of a nuclear accident at any given nuclear site is generally calculated to be more than 106 years, i.e. less than one accident every million years. If the magnitude of an accident exceeds the maximum projected for the site, as it was at the Chernobyl Nuclear Power Plant (NPP) in 1986, significant amounts of radionuclides are emitted to the environment. For accidents of such magnitude, transboundary transport of pollutants is characteristic. The design of nuclear installations should provide that accident emergency systems localise the consequences of an accident in the territory of the installation.

The major dangers are from 131I aerosols, inert radioactive gases, other radionuclides. Iodine isotopes and inert gases create a short-term hazard, but other radionuclides may alter the global [gamma] background level and [alpha, beta] pollution.

The largest threats to Latvia from nuclear installations are Ignalina NPP and St. Petersburg NPP. Of course, major accidents at other NPPs in Russia, Sweden, etc. may also have hazardous consequences in Latvia.

1.2. Regular radioactive pollution

The operation of nuclear installations typically results in the regular emission of small amounts of radionuclides into the environment from gas and water treatment facilities. These amounts are practically too small to have any effect on the environment, with the exception of radioactive inert gases, that slowly alter the conductivity of air as they ionise. It is anticipated that will cause some climatic changes in the distant future. The collection of these inert gases was never addressed practically in NPPs of the former USSR, and in many Western countries this problem has not yet been completely resolved.

The operation of NPPs, and of any thermal power plant, results in the discharge of heat pollution into the closest watercourses. However, in Latvia this is not an issue.

1.3. The potential for pollution as a result of transport accidents

The operation of nuclear installations involves the transportation of radioactive materials and wastes. As in any transport operation, there is the probability that an accident may occur. Therefore, the planning of such operations must take into account the potential radioactive pollution of localised areas. Even if the containers used to transport new and used nuclear fuel have been designed to guarantee adequate safety, then nonetheless, in the case of an accident during the transportation of nuclear waste of medium-activity, particularly in liquid form, the environment is polluted.

In Latvia, such transportation operations are connected with the operation of Salaspils Scientific Nuclear Reactor. Up till now (since 1962) such accidents have not occurred.

1.4. Used nuclear fuel

This is a problem of national importance requiring an international solution. When the Salaspils nuclear reactor was constructed, no consideration was given to the containment of used nuclear fuel within the territory of Latvia.

1.5. Decommissioning the nuclear reactor

A special Cabinet decision has been enacted to address this problem of national importance, and to simultaneously address the following tasks: establishment of a fund to accrue the required financing (approximately 20 million Lats), retention of staff necessary for the operation, maximising the use of available international assistance.

2. From the use of radioactive substances

2.1. Potential radioactive pollution from accidents

Radioactive substances in available form i.e. liquid, powder or gas, are only used by several medical, scientific and educational institutions in Latvia. A fire in such a radiochemical laboratory may result in the emission of these substances into the environment. Such accidents endanger neighbouring areas.

Radioactive substances are mainly used from sealed radiation source, i.e. in a metal container, the construction of which ensures the containment of radionuclides even in case of an accident.

2.2. Regular pollution

The use of radioactive substances in available form typically results in the regular emission of small amounts into the environment from gas and water treatment facilities. There is a slight chance that several institutions that discharge radiation may be located in the same vicinity, each discharging only the permitted small and seemingly insignificant amount of radionuclides into the environment. However, once these amounts reach the communal sewage collector, the total may exceed permissible levels. In order to eliminate such a possibility, emission permits set allowances for a whole year as well as for specific operations. The location of the institution and possible summing of emissions is also taken into account.

2.3. The potential for pollution as a result of transport accidents

The use of radionuclides involves the use of transport, just as does the operation of a nuclear reactor. Different modes of transport offer different levels of safety, e.g. aeroplanes are widely used to transport new medicines, because even though the possibility of an accident is relatively high, the radioactivity of such substances is relatively insignificant.

A more important problem is the transportation of nuclear wastes from their site of use to the site of their final disposal. In case of an accident, local watercourses may be polluted this is turn may pollute the surrounding territories.

3. Non-ionising radiation

3.1. Light pollution

3.1.1. The emission of infra-red radiation in high temperature processes is a work safety problem.

3.1.2. The emission of infrared radiation in low temperature processes (or heat pollution) may be characterised as a global problem that influences the environment indirectly. It is directly associated with the production of electric power - as power losses. Thus, the problem should be discussed separately in connection with the production, transportation and consumption of electric power.

3.1.3. Ultra-violet radiation in high temperature processes is a work safety problem.

3.1.4. Ultra-violet radiation through an ozone layer of uneven density is a global problem that can only be directly influenced by using ozone-friendly substances. This problem should be discussed within the context of protection of the ozone layer.

3.2. Noise

3.2.1. Noise pollution is a problem of work safety in all industrial processes, as well as a problem for human habitation in industrial regions; in certain situations (repair works, construction) it creates discomfort for humans. Noise pollution is a local problem that should be individually solved for each case, often in connection with technology improvements.

3.2.2. Noise pollution from transport movements is a problem in the vicinity of highways, railroads, airports. The problem is widespread, but solutions require a certain level of financial support. In the field of aviation, it can partially be solved by applying international requirements for air transport.

3.2.3. Noise pollution in domestic areas is an insignificant problem, unless it is connected with industrial or transportation noise. It may be solved by increasing the level of understanding of the general public and of individuals.

3.3. Vibration

3.3.1. Vibration in technological processes is a problem of work safety.

3.3.2. Vibration caused by the movement of transport vehicles may be a problem in areas containing buildings of historic and cultural importance, especially in ‘old towns’.

3.4. Electromagnetic fields

3.4.1. Electromagnetic fields created by technological equipment generating constant electric radiation is a localised problem that is usually connected with work safety.

3.4.2. Electromagnetic fields from transmitters, radar - alternating fields and impulse-type radiation. Since this problem is yet not completely understood, but there are indications that there are negative impacts, the following approach should be adopted: if its application cannot be proven to be harmless, its potential impact should be reasonably reduced. Possible measures for solution include transition to the use of ultra-high frequencies, and raising the elevation of transmitters higher above the ground.

3.5. Electrostatic fields

3.5.1. The hazardous impact of electrostatic fields in the vicinity of power transmission lines is yet not completely understood. If possible, maximum safety should be applied.

3.5.2. An electrostatic field (surface charge) formed during an accident is a safety problem for humans and animals. The primary response should be to locate the accident site as soon as possible and nullify the source of electrical discharge.

3.5.3. Electrostatic fields in production industries is a work safety problem that also increases the risk of accidents (fire, explosion). For certain types of production, static neutralisers should be used - passive or active type.

3.5.4. Electrostatic fields in households is a domestic problem that increases with increase in the use of synthetic materials.