THE REPUBLIC OF LITHUANIA

Republic of Lithuania
THE MINISTRY
OF ENVIRONMENT

NATIONAL REPORT ON

SUSTAINABLE DEVELOPMENT

From Rio to Johannesburg

From transition to sustainable development

Vilnius, 2002

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The year 2002 is famous for the jubilees of some very significant global events. 30 years ago the United Nations organised a very important intergovernmental conference in Stockholm. In this conference a new approach to the environmental protection policy at global level was adopted in order to integrate environmental protection requirements into the whole economic development at the same time relating this to the relevant social changes. These issues should have already been addressed at global level because it was realised that natural resources were limited and that some factors of economic development destroying the environment in many countries caused evident irreversible negative changes in the natural environment. These changes are also closely related to the emergence of social problems. The ideas of sustainable development started to form. The principles of the development were laid down in the declaration at the United Nations conference on environment and development in Rio de Janeiro in 1992. In 2002 the representatives of all the world countries are again going to congregate in the World Summit Meeting in Johannesburg. There the countries' success in implementing the ideas of sustainable development and the priority challenges that we will have to face in the nearest future will be discussed.

While preparing for the Summit Meeting in Johannesburg Lithuania also has made an elaborate assessment of what was achieved during 10 years after the conference in Rio de Janeiro, what issues are still to be addressed, what should be done in the nearest future so that our economic and social development will gradually come up to compliance with all the sustainable development requirements. This is very important to us not only because we must ensure the living conditions favourable to health and prosperity of our future generations, but also because we have to meet the challenges of the EU Sustainable Development Strategy when getting ready for the accession to the European Union.

On the basis of this report with the achievements and shortcomings analysed, the National Sustainable Development Strategy is being devised to that will be finalised this year.

Taking the opportunity I would like to express my sincere gratitude to all the institutions that helped collect the material for the report and analyse it as well as to the United Nations Development Programme and the Earth Council that gave financial assistance in preparing and publishing this report.

Arūnas Kundrotas
The Minister of Environment
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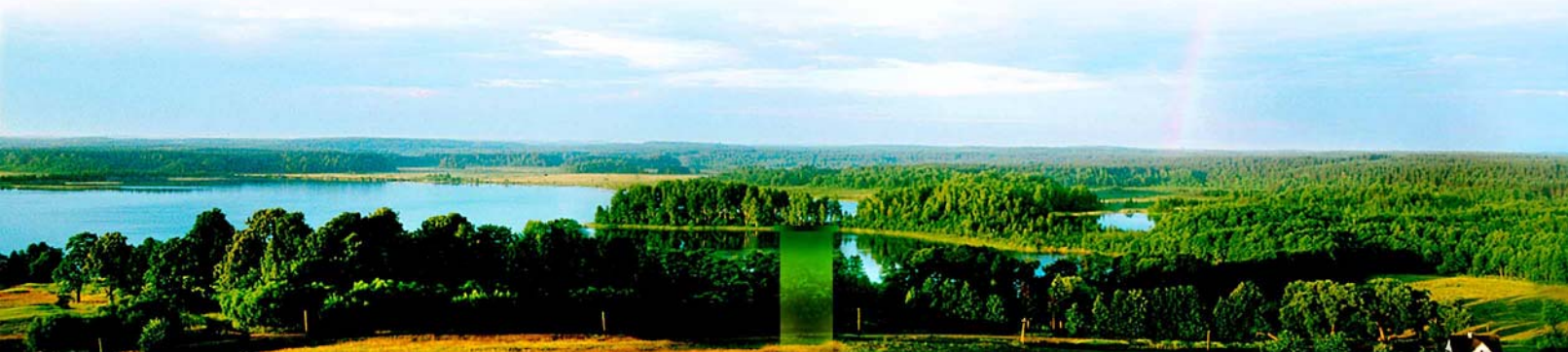


1. INTRODUCTION

Last decade was a period of very great changes in Lithuania as well as in the neighbouring countries. Essential changes in the political and economic system and transition to market economy determined great changes in different fields, which should be taken into account in analysing the experience and prospects of sustainable development.

This decade of changes showed that the success of the reforms carried out had been determined not only by objective, but also by subjective factors. Having legalised a democratic political system and having created new economic development possibilities, the public and state institutions needed some time so that they could acquire the necessary knowledge and gained at least minimal experience, allowing to more effectively make use of these opportunities.

At the beginning of the transition period the decline of Lithuanian economy started, production, as well as the consumption of the natural resources and environmental pollution decreased by several times. In the second part of the decade with the recovery in economy, the consumption of natural resources and environmental pollution were on the slight increase. However, economic market relations, restructuring of Lithuanian economy and the increased prices of energy and other resources determined favourable changes in the development of Lithuania in relation to sustainable development. At the beginning of the transition period the consumption of natural resources and environmental pollution decreased more rapidly than production, and when the economy started to gradually increase, the consumption of natural resources and environmental pollution increase incomparably more slowly than production and services do or they do not increase at all.

In assessing future possibilities and a possible pace of changes in Lithuania, as well as in other countries of transition economy, it is necessary to take into account the fact that, together with underdeveloped and stagnant economy, as well as heavy polluted environment, they inherited many positive things. First and foremost, this is a sufficiently high level of education of the people, a rather well-developed energy, communications infrastructure, quite a high-levelled industry and so on. This human and economic potential forms good preconditions for a quite rapid and sustainable development.

In preparation of this report we were trying to make it not only in line with the spirit of the Johannesburg World Summit Meeting, but also to provide comprehensive information on those great changes that took place in different areas of our life during this really extraordinary decade for our country and to register Lithuania's state entering the third millennium. The report is simultaneously prepared in English and Lithuanian so that the public of the country could also get acquainted with the ideas of sustainable development and more actively participate in implementing them. On the other hand, this report should be as an original reading point in evaluating Lithuania's further development and its steps from the transition period to sustainable development.

In the first chapters of the report the principles of sustainable development, specific features of the countries in transition and sustainable development policy in Lithuania are presented. The other three (5-7) chapters analyse basic components of sustainable development – the condition of the environment, economic and social development. In preparation of these chapters, changes in different environmental components and economic and social sectors, which took place during the recent decade, were analysed in detail, the main problems faced in implementing the principles of sustainable development were emphasised and the measures taken in order to solve these problems. Together with the problems, the achievements were shown and examples presented, where a greater progress was made. At the end of each chapter the main challenges are presented and the measures to realise them considered, further development plans and prospects shortly defined.

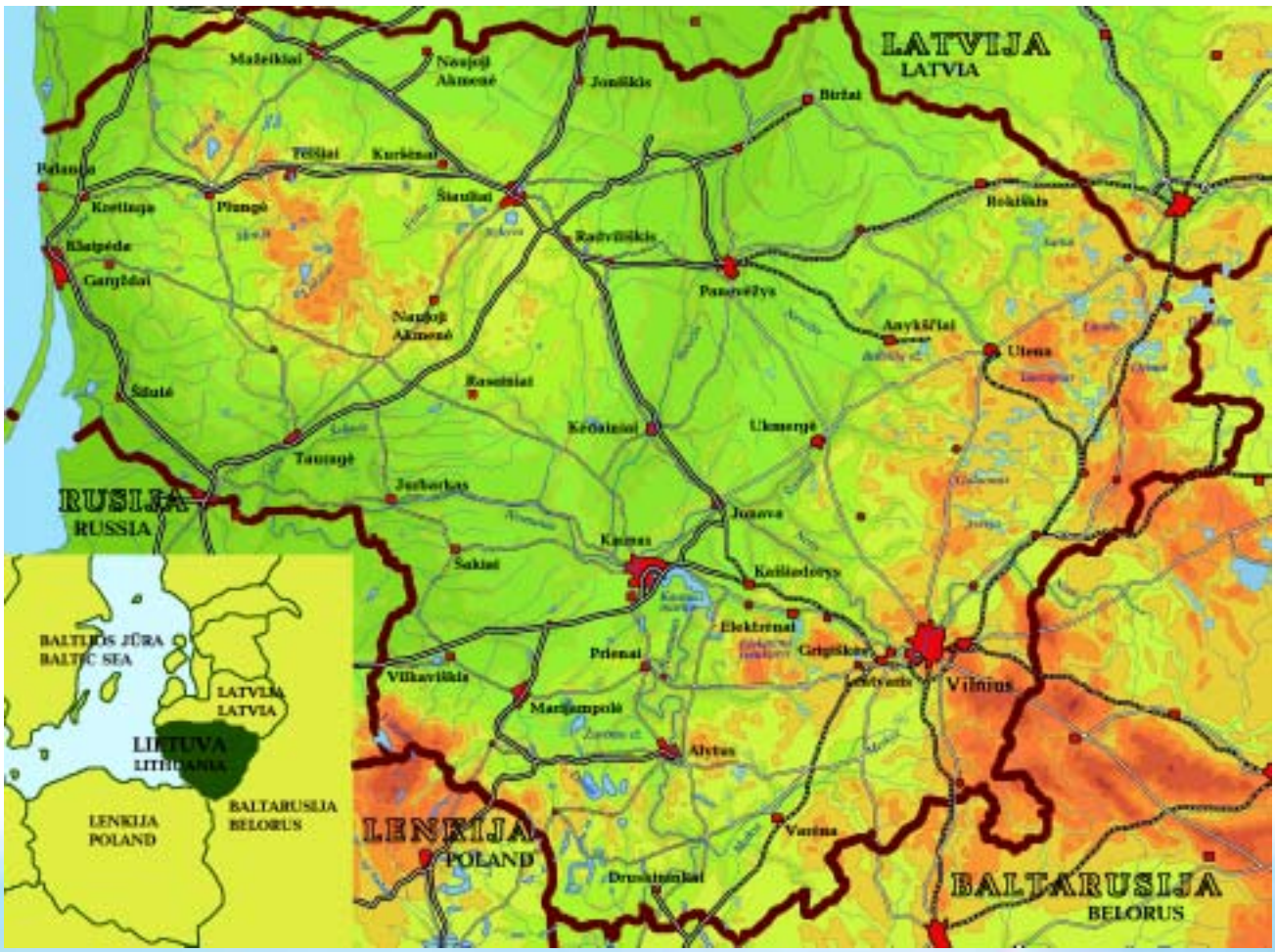
The final chapters of the report are dedicated to the implementation of sustainable development at local level and intersectorial co-operation prospects and problems. At the end of the report the main changes in the transition period and their relation to the principles of sustainable development are summarised and analysed in more detail and the strategic directions of sustainable development for Lithuania shortly reviewed.

2. LITHUANIA AS AN OLD AND NEW EUROPEAN STATE

During long decades the name of Lithuania, as of other Baltic states, was deleted from the political map of Europe, and since 1990 with the restoration of independence Lithuania has become an sovereign state again.

The territory of Lithuania borders on Latvia in the north, on Belorus and Poland in the east and south, on Kaliningrad region of Russian Federation in the north-west and on the Baltic Sea in the west. The National Geographical Institute of France has established that the geographical centre of Europe is 25 km northwards from Vilnius, the capital city of Lithuania, so Lithuania can geographically be regarded as a central European state. Its territory is a part of the Great North European Plain. The landscape varies: hilly areas alternate with flat plains. Lithuania has 758 rivers that are longer than 10 km. The longest one is the Nemunas. It is a transboundary river, its length is more than 470 km in Lithuania. There are 2834 lakes that are larger than 0.5 ha and which cover the total area of 87643 ha. The biggest one is Lake Drukšiai (4479 ha, 33.3 m deep). Forests cover 31.2% of the country's territory; pine (36%), fir (23%) and birch (20%) stands prevail in Lithuania. Wetlands cover about 7% of the total area.

In Lithuanian coastal area marine climate prevails, in the west and central part and in the east – it gradually becomes continental. Because of the influence of west winds, summers are moderately warm, 80% air humidity predominates, every winter permanent snow cover is formed. Average temperature in January is –4.9°C and in July it is +17.2°C. Average annual



Kernavė – an old capital of Lithuania

precipitation varies form 540 to 930 mm. Plant vegetation period continues 169 - 202 days.

According to the data of the population census carried out a year ago, 3.5 millions inhabitants live in Lithuania: 67 percent is urban population and 33 percent live in rural areas. Different nationalities live in Lithuania: Lithuanians (82 percent), Russians, Polish, Belorussians, Ukrainians, Tartars, Jews and people of other nationalities. The capital of Lithuania is Vilnius, the population of it is nearly 600 thousand. According to the Constitution of Lithuania, state language is the Lithuanian language, which belongs to the branch of the Baltic languages of the Indo-European language family. Best of all alive Indo-European languages the Lithuanian language retained the old sound system and most of the specific morphological features. Standard Lithuanian started to form in the middle of 16th century. In 1547 M. Mažvydas published the first Lithuanian book in Karaliaučius.

By religion, the majority of Lithuanian residents are Roman Catholics. Moreover, Evangelical Lutherans, Evangelical Reformats, Orthodox, Old Believers, Catholics of eastern rituals, Muslims, Judaic believers, Kharaims are traditional religious communities.

The name of Lithuania was first mentioned in the historical sources in 1009. Mindaugas, the Grand Duke of Lithuania, united the Lithuanian state and was crowned King of Lithuania in 1253. In 14th-16th centuries the Great Duchy of Lithuania was one of the greatest European states. Its governed lands stretched from the Baltic Sea to the Black Sea in the south, and in the east they reached the borders of Moscow Great Duchy. Lithuanian state was challenged to difficult fights with the Orders of Crusaders and Sword-Bearers, which ended in victory in Žalgiris (Grunwald) Battle in 1410, it also blocked the way to Tartar-Mongolian invasion intruding into West Europe. The internal state life was regulated by the laws legalised in the Statute of Lithuania in 1529 (1529, 1566, 1588). In the cultural context the Great Duchy of Lithuania was oriented by the cultural space of West Europe, and Catholicism spread in all its territory. From the 15th century Lithuanian youth went to study to the oldest European universities. Vilnius University as one of the oldest in this European part was established in 1579 and trained many personalities of state importance and significant to the world science. So it played an important role in the country's history.

In the course of history, Lithuania and Poland got into rapprochement and in 1569 joint Lithuanian-Polish state was created. Its territory was divided by Russia, Austria and Prussia in 1795, and Russia annexed Lithuania. In resistance to the annexation and russification in 1830-1831 and in 1863 two revolts against tsarism yoke took place,

more than 50 years Lithuanian press was prohibited. In the second part of the 19th century the national liberation movement arose, and due to this independent Lithuanian state was restored on 16 February 1918. During the two decades of the state independence development, Lithuania made a good progress, approaching the neighbouring European countries.

In 1940, according to the so-called Molotov-Ribbentrop pact, the Soviet Union occupied and annexed Lithuania. With the World War II ending, the Soviet Union occupied Lithuania again, and up to 1952 hundreds of thousands of residents were deported to Siberia, and many people were forced to emigrate to the West. Armed resistance to the occupation was expressed by active partisan movement, which lasted for 9 years. Later Lithuanian patriots participated in the resistance in other ways and were constantly raising the idea of independence restoration. Forcible collectivisation, industrialisation of the country, implementation of the so-called model of socialist economy in Lithuania caused economic, political and ecological crisis and encouraged a new Lithuanian national revival in 1987-1988. Lithuanian Sajūdis played a crucial role in this historical period, and Lithuania was the first of the former Soviet republics to announce its independence. This historical decision was made by the Lithuanian Parliament (the Highest Council of the Republic of Lithuania) on 11 March 1990.

In October 1992 the new Constitution was approved by referendum, a parliamentary system with President – the head of state – who shall be elected for a five-year period by direct voting, was introduced. The Lithuanian Seimas (Parliament) is a parliament consisting of one House, it comprises 141 members elected for a four-year period. Prime Minister shall be appointed or relieved of his/her post by the President with the consent of the Seimas.

In 1995 local government reform, which joined 44 districts into 10 counties governed by county governors appointed by the Government, was carried out in Lithuania. Local self-government is formed according to the Lithuanian administrative territorial division. There are 56 municipalities, the highest self-government institutions are municipality councils elected by direct voting. The main functions of local government are as follows: municipal economy, social security, public health services and education.

During the twelve years of Lithuanian independence democratic political system, market economy and high-capacity environmental institutions were formed. The main current challenges in the Lithuanian foreign policy all the parliamentary parties approve of is the accession to the European Union and NATO in the nearest extension stages of these structures.

3. SUSTAINABLE DEVELOPMENT - GENERAL PRINCIPLES AND SPECIFIC FEATURES OF COUNTRIES IN TRANSITION

For a long time development of society has been related to increasing environmental impact. Exponential growth in economy and population during the recent century determined fast increase in consumption of natural resources and environmental pollution. The attitude that growing production is the only guarantor of society welfare and smoking factory chimneys being the most obvious symbol of this welfare, has prevailed for a long time. Since the middle of the past century, as a consequence of revolution in science and technology, the growth rates of production and consumption of natural resources have soared up as much as twice, and the increase in population acquired a nature of a demographic explosion. This determined a much faster growth in the environmental pollution and it reached such high level in the 60s that it was no longer possible to ignore that problem.

A "World Dynamics" by J.Forester appeared at the beginning of the eighth decade (1971), and later the reports of the Rome Club (D. Meadows et al., The Limits to Growth, 1972; M. Mesarowitch and E. Pestel, Mankind in the Turning Point, 1975) presented very gloomy future forecasts of the world. The main conclusion was as follows - if the world population, the consumption of natural resources and production will increase at the present rate, the environmental pollution would reach a catastrophic level at the beginning of the twenty-first century and the humankind will face an inevitable ecological catastrophe. It became evident that the time had come to review in essence further priorities of the society development, to refuse a decisive economic growth as an exclusive one and to focus on a more efficient consumption of natural resources and the reduction of the environmental pollution.

On the basis of the reports of the Rome Club and publicistic and philosophical publications that appeared later, the conception of the survival of the humanity has been formulated. Its essence was as follows - if we want to have a sufficiently clean environment, to preserve nature and to survive ourselves, we have to refuse further economic development, to strictly limit the consumption of natural resources and our desires to possess more and more wealth of civilisation. Since the principles of this conception, were at obvious contradiction with the human nature and objective laws of the society development, searching for the ways-out and methods of resolving deepening environmental problems without refusing further economic progress was started.

The United Nations played a significant role in solving this dilemma the global society faced. In 1972 the United Nations Conference on environmental issues was convened in Stockholm. Representatives of 113 countries participated in this conference. During this conference it was stated that with science and technology progress man's possibilities to affect and change the environment had reached an unbelievable scale. The consequences of that impact are often unpredictable and poses a threat not only to nature but also to man himself. The principle that economic development must be carried consuming natural resources as effectively as possible and taking into account the environmental impact was clearly formulated at the conference. In Stockholm a standing institution under the United Nations was decided to establish - the United Nations Environmental Programme (UNEP). It played an important role in further development of the environmental policy.

Three international institutions - the United Nations Environmental Programme (UNEP), the International Union for the Conservation of Nature and Natural Resources (IUCN) and the Worldwide Fund for Nature (formerly World Wildlife Fund - WWF)

announced a very important document in 1980 - the World Conservation Strategy. **This document finally refused setting off economic development against conservation and clearly declared that conservation is not opposite of development, and that a rational consumption of natural resources is an inseparable part of economic development and nature conservation.** Stressing the interdependence of conservation and development World Conservation Strategy actually formed a basis for the Conception of Sustainable Development.

Seeking for environment - friendly ways of development, in 1984 a special Commission on Environment and Development was established under the United Nations and headed by Gro Harlem Brundt-land, the former Minister of Environment of Norway and a well-known public figure. During three years that Commission did a huge work. It prepared the Report "Our Common Future" published in many copies in 1987 and later translated into many languages of the world. The Report finally formulated the Conception of Sustainable Development defined in the Report as follows: **Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs**. Though this definition of sustainable development was often criticised because of its insufficient definiteness and possible ambiguous interpretations, it has been the main and most widely used definition of sustainable development so far.

The Report of the Brudtland Commission for the first time emphasised that sustainable development must not only be based on harmonisation of economic and environmental interests but it must also guarantee social justice in the state itself and in its relations with other countries. Poverty was stated to be one of the major obstacles to the implementation of the sustainable development principles. According to the current understanding of sustainable development, **three pillars of an equal significance - environmental protection, economic development and social development - form its basis**.

In further developing the ideas expressed in the Report, in 1991 the same international organisations, which drew up the World Conservation Strategy, announced a new document named a Strategy for Sustainable Living. This document formulated the basic sustainable development principles, identified appropriate measures necessary for the implementation of the principles of sustainable development, provided for the mechanism for implementing the Strategy and compiled the primary list of sustainable development indicators. The Strategy for Sustainable Living is based on three basic principles, which in short can be presented as follows:

- People want and can not only survive but also to live, that is, have satisfactory living conditions for themselves and their descendants;
- The humanity took little care of the environment and consumed resources irrationally, therefore it found itself on the brink that posed a threat to its own survival;
- Further social development must ensure that the results of the economic progress should be used not only for the benefit of man himself but also for the benefit of the environment.

It is obvious that with the globalisation rate increasing and economic relations and the scope of environmental problems extending, sustainable development principles can be implemented by means of joint international efforts only. The Rio de Janeiro World Summit on Environment and Development that took place ten years ago legitimated Sustainable Development as the main long-term ideology of the society development. Principles of sustainable development were presented in Rio Declaration and Agenda 21 - a programme for the implementation of sustainable development were adopted in Rio Summit. Moreover, other two highly important international documents were adopted in the Rio Summit as well: the Convention on Biological Diversity and the Framework Convention on Climate Change. At the same time the decrease in biological diversity and warming of the world climate changes were recognised to be the main environmental problems urgent to all the world countries.

At the Rio Summit a great attention was paid to the social aspects of sustainable development. If such problems as poverty, poor public health care services, a low level of education are not solved in time, they might become the greatest obstacles to the implementation of sustainable development principles inside a country and on the international scale. Attention was drawn to the fact that developed countries consumed a disproportionally large amount of the world natural resources, especially energy resources that are run-

ning short, and they bear the greatest responsibility for environmental pollution and regional and global environmental problems. On the other hand, people in the developing countries often are unable to meet basic needs, let alone the needs for education and culture. Experience shows that only raising the level of people's wellbeing and education can solve the problem of fast growth of population in these countries.

Resolving many of these problems and making the elimination of economic, social and cultural differences between separate regions of the world more rapid are practically impossible without the support of developed countries. The events of the recent years show that without solving these problems a real threat is posed not only to a future development of the world but also to its existence.

Going back to the very term of sustainable development and its essence, from the definition presented in G.H.Brundtand's Report it is clear that the concept of sustainable development is purely anthropocentric, and a right understanding of the conception to satisfy the needs of the human race is of paramount importance. Different regions of the world are characterised not only by different standards of living but also by different needs. It is absolutely obvious that if currently we made up our minds to meet the needs of at least an average inhabitant of Western Europe or North America in the immediate future, the consumption of the world natural resources and environmental pollution would increase by several times and would exceed all the allowable limits of environmental impact. Therefore it is necessary to look for other, more effective ways of economic development in relation to the consumption of natural resources and to review in essence the needs of the developed countries by changing current lifestyles with environment-friendly ones.

Hundreds of attempts have been made to present a more detailed and clearer definition of sustainable development than that presented in G.H.Bundtland's Report, however, so far nobody has succeeded in finding a universally accepted variant. It should be admitted that a lack of certain clarity in the definition of sustainable development has some advantages allowing groups with different interests to have a common ideological basis and aim. On the other hand, the ambiguity of the definition of sustainable development allows the term of sustainable development to be used where it is necessary and unnecessary, and it deprives the concept of sustainable development of its essence.

Perhaps a view, according to which a unified, very concrete and detailed definition of sustainable development is impossible and unnecessary, must be recognised as the most rational one. In different countries and regions with a different level of the economic and cultural development, different history, different lifestyles and traditions, a different abundance of natural resources and a different degree of environmental pollution, the accents and principle objectives of sustainable development can also be quite different. However, the very essence of sustainable development should remain clear enough. **In this publication sustainable development is treated as a compromise between environmental, economic and social objectives allowing to reach commonweal of the society for itself and future generations without exceeding allowable limits of environmental impact**.

Speaking about different aspects of sustainable development, two categories of countries are usually distinguished - developed countries and developing countries. Though this classification is relative and differences inside the same group of countries can be quite significant, most features in relation to sustainable development of the countries belonging to the same group are similar. If problems of especially fast growth of population, poverty, gender equality, education, public health care services are typical of developing countries, the developed countries most often face problems of an excessive consumption of natural resources and environmental pollution. However, on the other hand, both groups of countries have a significant common feature in their development. The development of both types of countries (with the exception of the countries emaciated by wars or other calamities) takes place in a way of natural evolution; their economy and the people's wellbeing, though at very different rates, grow up.

At the beginning of the last decade, after the former Soviet Union collapsed and all Soviet block broken down, a third group of countries with especially specific features of their development formed alongside those two traditionally distinguished groups of countries. Though these countries of so-called transitional economies occupy a large area from the Atlantic to the Pacific Ocean, too little attention is being paid to the analysis of specific features of their development

Industrial region of Kaunas

and possibilities of the implementation of sustainable development principles. The main feature of the development of these post-communist countries is that they were deprived of the possibility of natural evolution. Either out of their own will or by force these countries for long decades developed according to the wrong ideology and they came to a dead end. It was more difficult to find the way out than it was thought at the beginning. An essential change in the economic system and transition from the centralised economy to a market economy determined an inevitable transformation decline. The experience of the past decade showed that the success of the reforms being carried out was determined not only by the objective but also by subjective factors. After the democratic political system had been legalised and the new possibilities for the economic development created, a certain period was necessary for the society and state institutions to acquire sufficient knowledge and gain experience allowing making an efficient use of these possibilities.

Though the pace of changes in different transitional economies differ, the main features of development are common. After the transformational decline in economy had set in, not only the production but also the consumption of natural resources and the environmental pollution decreased by as much as several times. Since the middle of the past decade the economy of most of these countries has started to recover. More rapid positive economic changes are taking place in the countries that chose the way of fast reforms, so-called "shock therapy", than in those countries, which chose slow institutional reforms. The characteristic feature of transitional economies is that rates and scopes of changes that have taken place and are still taking place are very fast and huge. If changes in the production, the consumption of natural resources, the environmental pollution and social changes are measured by per cent or tens of percent in the developed and developing countries, in the transition countries changes are measured by times or by tens of times.

From the point of view of sustainable development a multiple decrease in the consumption of natural resources and environmental pollution at first sight seems very positive. However, taking into account the

fact that the changes favourable to the environment took place mainly due to a decline in the economy rather than due to some effective environmental measures, these changes can be treated in a different way. The most important questions must be answered in assessing the above-mentioned changes are, first and foremost, as follows:

- Has the consumption of natural resources decreased due to an economic decline only?
- Has the environmental pollution decreased only due to a decrease in the consumption of resources?

If answers to both questions would be positive, this would mean that the changes taken place in the transition economies offer nothing good in relation to sustainable development because with the economy picking up, a simultaneous increase in the consumption of natural resources and environmental pollution would start. Changes taken place in Lithuania are analysed from this point of view in the last chapter of this report.

On the other hand, the economic growth started in the transition economies several years ago will inevitably determine a certain growth in the consumption of natural resources and environmental pollution. However, these unfavourable from the environmental point of view trends should not be automatically assessed as non- fitting of the principles of sustainable development. If the economic growth of these countries is successfully decoupled from the growth in the consumption of resources and environmental pollution, that is, if the consumption of natural resources grows much slower than the economy does, and the environmental pollution grows slower than the consumption of resources, this would mean that the principles of sustainable development are not violated. Another issue to be made clear is which relative differences in the growth of economy, the consumption of resources and environmental pollution should be treated as very positive, and which should cause concern. From this point of view, special attention will have to be paid to the analysis and assessment of the development of countries in transition.

It is already clear that a part of the proposed sustainable development indicators reflecting absolute values - emission of pollutants per capita or area unit, the quality of urban air, the amount of waste, the amount of energy consumed per capita, etc. - will not be informative enough with respect to the transition economies, and the possibilities to use them for assessing the changes going on will be limited. Sustainable development indicators reflecting the ratio between the changes in economy, the consumption of natural resources and the environmental condition - consumption of energy and other resources per GDP unit, the amount of emission and waste per GDP unit, etc. - will have to be used. Currently, in drawing up the National strategy for sustainable development, a list of sustainable development indicators that correspond to the specific features of the transition economies is also being devised.

In assessing future possibilities and a possible pace of changes in the development of transition countries it is necessary to take into account the fact that these countries, together with underdeveloped and stagnant economy as well as heavy polluted environment, inherited many positive things. First and foremost, this is a sufficiently high level of education of the people, a well-developed energy, communications infrastructure, quite a high-levelled industry etc. This human and economic potential forms good preconditions for a quite rapid and sustainable development. Many western countries of former Soviet block have serious aspirations to join the European Union in the immediate future. Since the concept of sustainable development has already became an ideological basis of the development of European Union, the success of Lithuania's accession to the EU and other Euro-Atlantic structures and world organisations will largely depend on the progress in the implementing the principles of sustainable development.

4. SUSTAINABLE DEVELOPMENT POLICY IN LITHUANIA

After the re-establishment of the independence of Lithuania on the basis of a new national economic development policy and taking into account new environmental protection problems and objectives as well as priorities of the environmental policy, the Parliament of the country approved the Environmental Protection Strategy of Lithuania in 1996. The Government adopted the Action Programme aimed at directing the country towards sustainable development so that clean and healthy environment, biological and landscape diversity could be preserved and effective consumption of natural resources ensured. Then, perhaps, for the first time a term sustainable development was officially mentioned in our country. The environmental protection strategy was based on the principles laid down in the Rio de Janeiro Declaration. Later, on the basis of the principles of sustainable development, strategies for certain spheres were mapped out, e.g. the National Strategy for the Implementation of the United Nations Framework Convention on Climate Change, the Biological Diversity Conservation Strategy, the Strategy for the Public Environmental Education, the Energy Strategy, etc.

4.1. INTERNATIONAL CO-OPERATION

Up to 1990 Lithuania had no practical possibility to establish closer co-operation with foreign countries. The information about the state of environment in the former Soviet Union was considered to be a state secret. However, even then with the help of bilateral agreements on environmental protection between the former Soviet Union and the USA as well as Sweden, relations between the Lithuanian and foreign environmental protection specialists were established. Their experience and ideas were taken over, joint experiments and measurements of environmental pollution were started to carry out.

The situation changed drastically in 1990 after the re-establishment of independence. With the assistance of foreign experts, new laws and legal acts were drawn up. Real Lithuania's way to sustainable development started in 1992, when the Programme for Environmental Protection of Lithuania was devised. It defined basic environmental problems of the country. This programme was based on sustainable consumption of natural resources and on the condition that any economic activity should comply with the environmental requirements.

In 1992 Lithuania joined the family of the Baltic Sea Region countries by signing a multilateral agreement - the Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki). In the same year, together with other eight Baltic Sea Region countries, Lithuania started implementing Joint Environmental Action Programme of the Baltic Sea. All the Baltic Sea Region countries actively co-operate in implementing this Programme and Helsinki Convention and all its annexes. According to a gradually changing situation, the Helsinki Commission improves different implementation plans of the Convention and adopted recommendations by harmonising them with the sustainable development principles. For example, alongside the permanently emphasised chemical pollution (nutrients, heavy metals and persistent organic pollutants), a negative environmental impact is becoming ever-more threatening due to construction, especially in the coastal zone, as well as because of urban development. With the point pollution decreasing, non-point pollution resulting from agricultural activity and development of the transport sector poses one of the most serious problems. Problems of consumption and production are of ever-increasing concern, especially due to a non-qualified waste management. Problems of fishing in the Baltic Sea and pollution from vessels and surface pollution sources also evoke serious concern. On the basis of the principles of sustainable development, Lithuania and

other Baltic Sea Region countries also address these and similar issues.

In strengthening international relations with other European states, at the beginning of 1992 Lithuania signed two Conventions of the United Nations Economic Commission for Europe - Convention on the Protection and Use of Transboundary Watercourses and International Lakes, and Convention on the Transboundary Effects of Industrial Accidents.

In 1992 the Lithuanian delegation took an active part in the discussions on preparation and adoption of the main conference documents at the United Nations Environment and Development Conference held in Rio de Janeiro. It signed two new international conventions - Framework Convention on Climate Change and Convention on Biological Diversity. Prior to the Rio Conference, the National Report of Lithuania intended for the conference was prepared. It presented economic infrastructure (trade, industry, agriculture, energy), the state of environment (air, water, waste, landscape and land use, soil, natural resources and their protection, environmental pollution and public health issues), environmental policy objectives and strategies, implementation of environmental policy in different spheres.

Following the Rio de Janeiro Conference, Lithuania established permanent relations with the United Nations Sustainable Development Commission in New York, presented reports at several sessions of this Commission.

During the meeting of the Ministers of the Baltic Sea Region countries in May 1996, the initiative was launched to gradually implement sustainable development in the Region by mutual efforts. The joint programme for the Region - Baltic 21 - was started to draw up. It was completed within two years, and in June 1998 the Council of the Baltic Region countries (Ministers of Foreign Affairs) approved it. In essence, this is a sustainable development programme for our region. Eleven countries - all nine Baltic Sea Area countries, Norway and Island, are carrying it out. The European Commission, several intergovernmental organisations, some international financial institutions, some non-governmental organisations are also members of the Programme. Lithuanian experts took an active part in drawing up this programme and later participated in co-ordinating its implementation. The programme was drawn up for seven most important sectors of the Baltic Sea Region - energy, forestry, industry, transport, tourism, agriculture and fishery as well as territorial planning. In the year 2000 the educational sector was included in the Programme. Each sector was allocated to two countries responsible for the co-ordination of activities and implementation. Lithuania with Finland was in charge of the forestry sector and Lithuania with Sweden was responsible for the educational sector.

Apart from the activities in separate sectors, Programme Baltic 21 provides for joint actions uniting several sectors. Each sector is fully responsible for the implementation of the sustainable development programme.

In the forestry sector supervised by Lithuania and Finland, activities are carried out in accordance with the sustainable forestry objective: forests and forest lands must be managed and used in such a way and at such a pace that biological diversity, productivity, regeneration capacity and vitality should be preserved. Their abilities to carry out ecological, economical and social functions at local, national and global levels now and in the future should be ensured so that they do no harm to other ecosystems. Sector plans are devised on the basis of the resolutions of the Rio de Janeiro, the Strasbourg (1990), the Helsinki (1993) and the Lisbon (1998) Conferences on forest protection in Europe. Criteria and quantity indicators proposed by the European Union for sustainable development process of European forests are used in the sector.

In 2000 after the Ministers of Education signed the Hague Declaration, the Educational Agenda 21 (Baltic 21E) for the Baltic Sea Region was started to draft. It was approved by all the Ministers of Education of the Baltic Sea Region countries at their second meeting in Stockholm. Lithuanian and Swedish specialists on education supervise that sector.

Permanent international co-operation of Lithuanian environmental specialists is not limited by the Baltic Sea Region. Such co-operation is promoted devising and implementing working plans for bilateral intergovernmental and interdepartmental agreements between Lithuania and other foreign countries. Lithuanian representatives constantly address these issues in the events organised by the European Union institutions and held by the United Nations Economic Commission for Europe, at different meetings organised by the secretariats of multilateral meetings - international conventions, sittings of the representatives of the countries in transition and other events. Urgent intersectoral issues, such as transport, environment and health, water and health, transport and environment, energy and environment, agriculture and environment, etc. are often addressed at the aforementioned events. With the most significant event of the year 2002 - the World Summit on Sustainable Development in Johannesburg - in view, we are already preparing for the ministerial meeting "Environment for Europe" to be held in Kiev in 2003.

4.2. MAIN INSTRUMENTS FOR THE IMPLEMENTATION OF SUSTAINABLE DEVELOPMENT POLICY

First and foremost, the main law - the Constitution of the Republic of Lithuania

regulates the rights and duties of individuals. The Constitution contains several articles directly influencing the implementation of the principles of sustainable development in the country. Article 46 reads as follows: "Lithuania's economy shall be based on the right to private ownership, freedom of individual economic activity, and initiative. The State shall support economic efforts and initiative useful to the community. The State shall regulate economic activity so that it served common welfare of the people. The law shall prohibit monopolisation of production and the market and shall protect freedom of fair competition. The State shall defend the interests of consumers." Article 48 states that "every person may freely choose an occupation or business and shall have the right to adequate, safe and healthy working conditions, adequate compensation for work, and social security in the case of unemployment." The Constitution obliges the State to take care of the protection of natural environment. It also obliges the citizens to protect the environment. Article 53 establishes that "the State and each individual must protect the environment from harmful influences." Article 54 of the Constitution establishes how the State must do that: "The State shall care about the protection of natural environment, its fauna and flora, separate objects of nature and particularly valuable districts; it shall supervise moderate use of natural resources as well as their restoration and augmentation. The exhaustion of land and earth entrails, pollution of waters and air, making radioactive impact as well as impoverishment of fauna and flora shall be prohibited by law."

The Law on Environmental Protection of the Republic of Lithuania adopted in 1992 and supplemented several times later lays down the basic principles of environmental protection. The main objective of this Law is to seek ecologically safe and healthy environment, to protect the characteristic landscape of Lithuania as well as diversity of biological systems. The Law provides for environmental impact assessment and lays down the principle "polluter pays", encourages the citizens and public organisations to ensure environmental protection.

On the basis of the Law on Environmental Protection, a number of other laws and legal acts regulating the consumption of natural resources and environmental protection were adopted. The basic laws related to consumption of natural resources and protection of the environment as well as some other laws that have a significant impact on the implementation of sustainable development in Lithuania are presented in Table 4.1.

Application of laws is usually regulated when resolutions of the Government, rules, strategies, implementation programmes, plans and other legal acts are adopted. Legal and natural entities, who have violated laws and other legal acts or have done harm to the environment, may be brought to criminal, administrative or civil responsibility.

When integrating environmental requirements for the economic activity, the following economic instruments shall be applied:

- taxes on state natural resources;
- air, water and soil pollution taxes;
- fines for exceeding the established pollution limits or concealed pollution, harm done to the environment, tree felling without a permit, etc.;
- excise/ duties on fuel and cars;
- consumer taxes on water consumption, waste water treatment and household waste management;
- subsidies for project studies, research and implementation of projects.

Environmental taxes on pollution and consumption of natural resources have been imposed since 1991. Taxes are collected to compensate for the harm done and to cover the costs of restoration. On the basis of the amendments to the Law on Tax on Environmental Pollution (1991, new wording in 1999) approved in 2002, the procedure of calculation and payment of taxes on environmental pollution as well as

Table 4.1. Basic laws regulating environmental protection and consumption of natural resources and other laws of significance for implementing sustainable development

Law on Taxes on State Natural Resources (1991, amendments in 1996, 2000)
Law on Pollution Taxe (1991, new wording in 1999, amendments in 2000, 2002)
Law on the Principles of Transport Activities (1991, amendments in 1997)
Law on Environmental Protection (1992, amended and supplemented in 1996, 1997, 2000, 2001)
Law on Tax on Oil and Gas Resources (1992, amendments in 1996)
Law on Protected Areas (1993, new wording in 2001)
Law on Land (1994, amended and supplemented in 1995, 1996, 1997, 1999, 2000, 2001)
Law on Forestry (1994, new wording in 2001)
Law on Territorial Planning (1995, amended and supplemented in 1997, 2000, 2001)
Law on Plant Protection (1995, new wording in 1998, amendments in 2001)
Law on Earth Entrails (1995, new wording in 2001)
Law on Local Government (1995, new wording 2000)
Law on Energy (1995, amended and supplemented in 1996, 1997, 1998, 1999, 2000)
Law on Provision of Information to the Public (1996, new wording in 2000)
Law on Construction (1996, new wording in 2000)
Law on Environmental Impact Assessment of the Proposed Economic Activity (1996, new wording in 2000)
Law on Water (1997, amendments in 2000)
Law on Protection of Marine Environment (1997)
Law on Wildlife (1997, new wording in 2001)
Law on Environmental Monitoring (1997)
Law on Waste Management (1998, amended and supplemented in 2000, 2002)
Law on Public Administration (1999)
Law on Ambient Air Protection (1999)
Law on Radioactive Waste (1999)
Law on Regional Development (2000)
Law on the Right to Access of Information from State and Municipal Institutions (2000)
Law on Biofuel (2000)
Law on Genetically Modified Organisms (2001)
Law on the Management of Packaging and Packaging Waste (2001, enters into force in 2003)

on some kinds of products and product packaging is being prepared.

The Law on Taxes on State Natural Resources (1991, amendments in 1996 and 2000) obliges the consumers of natural resources to pay taxes to the State. The Resolution of the Government of the Republic of Lithuania of 11 October 1995 "Concerning Taxes on State Natural Resources" established the methodology for calculating taxes. Taxes are directly related to the amount of the resources consumed. Taxes on fish resources, water and mineral resources are paid to the State budget. When an impermissible amount of mineral resources is consumed and having caught an impermissible amount of fish, fines are imposed. They shall be paid to the Environmental Protection Support Programme.

The Law on Tax on Oil and Gas Resources (1992, amendments in 1996) establishes the basic tax rate - 20% of the selling price of extracted oil or gas, but not less than the control price fixed by the Government. If the deposits have been found and prospected by the State financing, the tax rate shall be increased by additional 9%. The Ministry of Environment indexes the tax rates on quarterly basis. In the case of failure to timely pay taxes, tax on oil and gas resources as well as fines shall be paid to the State budget. Fines for exceeding the limit of resource extraction shall be paid to the Environmental Protection Support Programme.

The Law on Pollution Tax (1991, amendments in 1999, 2000, 2002) establishes rates for the main water, air and soil pollutants. Terms "maximum permissible pollution" (MPP) and "temporarily permitted

pollution" (TPP) are used in the Law on Pollution Tax. Beginning with 2003 legal entities with issued TPP licenses shall pay 20% higher taxes. State Tax Inspectorates shall collect pollution taxes. 70% of the tax is paid to the municipal environmental protection funds, 20% - to the Environmental Protection Investment Fund of Lithuania and 10% - to the state budget.

When state natural resources are extracted without license, a tax shall be paid and economic tenfold rate sanction shall be imposed. If pollutants are emitted into the environment without a license or in another place than designated for that purpose, losses to compensate for the harm done shall be calculated in accordance with the methodology adopted. Fines shall be paid for exceeding the standard established in the license or for the amount of pollutants concealed.

Foreign countries have allocated and are still allocating subsidies for project studies in order to carry out research and implement projects. Municipal environmental protection funds grant subsidies for enterprises to update the environmental equipment. If there is a shortage of funds necessary to implement pollution reduction measures, some part thereof may be allocated from the Environmental Protection Support Programme.

Polluters that implement pollution reduction measures reducing the amount of pollutants at least 10% out of the maximum permissible pollution shall be exempt from taxes on these pollutants (not longer than for a three-year period).

The Government, ministries, departments, organisations subordinated to the ministries and municipalities make use of plenty of administrative measures intended for creating preconditions for the gradual implementation of sustainable development. To this end, economic development of the sector is combined with environmental requirements and social needs, documents intended for the rational consumption of natural resources are prepared, electricity and heating energy are consumed economically and efficiently, relevant strategies and action plans are elaborated, state standards and norms that must not be exceeded by no economic activity are adopted regulating the quality of natural environment. Permissions must be obtained

for all kinds of activities related to the environmental pollution. Every permission specifies environmental protection conditions and requirements so that the activity should be carried out without violating the established environmental standards.

Every ministry and organisations subordinated to it as well as other state and municipal institutions implement laws and other legal acts within the area of their competence, formulate state policy in a relevant sphere, prepare standards, system of permissions, economic measures, ensure participation of the public in the process of adopting decisions related to any environmental impact and social issues.

The functions of the regional departments of the Ministry of Environment comprise issuance of permissions, environmental impact assessment, laboratory control and application of environmental standards. In order to carry out these functions the regional departments have central apparatus and regional environmental protection agencies. Inspectors have the right to check plants and equipment in them. They can authorise laboratories to observe pollution and can impose fines if standards or permissions are violated. Inspectors from the regional departments and agencies are responsible for exerting control over application of environmental legal acts, norms and standards. The process of applying the laws is based on the system of permissions and local monitoring. Environmental inspectors regularly check the amounts of emission harmful to the environment as well as the accuracy of the reports of plant operators. Non-provision of data (or erroneous reports) on environmental condition and emission of pollutants without permissions are violations subject to punishment.

Territorial planning is one of the most important instruments for formulating and implementing the sustainable development policy. This activity is regulated by the Law on Territorial Planning and realised by preparing territorial planning documents. The Law established the right and duty of the administration of all governing levels to prepare territorial planning documents for the territory it manages. Such a democratic and decentralised system creates a possibility to make use of all the public initiatives seeking to achieve the objectives set at the International United Nations Forum in Rio de Janeiro 10 years ago.

An important step to implement sustainable development ideas in relation to territorial planning is the preparation of the Master Plan of the Territory of the Republic of Lithuania undertaken on the basis of the Resolution of the Government. The plan was started to draw up in 1996. In the year 2002 it was submitted to the Government of the Republic of Lithuania for endorsement and then it will be submitted to the Seimas for approval. A significant feature of that document is intersectoral planning methods seeking sustainable territorial development.

One of the necessary measures and preconditions for any proposed economic activity to be implemented in compliance with the principles of sustainable development is a qualified environmental impact assessment of that activity. In Lithuania environmental impact assessment is carried out in accordance with the Law on Environmental Impact Assessment of Proposed Economic Activity (2000).The law regulates the process of environmental impact assessment and relations between its participants. According to this Law, the public plays an important role in the process of environmental impact assessment.

In further implementing the sustainable development policy in Lithuania it is necessary to complete devising Lithuanian Sustainable Development Strategy. The Strategy would formulate clear objectives of all-round development of our country that organically embraces all the three dimensions of sustainable development - environmental, economic and social. It would provide a vision of strategic management of the development. The National Strategy must be harmonised with the Sustainable Development Strategy of the European Union adopted at the meeting of the European Council in Göteborg in June 2001 and supplemented at the meeting of the Council held in Barcelona in March 2002.

At the beginning of 2002 a working group for preparation of the National Strategy for Sustainable Development was set up. The Strategy is planned to devise till September-October 2002, providing for the measures of its implementation and monitoring, which will be carried out in accordance with relevant general (intersectoral) and sectoral sustainability indicators.

4.3. PUBLIC PARTICIPATION

Article 53 of the Constitution of the Republic of Lithuania reads as follows: "The State and each individual must protect the environment from harmful impact". A number of laws and secondary legislation expand and consolidate that constitutional provision. In the course of more than ten years, with the process of democratisation of the society rapidly taking place in Lithuania, the rights of the public to obtain information, to participate in decision-making process and to defend its rights in independent institutions, were ever more consolidated.

The following processes taking place on the international scale had a great impact on strengthening of these rights in the country: the activity of the United Nations to implement the principles of sustainable development, the accession to the European Union (EU) and the most important documents adopted by these institutions. Three principles formulated in the Environmental Protection Strategy of Lithuania (1996) - the principles of subsidiarity, partnership and publicity of information - directly relate to the statements laid down in the Rio de Janeiro Declaration on participation of citizens and publicity of information.

In 1998 Lithuania and other 35 countries signed the Aarhus Convention on Access to Information, Public Participation in Decision-Making Process and Access to Justice in Environmental Matters. In 2001 the Seimas (Parliament) of the Republic of Lithuania ratified this important international Convention enforcing the principles of public participation. The Law on the Right to Receive Information from State and Municipal Institutions (2000) and other legal acts directly regulate the provision of information to the public. Taking into account the provisions laid down in the Aarhus Convention and the ES Directive "On Access to Information on the Environment", the procedure of providing information to the public has been prepared (1999). Reliable and timely information creates the possibility for the public to participate in making decisions that have an impact on the environment and human health.

Apart form the laws mentioned above, other legal acts of Lithuania - the Law on Environmental Protection (1996), the Law on Territorial Planning (1995), the Law on Environmental Impact Assessment of Proposed Economic Activity (2000) - regulate the provision of information to the public and its participation in making decisions on specific activities that may have an impact on environment.

Public participation in considering plans and programmes in Lithuania is regulated by the Law on Regional Development (2000). All the documents of regional development are being prepared following the basic principles. One of them establishes that legal and natural entities concerned (including non-governmental organisations) are informed about the preparation of national and regional development plans as well as about the possibility to provide proposals according to the procedure established by the Government. The public has the right to participate in discussions on regional development plans, plans and programmes of different sectors at local level, general and special plans of territorial planning. This possibility is defined in three legal acts - the Law on Local Self-Government (2000), the Law on Territorial Planning (1995) and the Regulations for considering territorial planning documents with the public (1996).

Under the Resolution of the Government of the Republic of Lithuania of 28 July 2000 "On Setting up the National Sustainable Development Commission and the Approval of its Regulations", the Commission consists of the representatives of the state, municipal, scientific, public and other non-governmental organisations. The main objective of the Commission is to help ensure the implementation of the basic principles of sustainable development laid down in the Declaration of the United Nations Environment and Development Conference in 1992 and the Agenda 21 in Lithuania.

In accordance with the Order of the Minister of Environment of the Republic of Lithuania of 12 September 2001 "On the Council of Advisors of the Ministry of Environment", the Council of Advisors of the Ministry of Environmental has been formed and aimed to involving the public in the decision-making process of the Ministry of Environment within the areas of competence of the public.

Participation of the public in preparing legal acts in Lithuania is regulated by the Law on Drawing up Laws and Other Legal Statutory Acts (1995), the Law on Public Administration (1999), the Law on Petitions (1999) and the Law on Legislative Initiative of Citizens (1999). The aforementioned laws provide for different levels of participation of the public: provision of information on the draft documents and the possibility of making observations and putting forward proposals. In certain cases at the invitation of responsible institutions the public may take part in considerations of legal acts under preparation or in the activity of the working groups that prepare these documents.

It goes without saying that legal acts create only preconditions for active participation of the public. Actual participation depends on the level of maturity of the civil society itself. In Lithuania, like in many post-Soviet countries, there are no traditions of participation of the public in the state administration. In a broad sense the activity of the public is far from satisfactory. Different non-governmental organisations, however, exert a great influence on formulation of environmental policy, decision-making processes and implementation of the principles of sustainable development.

Participation of the public in political life of the country on the whole, and in the processes of environmental and sustainable development in particular, is impossible to separate from the Lithuanian Reform movement "Sąjūdis" and the Greens' movement in Lithuania. In the 1960s the principles and aspirations of the Greens' movement in Lithuania, like in other countries of the former Soviet block, received public approval, though it was otherwise in Western countries. This widespread approval and public consolidation are characteristic of the period of awakening of national self-consciousness and maturity, the so-called rebirth period (1988-90). Then the unheard mass actions of the Greens' movement intertwined with striving for national sovereignty and state independence - values and ideals so important to the public.

Lithuania is one of the most illustrative examples showing how the rebirth of the nation closely intertwined with the ecological criticism of the former regime and ecological protest actions - with the universal national liberation movement. The protest meeting organised by the Greens in Kaunas in the summer of 1988 perhaps was the first event symbolising the public rallying together at the beginning of the

"Sąjūdis" movement. A crowd of many thousands gathered on the confluence of the Nemunas and the Neris Rivers and then, perhaps for the first time, ecological criticism obviously expanded up to the aspirations to create an independent state. Political criticism of the current regime was expressed in a meaningful language of environmental protection.

Alongside the historic and cultural memory, the propagation of national and independence ideas, the Greens levelled criticism at direct polluters - for example, Jonava Fertiliser Plant "Azotas". Strong pressure was exerted on the central authorities of cities and regions. Picketing of Ignalina Nuclear Power Plant, a hunger strike that lasted as long as the site for Kaunas wastewater treatment facilities was found and other actions also deserve mention. In 1988-90 the most important forms of expressing criticism by the Greens were a picket, protest marches, boycotts. For example, transportation of turbines to Kruonis Hydro-Accumulation Plant was physically boycotted. Questioning the development of Kruonis Hydro-Accumulation Plant, the Greens related it not only to ecological peculiarities and protection of the natural area of the Kauno Marios but also to the present and future issues of Ignalina Nuclear Power Plant and whether Kruonis would be necessary or unnecessary after Ignalina Nuclear Power Plant has been decommissioned.

The formation of ecological awareness of the Lithuanian society is perhaps the most important achievement of the Greens' movement. Alongside controversial views and interrelations between different social groups and organisation, opposition between ecology and development of the country's economy, arguments are ever more often heard in the Lithuanian society. Balance between ecological, economical and social development is sought to achieve.

A reflux in public participation, including movement of the Greens', as well as defining the challenges of sustainable development in a more comprehensive way can be related to economic recession in Lithuania in 1991-1995. A growing professionalism of the Green's and the initiatives of sustainable development often replace radical civil mass actions. From the radical contra movement that propagates alternative lifestyle standards and trends in economic development they are gradually moving to the "dialogue regime" with the state and economic institutions. However, this does not mean that they refuse a critical approach expressed by means of actions that attract attention of the public. These actions are related to the following pressing issues: tree felling in privatised estates, protected areas and the development of economic activity violating the principles of ecological and social balance. Determination of the Greens is not abating, however, their argumentation is changing: less and less they use such categorical proposals as "to close down", "to freeze". For example, in discussing the future of the Nuclear Power Plant, economical consumption of energy in industry and everyday life, development of renewable sources of energy are emphasised and propagated as a balance to nuclear energy.

The society of the Greens "Atgaja" in Kaunas established a centre for economising energy. It propagates ways and means of energy economy and encourages people to change lifestyle and to start using bicycles more. Today residents of Vilnius, who earlier rallied round a rather radical and intellectual society of the Greens "Žemyna" and ecological centre "Alternatyva", are engaged in the activities of modern professional society "Baltijos konsultacinė grupė" (Baltic Consulting Group) or within self-governments of the city of Vilnius where they devise projects for the development of their city. Today the former activists of the Greens are engaged in professional environmental protection work. They take ecological inventory of the former military bases, design wastewater treatment facilities, waste storage and processing enterprises, etc. New ecological, economic and technological approaches are replacing protests. Educational activity is developed: for example, the Greens and the Lithuanian TV initiated a long-term competition "My home: ecology, economy, economising". The Greens of the city of Klaipėda (for example, members of Club "Žvejonė") are becoming ever more engaged in academic activity. They constructively contribute (by scientific knowledge rather than by pickets or protests) to solving the ecological problems of the Baltic Sea Region, design projects for ecological education of pupils and so on.

According to the data received from different sources, there are about 80-100 non-governmental organisations in Lithuania related to ecology, environmental protection and sustainable development. The scope of activity of these organisations is especially wide and versatile: from general nature protection societies, professional associations (of biologists, hydrologists, dendrologists, etc.), social-political move-

ment "Talka tėviškei", the partnership of organic agriculture "Gaja" to small specific-purpose associations, for example, for preserving turtles. Many traditional nature protection organisations such as Nature Protection Society carry on their activities. Former public organisations and societies founded in the independent Lithuania seventy years ago, like "Society to Beautify Lithuania" founded by Vaižgantas and Tadas Ivanauskas, are re-established.

Non-governmental environmental organisations closely co-operate with international organisations - Friends of the Earth, BankWatch, the Regional Environmental Centre (REC), the Baltic Environmental Forum (BEF) and others. This activity often encompasses not only for specific environmental or sustainable development projects but also general educational activity. However, so far there is no serious political force in Lithuania that represents environmental interests in a broad sense and that could directly represent and defend the ideas of sustainable development in the Parliament.

More active participation of the public in solving environmental problems depends to a great extent on environmental education. The objectives and tasks of environmental education of the public are established in the strategy for environmental education of the public of the Republic of Lithuania and the action programme approved by the Government of the Republic of Lithuania in 1998.

New non-governmental organisations, for example, "Gaja" and "Tatula", develop educational activity in organic farming. Other new non-governmental organisations were founded in 1990-1995. These are Association of Engineering Ecology under the Lithuanian Confederation of Industrialists and Pollution Prevention Centre. They promote industry ecologisation, environmental management and cleaner production. The number of alternative energy sources and the network of organisations popularising the ideas and technologies of ecological dwelling are on the increase. This development is actively supported by different international and national organisations - UNDP (United Nations Development Programme), UNEP (United Nations Environmental Programme), the World Bank, the European Union Phare and other

programmes, individual state-donors, in particular Denmark, Sweden, Finland, Norway, the USA, the United Kingdom and others.

The legal basis for eco-labelling of products was started to create in Lithuania in 1996. The Order of the Ministry of Environment "On Environmental Labelling of Products" legally establishes the principles of eco-labelling and the institutional structure and forms its basis. The ecological label valid in Lithuania - a water lily - has been approved. The creation of the eco-label and related statutory legal acts as well as their legalisation can be regarded as one of the features of modernisation of the Lithuanian environmental policy, the process of institutional improvement. On the other hand, actual use of the ecological label has been hardly taken notice of so far. Lithuanian consumers know far better the "green point" used for labelling goods imported from Germany or the stylised "swan" labelling ecological products produced in the Scandinavian countries. Meanwhile the distribution of the Lithuanian "water lily" is hindered by many obstacles related to institutional capabilities, peculiarities of market-orientation of an enterprise and a lack of motivation. For example, some Lithuanian textile enterprises exporting their products abroad seek to acquire a relevant international ecological label of that branch of industry, however, they are little interested in labelling their products with the Lithuanian "water lily". Perhaps, like in other spheres of public participation, consumers, citizens and the employees of enterprises still have to go a long way of education.

Substantial changes have been observed in the sphere of ecological education and propagation of ideas of sustainable development among children and young people - at kindergartens, schools, and higher educational institutions. Apart from the creation of aforementioned state strategy and its approval in 1998, lots of specific projects are carried out. Ecological education and methodological facilities are introduced in many Lithuanian schools. Competitions in the sphere of ecological education are organised in cities, regions and on the national scale. Municipalities and even President of the Republic Valdas Adamkus have established prizes. People who take part in this activity learn one from another and from foreign experience. Many bilateral agreements between Lithuanian schools and other countries, municipalities and institutions have been concluded. Ecological education is becoming an important part of the projects of Agenda 21. These projects started in the largest Lithuanian cities - Kaunas, Klaipėda, Panevėžys - rapidly spread in the local governments of small towns and districts (Chapter 8).

The mass media also plays an important role in environmental education. Lithuanian State Television has broadcast weekly programmes on the issues of environmental protection and sustainable development for several years already. Sometimes such programmes are broadcast on commercial channels. Public Information Division established in the Ministry of Environment has been promoting educational activity for several years. It took part in co-ordinating and preparing the aforementioned "Strategy for Environmental Education of the Public of the Republic of Lithuania and Action Programme".

It is worth noting that different publications on environmental education and projects are oriented towards an individual, the change of his/her principles, values and behaviour by presenting rational, economically substantiated (ecomodern) arguments rather than by moralising him/her. Ecological literature intended for all kinds of readers - industrialists, students, household owners, etc. - contains plenty of statements about the benefit that the reduction of pollution and waste bring. On the other hand, with public authorities orienting the educational activity towards ecological awareness of an individual and its practical manifestation in everyday life, it is hoped these changes in values and behaviour, distribution of certain norms and "standards" of behaviour will not be fragmental from the social point of view, that is, acceptable to certain social groups only, but will embrace all society.

5. Environmental Quality and Natural Resources

5.1. AIR

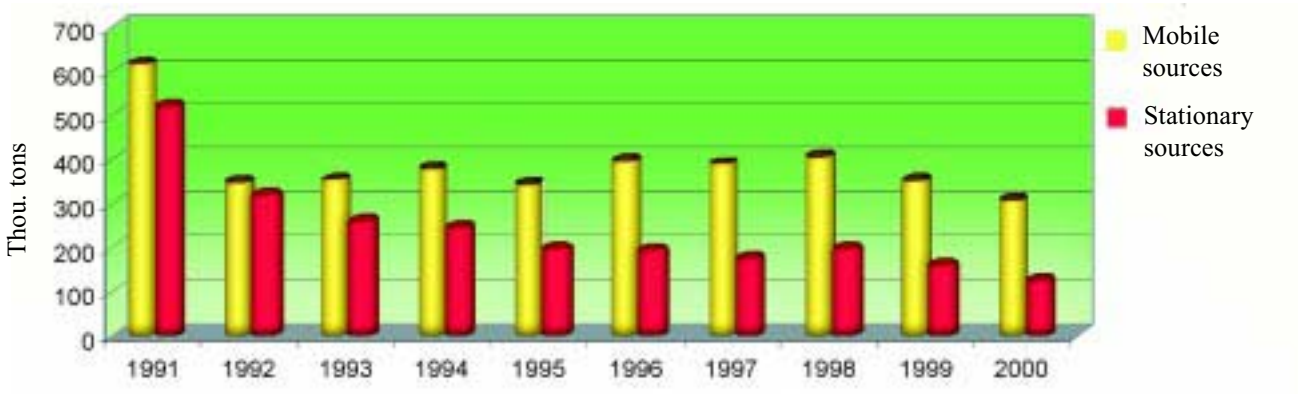
After Lithuania re-established its independence, as a consequence of an economy decline, emission of pollutants into the air has decreased substantially. Every year the Ministry of Environment sums up the information on the amount of pollutants emitted into the air. The data on the main pollutants - sulphur dioxide, nitrogen oxides, carbon monoxide and non-methane volatile organic compounds - from various sources are calculated on the basis of statistical data about the amounts of different kinds of fuel consumed during the year. Since solid particles (dust) constitute a rather great part of pollutants, and only a small part of these particles is emitted into the environment when burning fuel, the data on changes in dust emission are presented on the basis of data of annually inventoried stationary emission sources (industry, energy sector). However, dust emission from mobile sources (vehicles) is calculated according to the amounts of fuel consumed.

The data presented in Figure 5.1 show emission of the main pollutants (sulphur dioxide, nitrogen oxides, carbon monoxide, non-methane volatile organic compounds and solid particles) into the air. It is seen that throughout the analysed decade total emission of the main pollutants decreased from 1.1 million tons to 430 thousand tons, that is, by more than 2.5 times. The data presented also show that trends of emission from stationary (industry, the energy sector) and mobile (vehicles) sources of pollution are different. During this period emission from stationary sources was on the permanent decrease. Only in 1998, with economy slowly recovering, a temporary increase in emission was registered. During the ten-year period emission from stationary sources decreased by more than 4 times, whereas emission from mobile sources decreased as little as twice during the same period. That was because the transport sector started to recover much earlier (Chapter 6.4), and emission from mobile sources has started to increase since 1993. Due to a repeated decline in economy, since 1999 emission of pollutants from transport sector has decreased again. These processes are analysed in more details in chapters 6.4 and 10.

Emission of pollutants into the air on the territory of Lithuania is distributed very unevenly. For example, in 1999 emission of sulphur dioxide from stationary sources accounted for about half a ton per square kilometre in Lithuania, whereas in Mažeikiai district it amounted to almost 18 tons, and in Šalčininkai district - only 30 kg per square kilometre. The main sources of emission are mainly concentrated in two regions of Lithuania: Vilnius-Kaunas district (Vilnius, Kaunas, Jonava, Kėdainiai, Kaišiadorys and Trakai) and northern-western region (Mažeikiai, Akmenė, Klaipėda, Šiauliai, Telšiai and Plungė).

The largest stationary source of air pollution in Lithuania is JSC "Mažeikių nafta". The pollutants emitted into the air from the this source and Mažeikiai Heat and Power Plant account for almost one-fourth of total emision from stationary sources in Lithuania. The following largest stationary sources of pollution should be mentioned: the Lithuanian Power Plant accounts for over 10%, JSC "Achema" of Jonava - about 5%, JSC "Akmenės cementas" - about 3% in the total emission balance of stationary sources. However, mobile pollution sources, that is, transport and road transport in particular pollute the air most, therefore the largest reserves of reducing pollution emission lie hidden there.

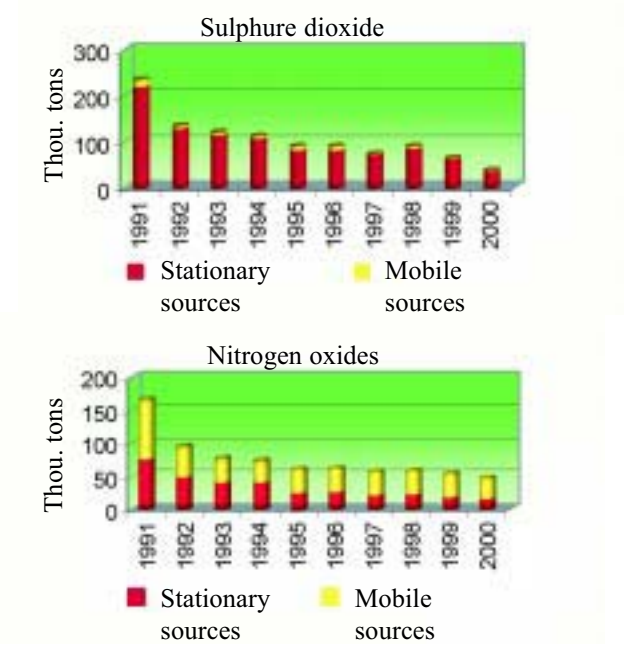
Changes in emission of basic pollutants during the decade under analysis are presented in Figure 5.2. The data presented show that the quantity of solid particles and sulphur dioxide decreased the most (about seven times and more than five times respectively) because these pollutants are emitted into the air from stationary pollution sources mainly. These emissions decreased much more significantly due to a decline in economy than that from mobile sources (Figure 5.1). Such a significant decrease in emission of solid particles was determined by a decline in the industry of construction materials. Emission of sulphur dioxide decreased not only due to a decline in the economy but also because the quality requirements for oil fuel with respect to sulphur were made stricter. Instead of the former 3.5% of the marginal quantity of sulphur, 2.5% of sulphur limit was legalised in 1998 for heavy fuel oil used in Lithuania. In the same year the requirements for diesel fuel were made considerably stricter, and the permissible amount of sulphur was reduced from 0.2% to 0.05%. Increased part of natural gases in the total fuel balance had an additional effect on the decrease in sulphur dioxide emission (Chapter 6.3).

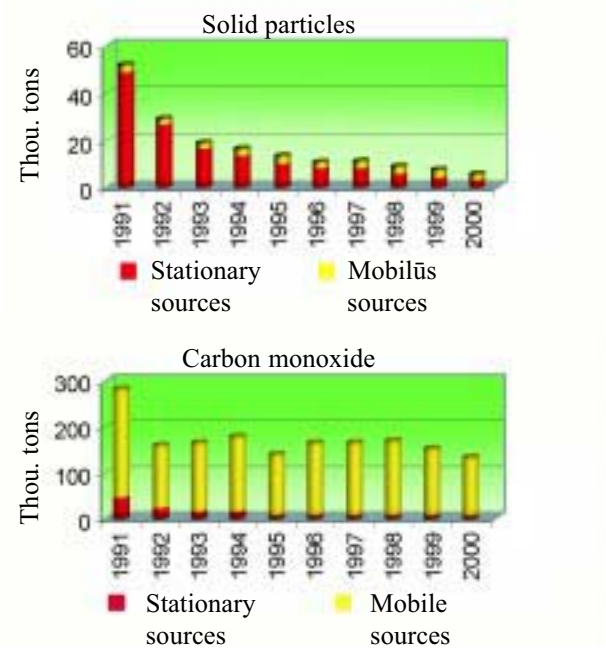


5.1 Changes in emission from stationary and mobile sources

Emission of nitrogen oxides, and carbon monoxide in particular, is mainly determined by mobile pollution sources. The data presented in Figure 5.2 show that emission of nitrogen oxides decreased by about 3.5 times and that of carbon monoxide - by about as much as twice during the past decade.

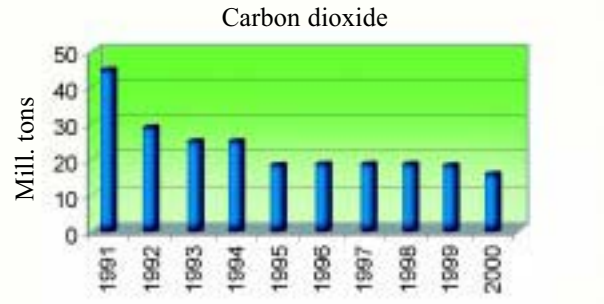
Changes in emission of greenhouse gases during last decade are presented in Figure 5.3.

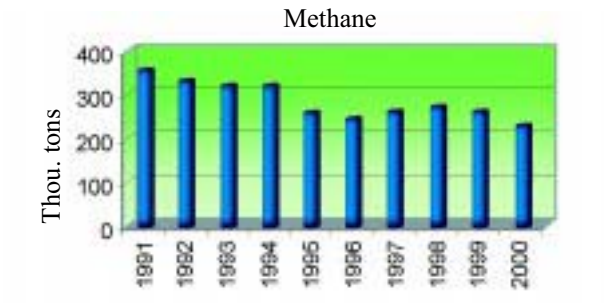




5.2 Changes in emission of basic pollutants

As seen from data presented in Fig 5.3, emission of carbon dioxide during ten years decreased from 45 to 16 million tons, that is, almost by as much as three times. Though these changes were mainly determined by a transformational decline in economy, a lot has been done in Lithuania to implement the requirements of the United Nations Framework Convention on Climate Change and the Kyoto Protocol. In carrying out the national programmes for increasing energy efficiency and implementing the Framework Convention on Climate Change, many buildings have been renovated seeking to use the supplied heat more economically. Many small boiler-rooms have been refurbished and fossil organic fuel has been substituted by bio-fuel (timber, straw). Action projects of joint implementation, as the means of implementing the Kyoto Protocol, were started in Lithuania in 1993 with the support provided by the Swedish Government. Over ten projects were implemented aimed at increasing energy efficiency in central heating systems and extending to use local re-





5.3 Changes in emission of greenhouse gases

newable fuel - timber as well as its waste at the same time reducing emission of CO_2.

Methane is emitted into the environment mainly from dump sites and wastewater treatment facilities as well as from silt formed and agricultural activities. On the basis of the assessment made in 2000, these sources generated 85% of total methane emission. The data in Figure 5.3 show that annual methane emission during the period under study decreased from 350 to 230 thousand tons, that is, is by approximately one-third.

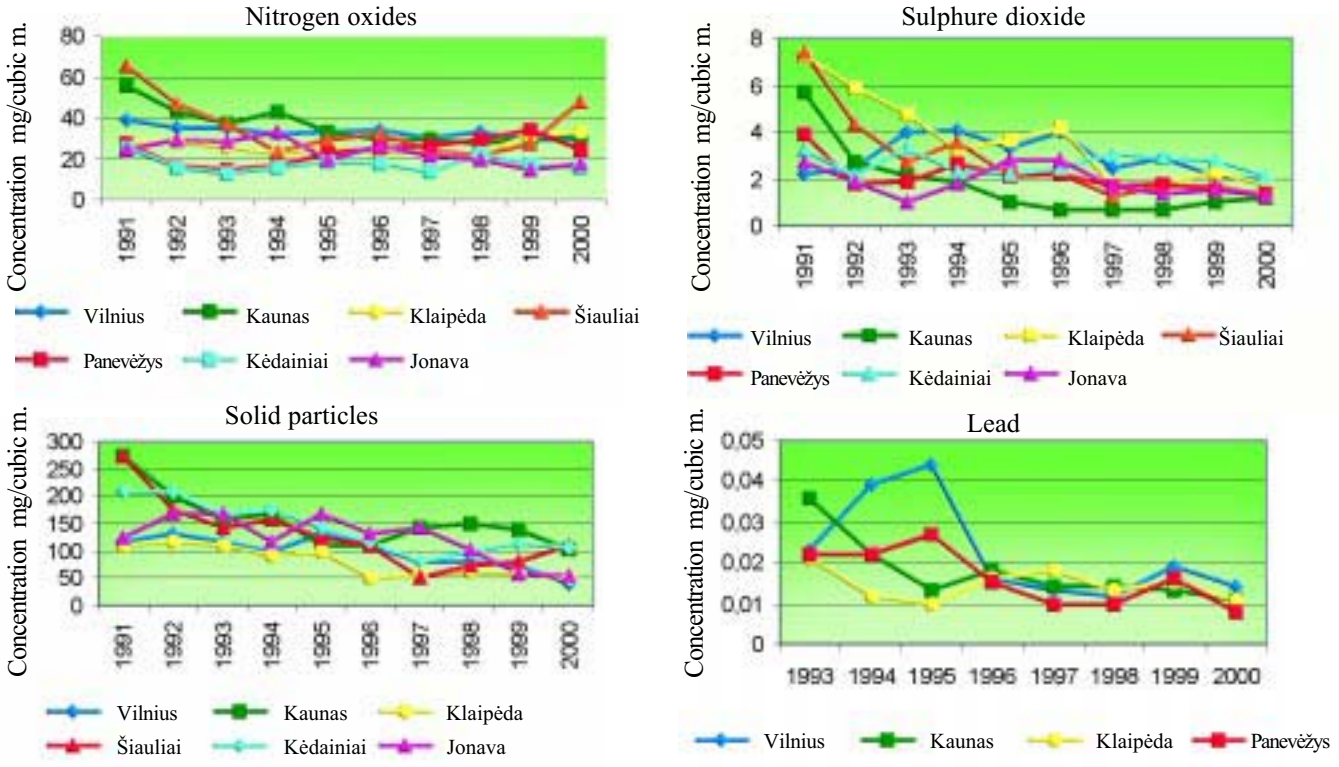
After emission of pollutants into the air had decreased, the quality of air improved considerably during the past decade. State air monitoring is carried out in large cities and industrial centres of the country seeking to control the situation and provide information to the public. In 1995 state local monitoring network controlling air pollution consisted of 22 stationary stations. There concentrations of sulphur dioxide, nitrogen oxides, carbon monoxide and solid particles, formaldehyde, benz(a)pyrene and some heavy metals - Pb, Cd, Cu, Zn, Hg - are measured. The Lithuanian air monitoring system is constantly being improved. The national legal basis that complies with the EU requirements has been prepared. On the basis of the Law on Environmental Monitoring (1997), regulations governing environmental monitoring of state, municipal and economic entities have been prepared, automatic air monitoring and pollution simulation systems are introduced in large cities.

The data on concentrations of basic pollutants in the largest cities and industrial centres of Lithuania are presented in Figure 5.4. The data presented show that concentrations of pollutants in the air decreased substantially during the past decade. If average concentrations of nitrogen dioxide in 1991 varied from 25-30 $\mu g/m^3$ (Klaipėda, Panevėžys, Jonava) to 55-65 $\mu g/m^3$ (Kaunas, Šiauliai), in 2000 they did not exceed 30 $\mu g/m^3$ in most of the towns and only in Klaipėda and Šiauliai the increase in the concentrations of nitrogen dioxide has been registered in recent years. Due to centralised heating systems, urban air in Lithuania contained small concentrations of sulphur dioxide. The concentrations decreased even more during the period under study, and its average annual concentrations in most Lithuanian towns do not exceed 2 $\mu g/m^3$.

The concentration of solid particles also decreased considerably in Lithuanian towns during that period (Figure 5.4) If in 1991 the concentration of solid particles in nearly all Lithuanian towns quite often exceeded maximum allowable concentrations (150 $\mu g/m^3$), and in Kaunas and Šiauliai the average concentrations of solid particles amounted to almost 300 $\mu g/m^3$, in 2000 the average annual concentrations of solid particles practically do not exceeded 100 $\mu g/m^3$. Recently a rather significant increase in the concentrations of solid particles has been registered only in Šiauliai.

Since 1996, after JSC "Mažeikų nafta" started producing only unleaded gasoline, and since 1998, after gasoline containing lead admixtures was prohibited in Lithuania, lead concentrations in urban air have also decreased significantly (Figure 5.4).

Like in other countries, the air quality in Lithuania is largely determined by a long-range transboundary air pollution. From this point of view, geographical position of Lithuania is unfavourable because, with western winds prevailing, polluted air masses are usually brought from industrial regions of Western and Central Europe. With the decreased emission of nitrogen and especially that of sulphur compounds into the air all over Europe, concentrations of these substances in arriving air masses as well as in precipitation have started to decrease, too. According to the data provided by the Institute of Physics, average concentrations of sulphates in precipitation during the past decade decreased by 2-3 times and those of nitrates - by about 1.5 times. When the concentrations of acid ions de-

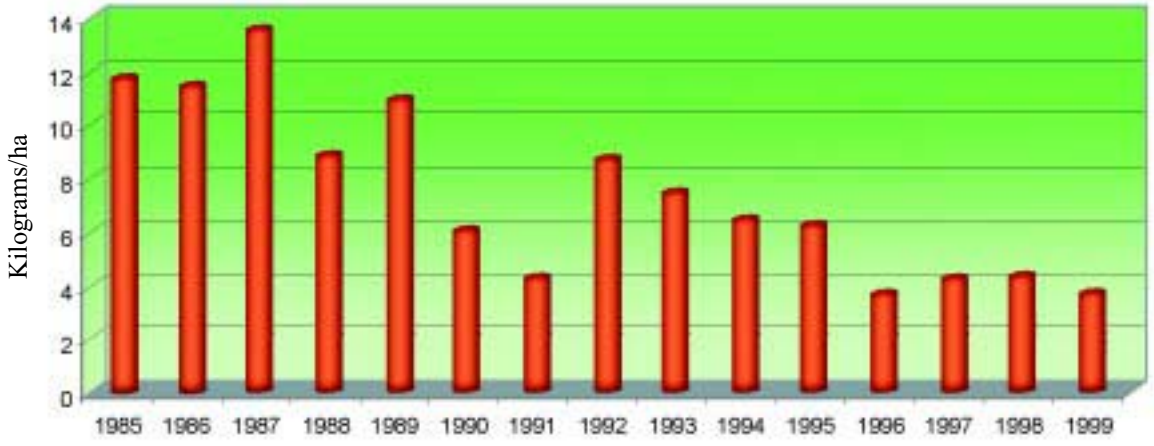


5.4 Concentrations of main pollutants in the largest Lithuanian cities and industrial centres

creased in precipitation, the acidity of precipitation also decreased significantly. Ten years ago average acidity of precipitation was about 4.5 pH in Lithuania and currently it is about 5.1 pH. This shows that a negative effect of acid rain has also decreased substantially.

Flows of pollutants reach the surface of the earth in the form of wet (rain, snow) and dry deposition. Data on changes in a wet deposition of sulphur during the past 20 years are presented in Figure 5.5. Wet deposition of sulphur was rather stable in the ninth decade and was about 12 kg per hectare annualy. Since wet flow of sulphur constitutes about half the total load, this means that total annual load of sulphur was about 24 kg/ha in Lithuania in the ninth decade of the past century. Since 1990, with sulphur emission and concentrations of sulphur compounds in the air of the European countries and Lithuania decreasing, sulphur deposition has been on the decrease. As seen from figure 5.5 show, during the past years wet deposition of sulphur constitutes about 4 kg/ha, hence, total annual load of sulphur in Lithuania constitutes about 8 kg/ha, that is three times less than in the ninth decade.

A load of nitrogen consists of nitratic (oxidised) nitrogen and ammonium (reduced) nitrogen. In the ninth decade annual wet deposition of nitrogen constituted about 10 kg/ha. Taking into account the fact that a dry deposition of nitrogen constitutes about one-third of the total flow of nitrogen, total flow of mineral nitrogen accounted for about 15 kg/ha in the ninth decade. Since emission of nitrogen compounds into the air decreased during the past decade rather insignificantly, nitrogen deposition decreased by one-third and currently total annual load of mineral nitrogen amounts to about 9-10 kg/ha. It should be noted that during the two past decades the ratio of nitratic and ammonium nitrogen within deposition changed greatly. At the very beginning of the ninth decade nitratic nitrogen prevailed in nitrogen deposition and currently the quantity of ammonium nitrogen within the total load of nitrogen considerably exceeds that of nitratic nitrogen and accounts for about 60-70% of the total load of nitrogen. Since agricultural activity mainly contributes to anthropogenic ammonium emissions, it can be concluded that local pollution sources have a significant effect on the formation of nitrogen load.



5.5 Changes in a wet deposition of sulphur *(D. Šopauskienė, D. Jasinevičienė, 2000)*

In Lithuania a great attention is focused on control of substances depleting the ozone layer, the decrease in their use and their replacement by less harmful substances. Lithuania joined the Vienna Convention to Protect the Ozone Layer in 1987. In 1995 the Montreal Protocol on Substances that Deplete the Ozone Layer was ratified. In 1998 Lithuania ratified London and Copenhagen amendments and supplements of this Protocol.

Substances depleting the ozone layer are not manufactured in Lithuania, however, they are used in different industrial sectors. In 1995 82% of all the substances depleting the ozone layer were used in manufacturing refrigerators. The remaining part of them was used in the manufacture of aerosols. The data presented in Table 5.1 show that since 1995 the consumption of substances specified in the annexes to the Montreal Protocol has decreased as much as eight times. This decrease has been determined by a decline in the economy, and special measures have been implemented by the Government.

The following main priority actions in relation to air pollution decrease have been provided in the Lithuanian Environmental Protection Strategy (1996):

Table 5.1 Consumption of substances depleting the ozone layer (ODS) in 1995-2000 (calculated level*, ODS tons)

Substance	1995	1996	1997	1998	1999	2000	2001
CFC (AI)	360.5	288.7	99.9	103.8	85.3	36.5	0.0
Halons (AII)	0.0	0.9	14.7	0.0	0.0	0.0	0.0
Other CFC (BI)	0.0	0.1	0.0	0.02	0.0	0.0	0.0
Carbon tetrachloride (BII)	10.5	8.3	5.6+9.0**	4.6+7.2**	12.1	0.0	0.0
HCFC (CI)	18.8	2.6	2.1	4.8	2.6	4.3	7.3
Methylbromide (EI)	31.4	27.4	18.1**	9.0**	9.6**	9.6	6
Total quantity of all ODS	421.6	328.6	149.4	129.4	109.6	50.4	13.3

* Calculated level of consumption is established by multiplying the amount of the substance consumed and the potential of ozone layer depletion (Annexes A, B, C, E to the Montreal Protocol)

** Substances consumed for the purposes considered as exceptions in the Montreal Protocol (quarantine, processing before transportation and so on)

- a gradual transition to the use of road vehicles corresponding with the EU standards,
- improvement of fuel quality,
- creation of legal standards corresponding to the EU requirements regulating the amount of pollutants emitted into the environment,
- implementation of energy economising measures,
- encouragement to use cleaner fuel and application of advanced production and pollutant treatment technologies.

In 1999 the Law on Ambient Air Protection of the Republic of Lithuania was adopted. It established basic priorities in implementing the principles of sustainable development to improve air quality:

- increase in the efficiency of energy consumption;
- decrease in pollution caused by road vehicles;
- introduction of the best available production methods and technologies.

Improving the legal basis and encouraging a decrease in pollution, environmental economic instruments such as an excise tax on oil products, pollution fee and fines for non-observance of environmental requirements have been introduced in Lithuania. When the procedures for the environmental impact assessment of the proposed economic activity were legalised, a real possibility for prevention of air pollution was created.

During the past decade, relations with the international organisations responsible for air quality were developed. In 1994 Lithuania joined the Convention on Long-Range Transboundary Air Pollution. The United Nations Framework Convention on Climate Change was ratified in 1995, and the Kyoto Protocol was signed in 1998. Data about air quality in Lithuania are provided to the international EMEP network, the European Environmental Agency and other organisations on a regular basis.

The implementation of the requirements laid down in the United Nations Framework Convention on Climate Change and the Kyoto Protocol is given special attention. In 1996 the National Strategy for the Implementation of the Framework Convention on Climate Change was adopted. In 1998 by decision of the Parliament of the Republic of Lithuania the National Energy Strategy and the Action Plan providing for the measures related to the implementation of these requirements were adopted. Since 1999 the International Co-operation Programme of the Baltic Sea Region (BSR) in the energy sector has been carried out. Representatives of the states of the Baltic Sea Region adopted this Programme at the conference of the Ministers of Economy held in Stavenger on 1 December 1998. The Programme provides for strengthening co-operation by devoting a great attention to the implementation of the requirements and of the Kyoto Protocol of the UN, that is, the implementation of projects of emission trading and joint implementation. The area of the Baltic Sea Region is stipulated to declare as "a tentative area" intended for the experimental implementation of a the Kyoto Protocol and different pilot models.

5.2. WATER

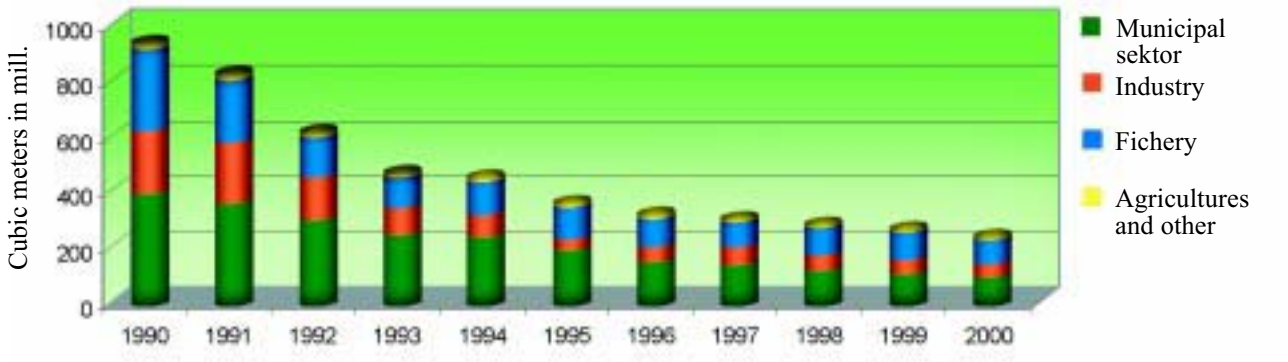
Lithuania abounds in rich water resources. Open internal water bodies cover 2.6 thousand square kilometres. That accounts for about 4% of the whole territory. The total length of Lithuanian rivers is about 63,700 km, that is, one kilometre of rivers per square kilometre of the territory. During the Soviet period, reclaiming the land, over 75% of the Lithuanian rivers were regulated and turned into canals. All Lithuanian rivers fall into the Baltic Sea either directly or through the territories of other countries. Total annual run-off of Lithuanian rivers constitutes nearly 30 km^3. All the six main river basins in Lithuania are transboundary.

There are 2834 lakes exceeding 0.5 ha in Lithuania, and their total area constitutes almost 880 km^2. That is nearly 1.5% of the territory of Lithuania. The Kuršių marios lagoon is the largest internal water body. Its total area amounts to 1610 km^2, however, only one-fourth of this area belongs to Lithuania. Total length of the Nemunas, the largest Lithuanian river, is 937 km (475 km flows through Lithuania). Its basin covers three-fourths of the Lithuanian territory, and it flows into the Kuršių marios lagoon. Therefore the Kuršių marios lagoon is one of the most polluted and eutrophicated water bodies in Lithuania.

Lithuania also abounds in underground water resources. After the consumption of water was reduced, the total annual amount of underground water consumed constitutes only one-fourth of the amount of underground water possible to be used.

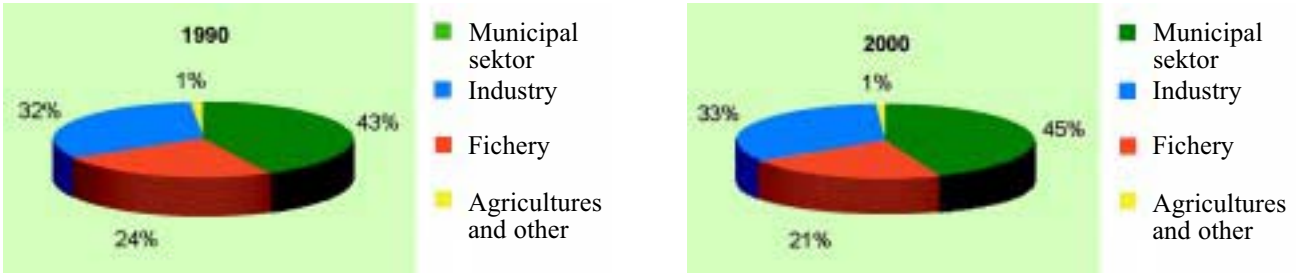
Recently about 4.5 mill. m^3 of water have been consumed in Lithuania to satisfy different needs. Over 90% of this amount has been consumed for energy needs, mainly to cool Ignalina Nuclear Power Station (99% of the total amount of water consumed in the energy sector), and its remaining part is consumed in Kaišiadorys Hydro-Accumulation Power Plant. As this water is not polluted and is returned to the same water body, the energy sector is not considered in a further analysis of water consumption and pollution.

Data on annual changes in water consumption (excluding the energy sector) during the past decade are presented in Figure 5.6. The presented data show that water consumption during the past decade decreased from 940 to 240 million m^3 per year, that is, almost four-fold. With prices of water resources growing and having introduced the system of accounting, water consumption in the municipal sector has been continuously decreasing, and at present 3.7 times less water is consumed than at the end of the Soviet period. Due to a decline in economy, water consumption in the industry sector decreased to a greater extent than in the municipal sector. Since 1997, with the recovery of the country's economy, a certain increase in water consumption for industrial needs has been observed, however, currently still almost 4.5 times less water is consumed in the industrial sector than in 1990. Though the agricultural sector consumes a comparatively small amount of water (Figure 5.6), the decrease in water consumption in this sector has been most considerable - over 6 times.



5.6 Changes in consumption of water

Structural changes in water consumption during the period under study are presented in Figure 5.7. It shows that after general water consumption decreased several



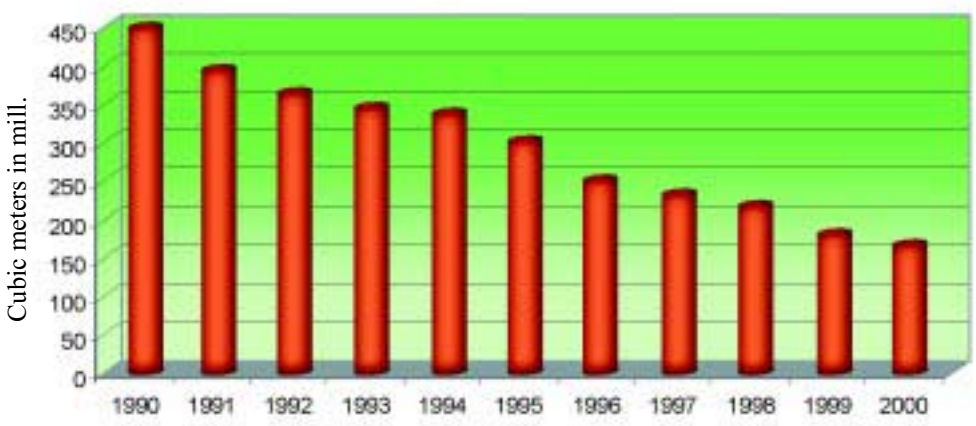
5.7 Structure of water consumption

times, the structure of water consumption changed comparatively insignificantly - the contribution of the municipal sector currently consuming 45% of water has slightly increased, whereas the contribution of the industrial sector to water consumption has decreased from 24 to 21 per cent.

With the decrease in water consumption, the amount of polluted wastewater during the transitional period decreased several times (Figure 5.8). The data presented in the Figure show that about 450 million cubic meters of polluted wastewater was formed in Lithuania in 1990. The amount of wastewater was continuously on the decrease and in the year 2000 its total amount constituted about 170 million cubic meters, that is 2.6 times less than in 1990.

quality of wastewater treatment started to improve considerably from 1996 when Vilnius biological water treatment facilities were run and water treatment facilities in some smaller towns were reconstructed or constructed. The amount of untreated wastewater decreased several times after Kaunas mechanical water treatment facilities started to operate in 1999.

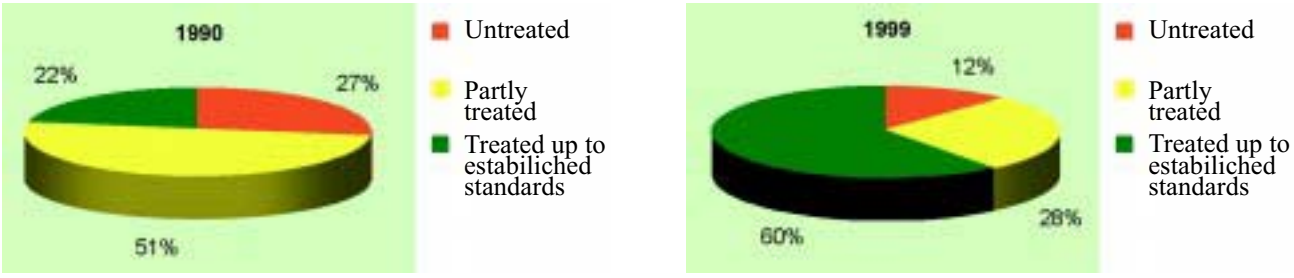
Since 2000 wastewater treatment standards have been changed, and treatment quality has begun to be assessed not only by organic pollution (BOD) but also by the amount of nitrogen and phosphorus. Consequently, the part of wastewater treated up to the established standards has increased, and these data cannot be compared with the data of the previous years.



5.8 Changes in total amount of polluted wastewater

During this period not only the total amount of wastewater but also the level of its treatment changed significantly (Figure 5.9). If in 1990 over 27% of the total amount of wastewater were discharged into the surface water bodies consisted untreated wastewater, over 50%- insufficiently treated waste water and only 22% - waste water treated up to the established standards, in 1999 the amount of untreated wastewater accounted for as little as 12% and that of waste water treated up to the established standards accounted for over 60 per cent. The

The data presented in Table 5.2. show that due to improved treatment of waste water the amount of pollutants discharged into the surface water bodies decreased much more significantly than the total amount of wastewater. For example, pollution of surface water bodies with organic and suspended matter during the decade decreased by more than five times, pollution with oil products decreased by more than six times, with nitrogen - by nearly three times and by phosphorus - by as much as twice.



5.9 Structure of polluted wastewater by the level of treatment

The amount of iron discharged into surface water bodies is as much as ten times smaller than ten years ago and that of heavy metals - tree times smaller. Zinc constitutes about half the amount of all heavy metals and its load to the surface waters has decreased by about as much as twice, and the amount of all other heavy metals under study (copper, nickel, chromium, manganese and lead) - by about ten times.

Surface water quality studies in Lithuania are carried out following the Law on Environmental Monitoring and the State Monitoring Programme. According to this Programme, the water quality is being studied in 105 sites of 50 rivers, 13 lakes and 1 reservuar. Samples of river water are taken every month and those of lakes and reservours - two times per year. The water quality is assessed on the basis of more than 70 indicators. River water samples are taken in the anthropogenical pollution impact zones of large and small rivers (above and below the cities and towns), in the districts of intensive agricultural activities (especially in the mouth of small streams as well as rivers on the state border - to assess transboundary pollution.

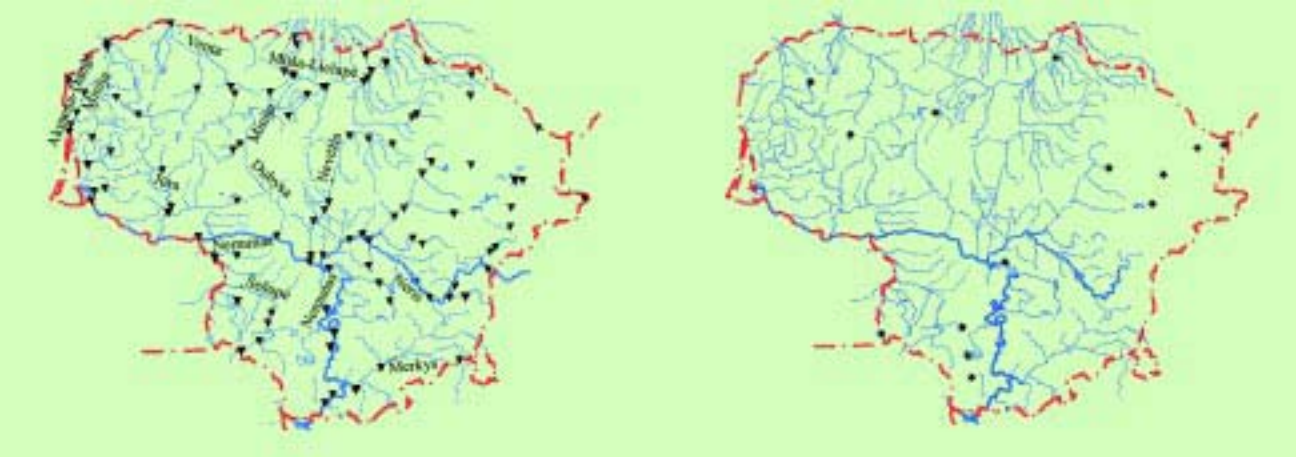
Lithuanian rivers are characterised by a high degree of pollution with organic matter and nutrients. According to water quality classification used based on pollution with organic matter (BOD), the concentration of nitrogen and phosphorus as well as bacteriological pollution (Colibacillus index), about 10% of Lithuanian rivers are attributed to relatively clean rivers (Quality Class I-II), about 70% - to rivers polluted to an average degree (Quality Class III-IV) and about 20% - to heavy polluted rivers (Class V-VI). The data presented in Figure 5.11 show that even after river pollution had decreased several times (Table 5.2.), the quality of river water changed insignificantly during the past decade. Partly this can be accounted for by secondary pollution of rivers by bottom sediments and non-point agricultural pollution.

Changes in the water quality of the Nemunas River, the largest river in Lithuania, that took place during the past decade, are represented in Figure 5.12. It shows that changes in the water quality of the Nemunas River and improvement of the condition according to basic water quality indicators during that period are not very significant. During the last two years this tendency was somewhat more pronounced downstream Kaunas after the mechanical water treatment facilities of Kaunas wastewater treatment plant started to operate.

Table 5.2 Amounts of pollutants discharged into surface water bodies (tons per year)

Year	Organic matter (BOD_7)	Suspended solids	Total nitrogen	Total phosphorus	Oil products	Iron	Heavy metals
1991	36 200	39 000			390	177	98
1992	31 900	36 900	10 600	1438	340	172	109
1993	27 920	30 430	10 208	1534	270	101	97
1994	34 500	38 500	10 773	1502	280	166	93
1995	21 000	26 000	7663	1183	220	71	59
1996	16 600	17 900	6446	960	160	30	48
1997	15 000	15 000	5401	879	150	10	46
1998	13 000	14 000	4545	795	130	4.4	36
1999	10 000	9000	3923	750	100	2.9	24
2000	7000	7000	3671	645	60	1.9	29

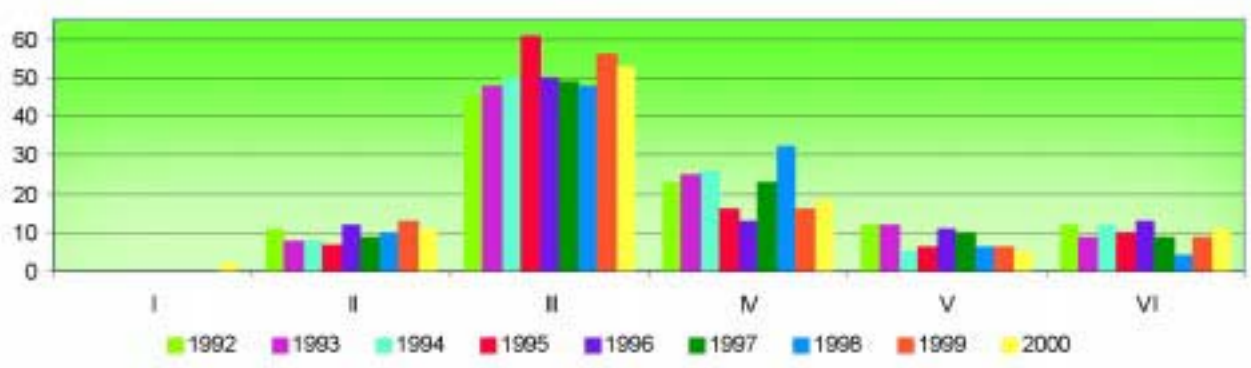
When flowing into the Kuršių marios lagoon, each year the water of the Nemunas brings large quantities of pollutants into the lagoon. Later these great amounts of pollutants get through the Klaipėda strait into the Baltic Sea. The load of pollutants to the Kuršių marios lagoon from the Nemunas basin in 2000 constituted nearly 79 thousand tons of organic matter (according to BOD_7), about 32 thousand tons of total nitrogen and 1.2 thousand tons of total phosphorus.



***5.10 Monitoring stations of rivers** (left) **and lakes** (right)*

tions of heavy metals - chrome, cadmium, lead and nickel - did not exceed the maximum allowable concentration (MAC) in river water. Only in certain cases, the concentrations of manganese, mercury and zinc exceeded MAC.

According to the hydrobiological indicators, the water quality of rivers changed insignificantly during the past five years. By phytoplankton about 90% of water in the sites under study was polluted to an average degree and about 10% - heavy polluted.

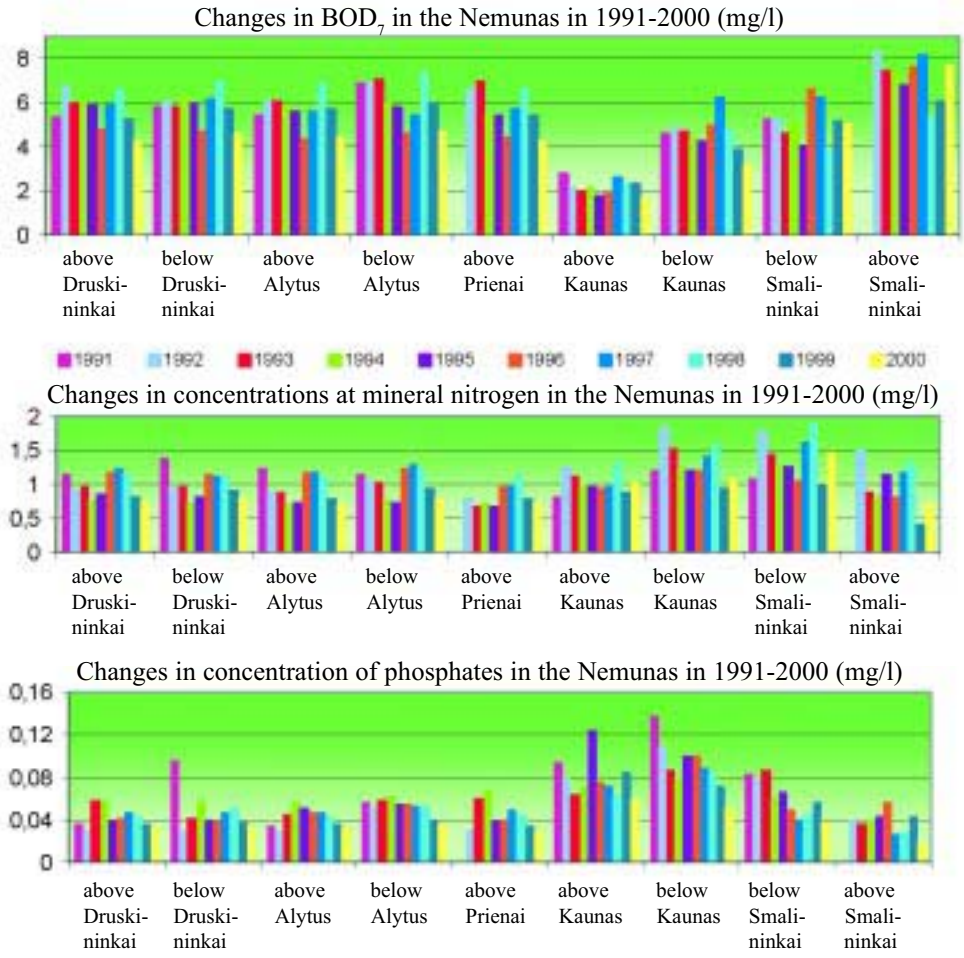


5.11 Percentage of water quality classes of Lithuanian rivers in 1992-2000

Pollution of Lithuanian rivers with oil products is not considerable. Pollution with oil products is rather pronounced only downstream the large cities and in some places it exceeds the allowable standards by 2-3 times. Most of Lithuanian rivers are not polluted with detergents.

Most often only traces of detergents have been detected in river water. No residuals of chlorine organic pesticides under study (a-, b- and g-hexachlorcycloxane) and polychlorobiphenyl were detected in river water in 2000. In rare cases small concentrations of pesticides DDT and DDE were determined. Average concentra-

According to the data of the state lake monitoring, water of lakes is much cleaner than that of rivers because lakes are not polluted with wastewater and they are subject to non-point pollution only. In the water of monitored lakes BOD_7 values varied from 1.0 to 3.35 mgO_2/l, and in Rėkyva Lake - up to 4.75 mgO_2/l. The concentrations of either total nitrogen or total phosphorus never exceeded the established MAC and ranged within the limits of 0.13-1.52 mg/l and 0.010-0.072 mg/l. Only in Rėkyva Lake the concentration of total nitrogen amounted to 2.75 mg/l (1.4 MAC). The concentration



5.12 Changes of pollutants concentration in the Nemunas River in 1991-2000 at state monitoring stations

of phosphates varied from 0.010 to 0.044 mg/l and that of total phosphorus was 0.01-0.072 mg/l. Lakes are not polluted with either ions of heavy metals - Cu, Pb, Cr, Cd ir Ni (with the exception of some sites in Vištytis and Drūkšiai lakes polluted with manganese) - or chlorine organic pesticides or phenols. Plateliai, Dusia, Šventas and Alnis lakes were most transparent (their transparency amounted to as much as 5-7 meters), the worst transparency was in Rėkyva Lake.

Slight alkaline medium has prevailed in lake water recently. Its pH varied from 7.1 to 8.9, and no tendencies of increased acidity have been observed. The oxygen regime has been good and it varied from 7.2 to 12.32 mg/l on the surface of lake water, however, going deeper the oxygen concentration has decreased and the deficiency of oxygen (0.1-5.2 mg/l) has been observed in near bottom water of almost all the lakes under study. No oil products have been recorded in lakes. Values of the residuals of phenols and pesticides are usually smaller than the detection limit.

According to the phytoplankton research data, lake water is polluted very insignificantly. The largest species diversity and biomass were in Vištytis and Plateliai lakes. The water of lakes studied according to zoobenthos is slightly polluted, and pollution of the lake bottom sediments by the macro-zoobenthos data was also insignificant. Bacteriologically (by the Colibacillus index) water of the monitored lakes remained clean, the number of coliforms was smaller than 1000 col.numb./l, only in Kirliai Lake it amounted to 1600 col.numb./l.

Pollutants brought by the Nemunas River, municipal and industrial wastewater as well as properties of the Kuršių marios lagoon as a highly specific water body (small depth and limited water exchange with the Baltic Sea) determine the hydrochemical regime and the level of eutrophication of the Kuršių marios lagoon. According

to the state monitoring data, the Kuršių marios lagoon is characterised as a eutrophic water body. During the summer season it reaches the hypertrophic level by the chlorophyll A concentration. Profound seasonal changes are typical of the dynamics of nutrient substances in the Kuršių marios lagoon. In spring, with a dramatic increase in phytoplankton, and in summer, during the period of intensive vegetation, the concentration of nutrient substances, that of nitrogen in the first place, decreases significantly, whereas during the cold period, when mineralisation of organic matter takes place, it increases.

Kuršių marios lagoon

An abundant load of nutrients (nitrogen and phosphorus) into the Kuršių marios lagoon and favourable oxygen conditions determine a high productivity of the water body. Therefore the Kuršių marios lagoon is distinguished by the abundance of biological resources and is one of the main aquatories abounding in fish in the Baltic region.

The increase in the amount of nitrogen has been observed recently, and it was only since 2000 that the average annual nitrogen concentration has slightly decreased. With respect to general bacterioplankton, the Kuršių marios lagoon is an eutrophicated water body with prevailing eutrophic species of phytoplankton (blue-green algae, Bacyllariophyta, cryptophyte algae). In assessing changes in phytoplankton, the increase in phytoplankton and mesozooplankton typical for waters with high nutrient concentrations has been observed to be characteristic of the Kuršių marios lagoon so far.

The results of the ten-year monitoring show that pollution of the Kuršių marios lagoon with toxic substances (such as oil products, phenols, oil carbohydrates, chlorine organic compounds, pesticides and heavy metals) is not intense. Greater concentrations of these substances have been detected in the Klaipėda strait, in the district of city wastewater discharger and in the region of the Nemunas delta near Uostadvaris. Greater concentrations of oil carbohydrates in the bottom sediments have been determined in the Klaipėda strait and Malkos Bay due to the Port deepening works (as a consequence of secondary pollution and sediment turbidity).

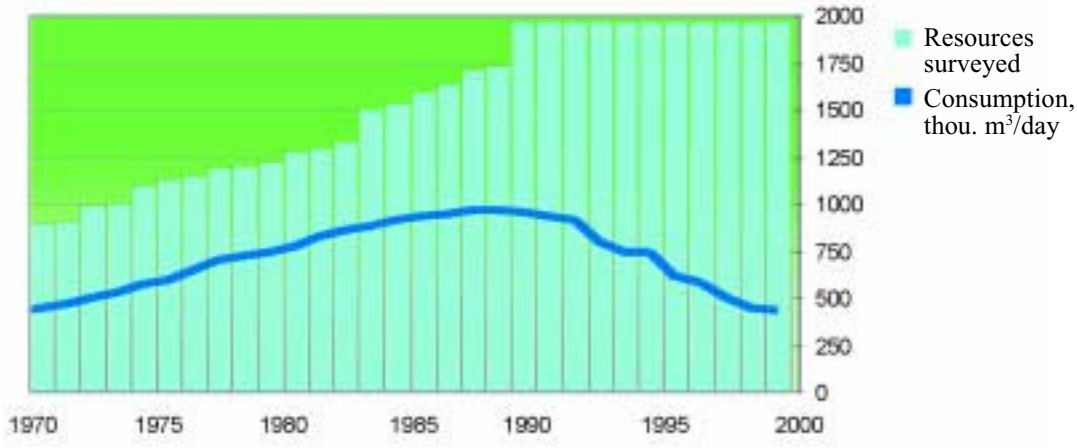
Waters of the littoral zone of the Baltic Sea on the territory of Lithuania are highly dependent on the inflow of water from the Kuršių marios lagoon. Waters of the Kuršių marios lagoon are 3-4 times more saturated with biogenic matter. They determine the dynamics of its amount in the littoral zone of the Baltic Sea. The layer of the active dynamics in the Baltic Sea (up to 70-80 m) is sufficiently saturated with oxygen, whereas deep waters are weakly aerated. In summer, oxygen concentra-

tion sometimes hardly reaches 1.5-2.0 mg/l in the near-bottom layer in the central part of the Sea.

In winter the concentration of nitrates in the littoral zone is threefold lower than that in the Kuršių marios lagoon, however, it remains 6-8 times higher than the concentration in the open sea. The concentration of nitrates in littoral waters has been on the increase since 1996 (especially during the winter season): it varied from 0.1 mg/l in 1996 to 0.3-0.4 mg/l in 2000. The dumping site in the Baltic Sea and the littoral zone are noted for greater pollution with heavy metals and oil carbohydrates. The increase in the species of toxic phytoplankton in the Kuršių marios lagoon and littoral waters of the Baltic Sea poses a serious problem.

Water abstraction sites in Lithuania supplying drinking water to the population in a centralised way usually abstract underground water from deep compressed acquifers. These acquifers are relatively protected from surface pollution. The dug wells to extract drinking water is mostly used in rural areas.

Water of deep compressed acquifers is suitable for drinking water supply by all indicators. Iron and manganese make an exception. Iron concentration exceeding the maximum allowable concentration has been detected in 64 towns, and manganese - in 10 towns. Therefore in many large water extracting sites, technologies of removing iron and manganese are applied. This problem is acute to underground waters of entire Lithuania. At present iron elimination technologies operate in water preparation systems in 42 towns. In the future iron elimination technologies are planned to install at drinking water preparation enterprises in 64 other towns (that accounts for 50% of the total amount of water supplied).



5.13 Resources of drinking water and their consumption (thou.m³/day)

Lithuania is perhaps the only European country using only underground water to provide the population with drinking water. Therefore the quality of underground water requires special attention. According to the regional assessment of the underground water resources, the most abundant potential underground water resources are detected in the middle reaches of the Nemunas, the Neris, the Šventoji, the Nevėžis and the Venta river basins. Perspective resources are most abundant in the middle reaches of the Neris and the Nemunas, in the small tributaries of the Baltic Sea and the Nevėžis basins.

In 1989, when underground water consumption was maximum, city residents consumed 50-75% of all underground water resources surveyed. After consumption of drinking water and consumption of water for industrial needs decreased, only 20-30% of the underground water resources were consumed in 2000 (Figure 5.13).

The quality of ground water in rural areas where water from dug wells is used poses more problems. According to the monitoring data, over 950 thousand rural inhabitants use water of dug wells. 40-50% of well water is polluted with nitrates exceeding MAC (nitrate concentrations often amount to 100 mg/l and more). If pollution with other chemical substances and microbiological and physical parameters was assessed, the number of wells polluted very highly would increase even more. Therefore further development of centralised water supply network and deep bores is one of the most important tasks.

A remarkable progress was made in solving problems of reducing water pollution and supplying high-quality water during the past decade. However, prob-

lems related to treatment of wastewater and elimination of nitrogen and phosphorus in particular and drinking water quality improvement further remain the most acute environmental problems in Lithuania. Currently control of water resources consumption and management is still carried out by administrative units rather than by hydrological ones - river basins, as the EU Framework Directive concerning the water policy requires. At present a legal basis is being intensely managed in accordance with the requirements set by the EU water sector. The Law on Drinking Water (1999), The Programme for Bathing Waters Monitoring (2001) have been adopted, the methodology of establishing rates of water supply and wastewater discharge (2001) and standards of hazardous substances discharge have been developed, a number of directives of the EU water sector have been transposed. In the nearest future a new edition on the Law on Water (adopted in 1997) is planned to develop according to the requirements of the new EU Water Policy Framework Directive and other EU water sector directives. So is the draft Law on Water Management.

The strategy for water resources and protection has three basic directions - international, related to the reduction of the Baltic Sea pollution, national - reduction of pollution of interior surface and underground waters as well as the reduction of international water pollution to and from other countries. The principal provisions of the strategy for water resources consumption and protection are as follows:

- to reduce water pollution with household and industrial wastewater;
- to improve the quality of drinking water;
- to reduce water pollution with toxic substances;
- to reduce water pollution from agricultural sources;
- to improve the condition of waters for recreation;
- to improve the condition of water ecosystems;
- to rationally consume water energy resources;
- to reduce pollution of the sea;
- to seek to reduce the impact exerted by the neighbouring countries on Lithuanian water resources.

Taking into account these provisions, one of the most significant aspirations is the creation of an integrated system (administrative, institutional, legal and scientific-technical) of water resources and quality management on the basis of a river basins.

5.3. SOIL

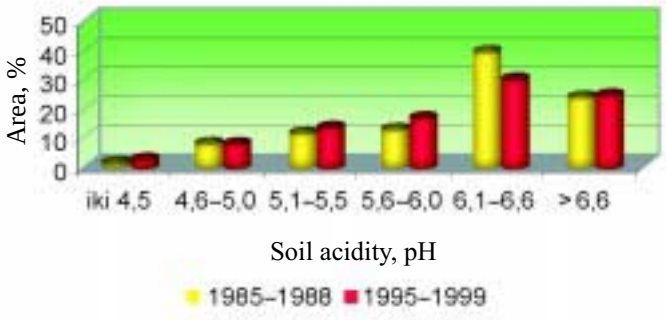
In assessing quality of agricultural soils, their properties, and their changes in particular, it is necessary to take into consideration absolutely different farming conditions prevailed before the re-establishment of independence of Lithuania and after it has been re-established. During those periods use of fertilisers and pesticides as well as soil liming differed significantly. 160-200 thousand hectares of acid soils were annually limed in Lithuania in 1965-1990, however beginning with the middle of 1990 liming was stopped at all. Use of pesticides and fertilisers has decreased several times since 1990, and favourable conditions for developing organic farming have formed (Section 6.6). Decreased volumes of liming and use of pesticides as well as mineral fertilisers had a considerable effect on the change in agrochemical properties of Lithuanian soil and the level of its pollution.

Agrochemical properties of soil and their effect on plants have been regularly investigated in Lithuania since 1965. In accordance with the state monitoring programme, soil monitoring has also been carried out since 1993. The Agrochemical Research Centre of the Lithuanian Institute of Agriculture performs this kind of work.

Soil acidity has a strong impact on nutrient availability, physical and agrochemical properties of soil, biological activity of micro-organisms, normal development of plants, accumulation of mobile heavy metals, etc. According to the 1963-1967 research data, the percentage of relatively acid soils (pH_{KCl} 5.5 and less) accounted for 40.7% in Lithuania, including 27.7% of soils with pH lower than 5.0. Acidity of these soils decreased significantly due to intensive liming, and according to the 1985-1993 research data, the percentage of acid soil (pH<5.5) decreased to 18.7%, including 8.5% soils with pH lower than 5.0.

Data of soil monitoring show that the acidity of deacidificated soils started to restore gradually after its regular liming was terminated (Fig. 5.14). Deposition of acid compounds considerably decreased during the past decade (Chapter 5.1), though they contribute to soil acidification to a certain extent. Soils of western Lithuania containing the largest areas of relatively acid soils prior to liming are acidified to the greatest extent. Durind past decade the percentage of relatively acid soils increased on average by 10.9% in of western Lithuania and this figure was essentially lower in Eastern (2.2%) and Central (1.3%) Lithuania. The data presented in Figure 5.14 show that the amount of relatively alkaline (pH>6.5) soils has increased as well. This increase constitutes as little as an incomplete per cent on the scale of the whole Lithuania, however in Central Lithuania it consist over 3%.

Though acidification of soil is rather slow with respect to the whole Lithuania, and pH of agricultural soil changed from 6.12 pH to 6.06 pH during the period under study (1988-1999), but this process is incomparably faster in soil artificially deacidificated earlier. Seeking to maintain productivity of those soils, it should be started to lime again in the immediate future.



5.14 Changes in acidity of Lithuanian agricultural soils

When soil acidity increases, the amount of mobile aluminium compounds, decreasing the yield of agricultural plants and lowering production quality, increases. Larger quantities of mobile aluminium were detected prior to intensive liming in the soils of western Lithuania. The quantity of soluble aluminium (Al^{3+}) in the soil was often 50-100 mg/kg. Due to liming (1965-1990), the quantity of soluble aluminium decreased to the minimum and became less harmful to the growth and development of plants. Despite certain soil acidification during last decade, no significant changes in the quantities of soluble aluminium have been observed. Data of special research has showed that quantity of Al^{3+} starts to increase significantly 15 years after liming is stopped. Therefore, in case of failure to start repeated liming of the earlier

deacidificated soils, the quantities of mobile aluminium can increase again in this soil within several years.

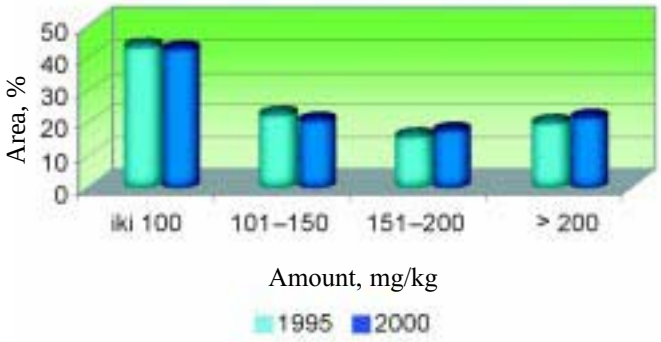
Mobile phosphorus (P_2O_5) and potassium (K_2O) do not only have an impact on the yield of plants and its quality but they also determine efficiency of fertilisers. According to the data of 1985-1993 agrochemical research, amount of mobile phosphorus in humic layer of one-fifth (20.3%) of agricultural soils was very low (up to 50 mg/kg). Large areas of soils - 41.5% contained low amount of phosphorus (51-100 mg/kg), 22.3% of soil contained medium amount of phosphorus (101-150 mg/kg) and the quantity of phosphorus was sufficient (over 150 mg/kg) only in 15.9% of Lithuanian soils.

As compared with mobile phosphorus, Lithuanian soils are supplied with mobile potassium much better. Soils containing low (35.4%) and medium (33.4%) amount of potassium prevail. Soils containing a sufficient amount of potassium (over 150 mg/kg) account for 23.6%, whereas soils containing very small amount of potassium (up to 50 mg/kg) constitute 7.6%.

During the recent decade the soils certain areas are fertilised differently. Farmers and partnerships that have sufficient funds at their disposal use more fertilisers, whereas those who are short of funds use phosphorus and potassium fertilisers only in some of the areas under crops. Therefore, the change in amount of mobile P_2O_5 and K_2O in different soils varies greatly. The data of monitoring carried out in 1995 and 2000 present the best picture of the changes in the quantities of P_2O_5 and K_2O in Lithuanian soil during the resent period.

The data presented in Figure 5.15 show that the amount of mobile phosphorus in agricultural soils of Lithuania changed insignificantly during last decade. Even a certain increase in the areas of soil relatively rich in phosphorus has been recorded. These changes differed considerably in separate regions of Lithuania. The largest increase (5,1%) in the areas of soils containing a small amount of phosphorus (up to 100 mg/kg) has been determined in western Lithuania. Meanwhile in eastern Lithuania the largest increase (6.3%) in the areas of soil rich in phosphorus (over 200 mg/kg) has been detected.

Changes in the amount of mobile potassium were somewhat different: areas of soil containing a small quantity of potassium have been on the decrease in

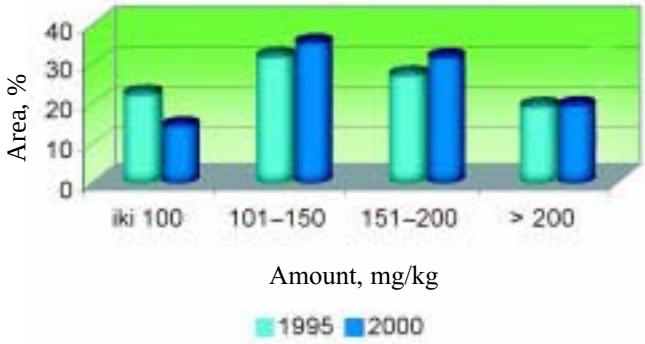


5.15 Changes in the amount of mobile phosphorus in Lithuanian soils

nearly all the objects, whereas areas of soil containing medium and sufficient quantities of potassium have increased insignificantly in the most objects (Figure 5.16).

Summing up the data presented in Figures 5.15 and 5.16, the following conclusion can be drawn: despite the decrease in fertilisation, agricultural soils are not exhausted during the recent period. In the conditions of normal farming it can produce sufficiently rich harvest.

In the climatic conditions of Lithuania the amount of humus in surface mineral layer depends mainly on



5.16 Changes in the amount of mobile potassium in Lithuanian soil

the type of soil, its texture and moisture and the degree of soil cultivation. Automorphic sandy soils contains the smallest amount of humus (0,5-1,5%), whereas clay soils contains the greatest amount of humus (over 4%). In other types of soil the amount of humus most often ranges from 2 to 4%.

During the Soviet time intensive anthropogenical factors such as reclamation, land cultivation, liming and fertilising did not only speed up the formation of humus but also accelerated its decomposition. How-

ever, farming that prevailed in the soils of normal moisture did not upset the balance of this process. Intensified land cultivation and liming as well as abundant fertilisation speeded up decomposition of humus, however, the harvest that increased due to the mentioned factors enriched the soil with organic matter. Therefore, during the past 40-50 years the amount of humus in these soils remained almost unchanged. In drained soils saturated with organic matter before drainage, oxidation processes intensified and due to increased harvest larger quantities of organic matter decomposed there. Hence, though due to the drainage, harvest increases, the amount of humus decreased up to the level of 2-3%. Moreover, the content of humus in eroded soils of arable areas is on the decrease. After the process of soil erosion intensifies, the humic layer of soil is carried from higher parts of the relief to its hollows. Seeking to protect these soils from further processes of decomposition, it is necessary to afforest them.

The quantity of nitrogen in soil is closely related to the content of humus. Therefore, the quantity of organic nitrogen, like that of humus, depends also on the type of soil, its texture and the degree of its cultivation. According to the data of the State Institute of Land Management, the quantity of total nitrogen in humus layer of soils in the country varies from 0,06 to 0,37%. Its quantity is lower in the sandy soils. The largest quantity of organic nitrogen is accumulated in complex compounds of humus. Plants can use it only when, during vegetation period, soil micro-organisms decompose organic matter and turn organic nitrogen into mineral nitrogen - ammonia and nitrates. According to the 1989-1990 research data, the amount of mineral nitrogen in one-fourth (25.4%) of the agricultural areas was very low (up to 30 kg/ha), in 61,1% of the areas its amount was low (30-60 kg/ha), in 12.2% of the areas - medium (60-90 kg/ha) and in 1.3% of the areas - high and very high (>90 kg/ha).

The amount of mineral nitrogen in soils is insufficient to produce rich harvests, therefore it is necessary to supplement its quantity by fertilising soil with mineral and organic fertilisers. Usually large quantities of mineral nitrogen are lost when soil is ploughed up in autumn and left without any plant coverage during winter season.

In accordance with the soil monitoring programme, not only the amount of nutrients but also the concentration of heavy metals (Cr, Cd, Pb, Ni, Cu, Zn) and residuals of pesticides are determined in soil. Having summed up the 1993-1997 soil monitoring data, it has been established that the humic layer of soil (0-20 cm) contains on average 10.7 mg/kg of chrome, 0.46 mg/kg of cadmium, 11.9 mg/kg of lead, 9.9 mg/kg of nickel, 6.9 mg/kg of copper and 28.5 mg/kg of zinc.

The content of heavy metals mostly depend on the soil texture: when the quantity of physical clay particles (<0.01 mm) increases, the quantity of heavy

Table 5.3 Amount of triazine herbicides and trifluoralyn residuals in soil in 1989-1991 and 1999-2001

Herbicides	Years	n	% of samples			Amount of herbicides Mg/kg ($\bar{x} \pm s$)
			Herbicides detected	MAC Exceeded*	Phytotocsic MAC exceeded*	
Simazine	1989–1991	1520	29.8	6.6	78.2	0.072±0.037
	1999–2001	144	2.1	0	100	0.039±0.009
Atrazine	1989–1991	7	71.4	0	71.4	0.080±0.064
	1999–2001	144	0	0	0	<0.005
Prometrine	1989–1991	280	6.2	0	–	0.200±0.115
	1999–2001	144	0	0	–	<0.005
Propazine	1989–1991	65	15	–	–	<0.005
	1999–2001	144	0	–	–	<0.005
Trifluorzaline	1989–1991	59	47	27.7	–	0.089±0.066
	1999–2001	12	0	0	–	<0.005

* Calculated from samples where residuals of herbicides vere detected

metals increases, too. The concetration of chrome, nickel, copper and zinc depend on soil texture the most. In Central Lithuania because of heavier texture and quite big areas of soil of limnoglacial origin, the amount of heavy metals is higher.

The soils of our country, which are farther from highways, industrial enterprises and other pollution sources, are antropogenically affected to a little degree. Therefore, the amounts of heavy metals in them can be considered as of natural origin.

Certain quantities of heavy metals get into soil together with mineral phosphor and potassium fertilisers. However, the analysis shows that mineral fertilisers used permanently for a long time change the concentration of heavy metals in the soil rather insignificantly. Larger quantities of copper and zinc are found in the surface layer of garden soil (0-5 cm) as a consequence of pesticides earlier used in large quantities.

Soils of Lithuanian towns are considerably more polluted with heavy metals. For example, according to the 1993-1997 research data, soil of the city of Kaunas that was strongly technogenetically affected contained on average about 1.3 times more Ni, 1.5 times more Cr, Mn and Fe, 1.9 times more Cu, 2.2 times more Cd, 2.4 times more Pb, 2.5 times more Hg and 2.8 times more Zn than the soil of its suburbs.

The research results (1990-1997 m.) show that the concentrations of copper and zinc are greater in main vegetables (beet-roots, onions, carrots, tomatoes, cucumbers) as well as in potatoes grown by city dwellers than in those grown in the agricultural lands.

When pesticides are used for protection of plants, especially when their quality fails to conform with the requirements and when their quantities are increased or technically disorderly facilities are used for spraying, soil, plants, water, food products are polluted and harmful residuals form remaining stable for a very long time. In the Soviet time especially large quantities of low-quality pesticides were used in Lithuania. After the use of pesticides decreased several times in Lithuania (Chapter 6.6), and currently about half a kilogram of them is used per hectare of arable land. Decomposition of modern pesticides is very fast, therefore the danger of polluting the environment has decreased.

However, some earlier used chlorine organic pesticides were extremely harmful to warm-blooded animals, and their residuals did not decompose for a long time. DDT is the first pesticide to be mentioned. Its use has been prohibited since 1970, however, its residuals are still found both in soil and underground waters.

According to the 1989-1991 research data, of all the samples analysed, DDD and DDT residuals in soil accounted for 13.3%, alpha (a) hexachlorane and DDE - for 45.9%, and gamma(g)hexachlorane - for 43,9%. However studies carried out in 1990-2001 show that their quantities are on the decrease. For example, the quantity of alpha (a) hexachlorane, as compared with that in 1989-1991, has decreased by about 43 times, that of gamma(g)hexachlorane has decreased by as much as twice, that of DDE - by 7 times, DDD - by 13 times and that of DDT - by as much as 16 times.

Triazine pesticides widely used earlier do not decompose in the environment for quite a long time also. It has been established that triazine herbicides (simazin and atrazin in particular) remain in soil longer than other pesticides used in Lithuania during soviet times (2-3 years). They pose an acute danger to the environment and exert a negative effect on sensitive agricultural plants. The maximum allowable concentration established for simazin in soil is 0.2, for atrazin - 0.5 mg/kg. The phytotoxic quantity for sensitive plants is 0.01 mg/kg. The comparison of soil pollution with triazine herbicides and trifluoralyn in different years (1989-1991 and 1999-2001 m.) shows that their average annual concentrations and soil pollution have been rapidly decreasing recently (Table 5.3)

Apart from triazine herbicides and trifluoralyn, the residuals of the following substances are found in soil: dozanex (0,002-0,036 mg/kg), ridomil (0,024-0,040 mg/kg), polycarbacin(0,020-0,047 mg/kg) and others.

Currently pesticides of the MCPA group, NTA, dialen, 2.4 D amino-salts, duplozan, glyphosat are mainly used. The residuals of most pesticides currently used remain in soil for a short time - from several weeks to 6 months - and pose an incomparably smaller threat to different animals and man.

Residuals of pesticides bearing 48 names have been analysed in vegetable products. Carrots, compared with other plants, accumulate pesticides most of all. In previous years residuals of propazin and prometrin were mainly detected, and they are impermissible in carrots. In 1999-2001 no residuals of these substances were detected in carrots. No residuals of other pesticides exceeding the maximum allowable concentration were detected in other plants either.

In the developed Lithuanian Agricultural Development Strategy, the extention of organic farming and strict control and restrictions on the use of chemicals are stipulated. That will form good preconditions for high-quality agricultural production growth and supply.

5.4. BIOLOGICAL DIVERSITY

The Convention on Biological Diversity adopted at the Rio de Janeiro Summit defines "biological diversity" as variability among living organisms of terrestrial, marine and other aquatic ecosystems and ecological complexes. Countries having ratified the Convention on Biological Diversity undertook obligations to control use and protection of biological resources, identify the most important components of biodiversity, carry out their monitoring and regulate the activity likely to have a negative impact. The implementation of the Convention requires a system of actions substantiated by preservation of biological diversity in natural (in-situ) and artificial (ex-situ) conditions. It has been established that the Convention on Biological Diversity is realised encompassing three levels of biodiversity: diversity within species, between species and of ecosystems.

The decade following the Rio de Janeiro Summit coincided with the consolidation of the status of the independent Lithuanian Republic in relation to internal affairs and international relations. During this decade legal basis for the preservation of biological diversity was created. Articles 53 and 54 of the Constitution of the Republic of Lithuania (1992) stipulate the duties of the state and each individual to protect the environment from harmful impact. These articles also comprise constitutional provisions to take care of the environment as well as to prohibit exhaustion of land and earth entrails, pollution of waters and air, production of radioactive impact as well as impoverishment of fauna and flora. Constitutional provisions are implemented by preparing and adopting the following legal documents important to protection of biological diversity: the Law on Protected Areas, (1993, new wording 2001), the Law on Land (1994), the Law on Forests (1994, new wording 2000), the Law on Environmental Impact Assessment of Proposed Economic Activities (1996, new wording 2000), the Law on Environmental Monitoring (1997), the Law on Protected Fauna, Flora and Fungi Species and Communities (1997), the Law on Flora Protection (1997), the Law on Water (1997), the Law on Marine Protection (1997), the Law on the National Genetic Resources of Plants (2001) and other laws. Currently 36 laws regulating environmental protection and use of natural resources are in force in Lithuania. Many requirements for the protection of biological diversity are included in other laws regulating economic activity. Necessary secondary legislation has been prepared and implemented. With the negotiations with the European Union, the Lithuanian legal acts are being approximated to the relevant European Union directives.

The system of protected areas (Chapter 5.5) developed during the recent decade plays an important role in preserving biological diversity. During over ten years of independence the total area of protected areas increased by more than three times and currently it covers 11.9% of the Lithuanian territory. In 1993 the status of meeting the requirements of the Ramsar Convention was granted to five protected areas. In 2000 the National Strategy for Development of Protected Areas that intended to increase the role of regional environmental structures in implementing the policy of protected areas management, to improve the internal interaction between protected areas as well as to strengthen their integration into the international protected areas network was prepared with the financial support of the Danish Government.

A workshop "Practical Implementation of the Convention on Biological Diversity in the Baltic States" organised by Regional Office for Europe of the United Nations Environment Programme (UNEP ROE) in Tallinn at 1994 gave way to a strong impulse to show interest in the preservation of biological diversity. There the representatives of the UNEP and the Baltic States singled out the most important goals to be implemented in the Baltic States so that the issues of the protection of biological diversity are systematically solved, taking into account the internal conditions of the country and international experience. The conclusions of this meeting encouraged the Parliament of the Republic of Lithuania to ratify the Convention on Biological Diversity in 1995.

Another important step in dealing with the protection of biological diversity at state level was the drafting of the Strategy and the Action Plan for the Conservation of Biological Diversity of the Republic of Lithuania in 1996. They were approved and promul-

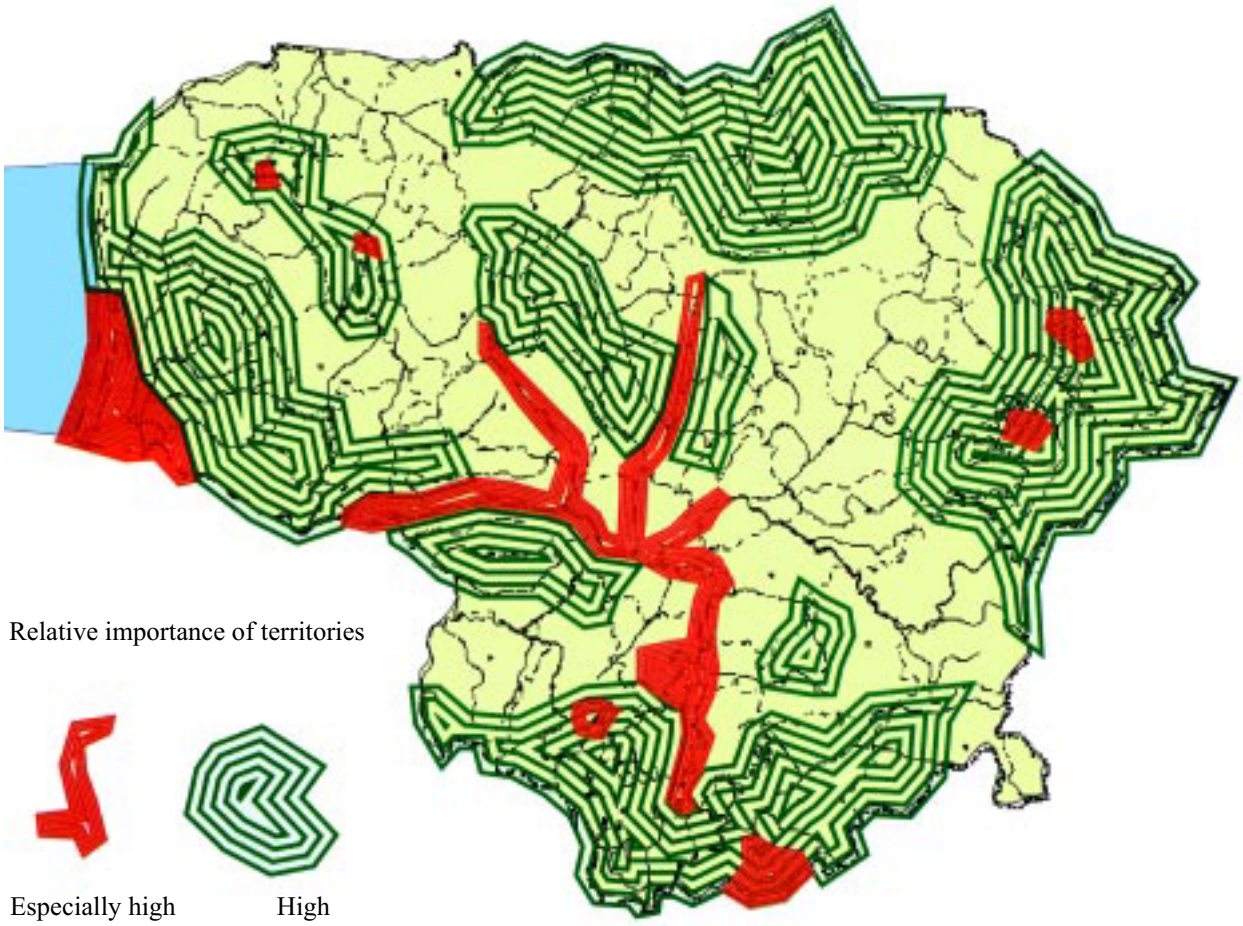
gated in 1998. The first work in this direction was performed as far back as 1995 when the Ministry of Environment together with the specialists of other ministries, scientific and designing organisations as well as the Irish company IDI (International Development Ireland) devised the National Strategy for the Protection of Environment. It regarded the protection of biological diversity as one of its main constituent parts. In 1995 following the recommendations of the World Bank, the project of Biological diversity national action plan was prepared. It was supplemented with the analysis of biological diversity condition, a strategic part and cartographic material. With the financial support of the World Bank, this strategy and the action plan were prepared for a twenty-year period, though many measures are elaborated for a five-year period (1998-2002). Distribution of the Lithuanian territory by relative importance for the conservation of biological diversity is presented in Figure 5.17.

Lithuania can be characterised by a wide biodiversity because there are 24-25 thou. species living in it. There are as many as about 15 000 species of insects in Lithuania, over 7000 species of fungi. Out of all this variety over 200 species of flora, 200 species of fauna and nearly 100 types of mushrooms are rare and are approaching extinction, therefore, they are included into the Lithuanian Red Data Book. It regulates the protection in accordance with the international practice (Table 5.4.). 28.7% of Lithuanian reptiles, 26.5% of mammals, 23% of amphibian, 22% of birds, about 15% of higher plant species are included into the Lithuanian Red Data Book. This percentage shows a serious danger to the most important species.

Great species diversity of flora and fauna characteristic of forest ecosystems

Recently (2000) the Lithuanian Red Data Book of Plant Communities, the first such kind of book in Europe, has been prepared. It included 53 plant communities. The distribution of these communities according to the main types of ecosystems is presented in Figure 5.18.

In summarising the work carried out over the decade, changes can be described as purposeful transition from preservation of separate elements of bio-



5.17 Territories of potential importance to the biological diversity conservation

logical diversity to systematic evaluation of its condition, analysis of the possibilities to preserve all elements and the implementation of specific actions and projects.

So far in Lithuania we have no extensive knowledge how to co-ordinate different aspects of sustainable development when conditions are changing in the whole state and in its certain parts. The elaboratet materials on preservation and use of biological diversity will be included in the National Sustainable Development Strategy.

There are several internal problems of further improvement and elaboration of Biological Diversity Strategy and the Action Plan:

- Elaboration of the country study. In 1995-1997 preparing the Strategy and the Action Plan for Biological Diversity Conservation, characteristic features of biological diversity were presented in accordance with the level of knowledge, possibilities of information provision and analysis. However, in further developing the works on the conservation of biological diversity and seeking to fully implement the international obligations of Lithuania, it is necessary to prepare the Country Study on the Biological Diversity of Lithuania. It would summarise the existing and gathered new data on diversity within species, between species and of ecosystems using modern technologies. Databases will be created, and the results of their analysis will be used in preparing and implementing the plans and strategies for environmental protection and nature conservation.
- Improvement of genetic resources protection. The Lithuanian State Science and Study Fund raised a concern about genetic resources protection in Lithuania after the programme "Resources of Cultural Plants" was implemented in 1994-1997 and financed. Following the development of this programme, a scientific much wider state programme "Gene fund" was carried out in 1998-2002.

Implementation of the latter programme corresponded to European Council Directive No.1467/94. This directive is a legal act of implementing the goals

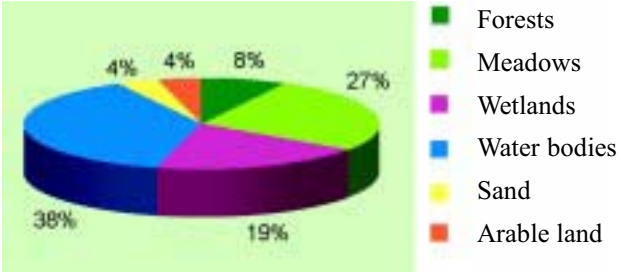
Table 5.4 The number of species included into the Lithuanian Red Data Book

	CATEGORIES						
	0	1	2	3	4	5	Total
Angiosperms	13	48	53	69	31	–	224
Gymnosperms	1	–	–	–	–	–	1
Sporophytes vascular	1	6	1	2	2	1	13
Moss (Liverwort)	–	3	2	4	14	–	23
Sphagnum and green moss	1	16	14	20	27	–	78
Fungi	7	21	23	38	43	–	132
Lichens	16	14	12	8	9		59
Mammals	3	1	1	5	10	2	22
Birds	–	16	21	30	9	–	76
Reptiles	–	2	–	–	–	–	2
Amphibians	–	–	–	1	2	1	4
Fish	2	1	–	2	3	–	8
Molluscs	1	–	3	4	–	–	8
Insects	4	1	–	82	21	–	108
Arachnids	–	–	–	4	–	–	4
Crustaceans	–	1	6	–	–	–	7
Leeches	–	–	1	–	–	–	1
Total	54	139	139	266	173	14	785

of the Common Agricultural Programme and the Convention on Biological Diversity. The Council has adopted more documents related to genetic resources preservation (No.1257/99, 2078/92, 2081/92, 2082/92, 1750/99, etc.). Lithuania is one of 34 European countries participating in the European Co-operative Programme for Crop Genetic Resources Networks (ECP/GR) and one of 30 European countries taking part in the European Forest Genetic Resources Programme (EUFORGEN).

Seeking to ensure further preservation of genetic resources, in 2001 the Parliament of the Republic of Lithuania passed the Law on National Genetic Resources of Plants. In 2003 starting to implement this Law, Plant Gene Bank and co-ordination centres of national genetic resources must be established. The activity of these structures and of plant genetic resources preservation must be financed. Having implemented these goals, the stage of work on the preservation of plant genetic resources will be completed, however, work related to preservation of animal genetic resources, evaluation of micro-organism genetic resources, creation and legalisation of national micro-organisms collection that have not been developed well enough so far will have to be carried out.

Detailed analysis of ecosystems. Due to historical conditions, research and evaluation of biodiversity of ecosystems are not advanced enough. This important work will be possible to carry out up to 2006, after a detailed scientific description of Lithuanian plant communities will have been completed in 5-volume publication "Vegetation of Lithuania". This will provide conditions to properly describe habitats of biological diversity, to perform their cartography work using methods of remote indication. Favourable conditions are created for carrying out such work, because



5.18 Distribution of plant communities in the Lithuanian Red Data Book

implementing the joint project of the Danish Environmental Protection Agency and the Ministry of Envi-

Wetlands are one of the most important protected ecosystems

ronment of the Republic of Lithuania as many as 52 important habitats that will be significant in creating the system of NATURA 2000 territories have already been singled out and described in Lithuania. They will form the basis for analysing the distribution and conditions of habitats, creating their conservation and monitoring system, preparing management principles and measures as well as supplementing the strategy and the system of the nature conservation

The Parliament of the Republic of Lithuania ratified the Convention on Biological Diversity in 1995. However, work aimed at the implementation of certain requirements of the Convention was started much earlier and is carried out quite consistently. An outstanding achievement is systematic implementation of the most necessary requirements of the Convention encompassing all three levels of biological diversity: diversity within species, between species and of ecosystems. The greatest achievements are in the traditional sphere of species protection: the territories of protected areas were enlarged by three times, a system of protected areas corresponding to the European standard was created and protected areas of international importance established.

The support of international organisations and the European countries in the field of biological diversity conservation can be considered as an outstanding achievement of the recent decade. Biological diversity projects were supported by the World Bank, PHARE, the United Nations Development Programme, the Governments of Denmark, Sweden, Ireland, Finland, the USA and other countries, scientific research projects of Framework-5 programme financed by the European Union were started to carry out.

The Government of the Republic of Lithuania granted credentials to the Ministry of Environment to co-ordinate all measures aimed at preservation of biological diversity. These measures are carried out both at state and local levels. The Ministry of Environment established Biological Diversity Department (current Department of the Living Nature Protection). Seeking to strengthen the effectiveness of activities in protected areas, a special Service of Protected Areas was established in 2001.

A number of local governments of Lithuanian districts exerted a great influence on organising biological diversity preservation. With the help of non-governmental organisations, scientists from universities and scientific institutions, biological diversity inventory of Marijampolė, Kėdainiai, Anykščiai, Akmenė, Rokiškis and of territories of other districts was made and the most necessary measures to protect it were foreseen.

Following the change in the curricula of secondary schools, the possibility to devote a special cycle of lessons to analysis, identification and preservation of biological diversity and to encourage extra curricular activities of environmental protection. Only in 2000 and 2001 over 80 groups of outstanding extracurricular activities took part in competitions to win the award of Valdas Adamkus, President of the Republic of Lithuania. Expeditions for pupils and students are organised so that they could study biological diversity of different territories. Original and translated text books and atlases encompassing problems of biological diversity for secondary and schools and universities were published as well as small publications for the society. Fundamentals of biological diversity are included in the curricula of universities, and part of diploma works is devoted to theses issues. The research on the most important aspects of biological diversity are included in the plans and projects of the scientific studies at Vilnius University, Vilnius Pedagogical University, Klaipėda, Vytautas Magnus and other Universities, Institutes of Botany, Ecology, Forestry, Agriculture, Horticulture and etc.

An important stage in implementing the strategy and the action plan for preservation of biological diversity will be the inclusion of measures to preserve, to sustainable use and maintain biological diversity in the National Sustainable Development Strategy. Documents of territorial planning played an important role in making the issues of preserving and utilising biological diversity important to the state and society. The system of territories important to landscape and biological diversity protection is included in the developed Master plan of the territory of the Republic of Lithuania. General provisions of landscape and biological diversity protection were formed as well as well-grounded proposals concerning the improvement of protected areas network presented. The Master plan provides for the integration of the requirements for biological diversity protection into the strategies, development programmes and action plans of all economy sectors. It states that in essence, the system of protected areas has been created and it encompasses nearly 12% of the territory of the country. However, it will be further improved ensuring internal and international links of protected areas network. It is very important that essential provisions of the Master plan of the Republic of Lithuania should be transferred to master plans of districts (counties) and municipalities and should play an important role in devising detailed plans of territories.

A very important measure to protect territorial biological diversity is the nature frame that will encompass about 60% of the territory of the country (Chapter 5.5) provided for in the detailed plan of the Republic of Lithuania. This plan provides for the measures to create a subordinate territorial system with nature frame - national ecological network that will consist of bioecological nucleus, bioecological divides and buffer zones of European, national and regional importance and all these will provide necessary preconditions for ensuring the stability of ecosystems used for different purposes and conservation of biological diversity.

Taking into account the fact that one of the main current tasks of forestry is to maintain and increase biological diversity, in 2001 joint Lithuanian-Swedish pilot project on Inventory of Key Forest Habitats in Lithuania started. While implementing the project it became clear that there still were habitats in Lithuanian forests lacking a detailed research and demanding special preservation measures. Their inventory and further research should give a lot of new material about characteristic complexes of living organisms for these habitats. That will allow to more precisely define the spread of some rare living organisms and their specific preservation conditions.

Permanent updating of the Strategy and Action Plan for Biological Diversity will help to strengthen positive perspectives of preserving and use of biological diversity in the future. The first stage of the implementation of the strategy will be completed in 2002. Following it, monitoring of the implementation of the strategy and action plan will be carried out and further actions will be planned taking into consideration its results.

5.5. LANDSCAPE

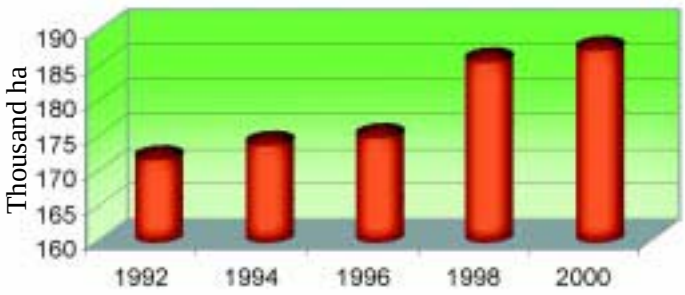
The condition, quality and diversity of landscape are determined by the natural and anthropogenic forces and their interaction. The most valuable Lithuanian landscapes are seashore (the Curonian Spit, the Nemunas River delta, the continental Baltic seashore), Žemaičiai highlands (the mosaic of forests and cultivated fields between the massive hills), Aukštaičiai highlands (forest islands, massifs of small and bigger lakes between hills), Dzūkai highlands (entire forest massifs, big river valeys, lakes and continental dunes) and the Middle Nemunas (picturious Nemunas River valley, forests, meadows and pastures). Lithuania abounds in many natural and seminatural areas with species of plants, mushrooms and animals extincted in the countries of Western Europe. There are quite a number of habitats of the European Community significance. In protecting traditional Lithuanian landscape, primary objectives are its traditional use, fostering of its structural diversity, protection of mounds, parks, nature monuments and unique complexes.

The structure of the landscape is subject to an active impact of land management. Currently they are impacted to a great extent by the land reform and the restoration of private ownership, development of land market and democratic relations, and changing economic priorities. Significant and rapid economic changes taking place during the recent decade determined a more intensive change in the structure of the landscape.

Ever-growing areas of urbanized territory (Figure 5.19.) reflect the increase in the anthropogenic impact on the landscape. In 1990-1995 a part of annually urbanized territory in Lithuania consisted by about 0.01%, while in 1995-2000 urbanization rate increased four times.

The agrarian landscape of different-degree forest coverage has prevailed in Lithuania since olden times (Figure 5.20.). The area of forests in Lithuania increased during the period under study and in 2000 forest coverage in the country accounted for 30.9% (Chapter 6.7). However, the data presented in Figure 5.20 show that forest coverage in different regions of Lithuania is rather different. If forest coverage in some regions of south-eastern Lithuania (sandy plains) amounts to almost 65%, in some of the most fertile regions of south Lithuania (clayey plains) forests cover less than 15%.

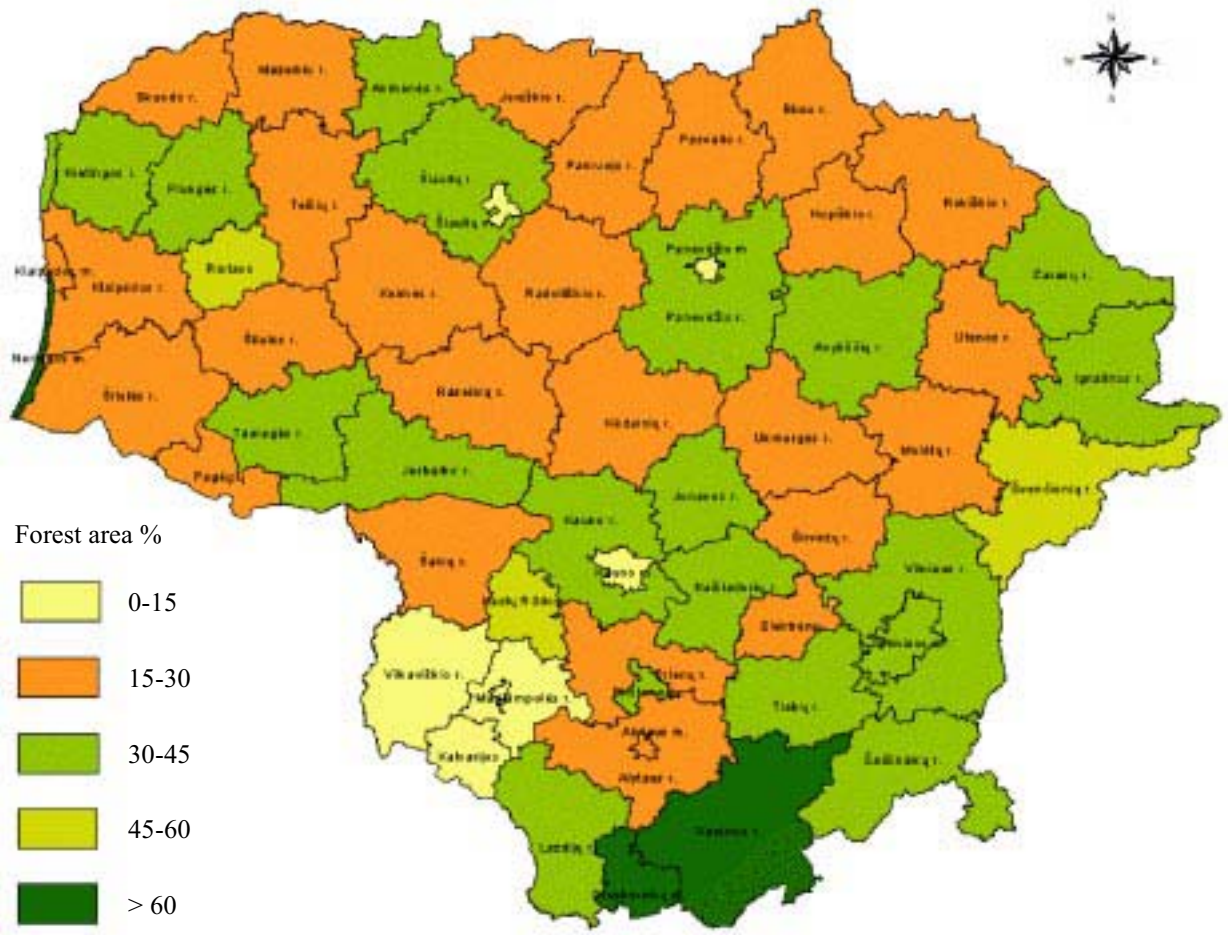
One of the most significant features of the landscape determining its identity is differentiation of farming lands. The structure and differentiation of farming lands are influenced by distinctive methods of farming during different historic periods.



5.19 Areas of newly urbanized territories in Lithuania (1992-2000)

In 1930 an average farm amounted to 15 ha in Lithuania. In post-war years, after 115 thousand homesteads had been removed together with green plantations, having drained about 80% of the country's territory, 20-50 km^2 of open drained fields with scattered islands of forests or other plantations became prevalent. Ecologically important swamps and wetlands have decreased significantly, for example, out of the former 450000 ha of drenched meadows and brushwood only 200000 ha remained. Nearly 80% of small rivers have been straightened and turned to canals. That did a great harm to the Lithuanian landscape.

The latter land reform launched in 1991 turns back to private land ownership. The number of people claiming back land and forests totals about 568000. The size of farms acquired in 1989-1991 according to the Law on Peasants' Farms amounted to 17 ha, whereas the size of an average private plot of land constitutes 3-6 ha. Due to this fact, with the increase in the share of private land, contours of land management increase, the degree of fragmentation of land use grows. Where re-naturalisation has become more active due to the agricultural recession, a minor pattern of farming lands creates preconditions for the increase in natural territory development. However, with the changes of land use destination, new conflicts between the environment protection and development arise.



5.20 Forest coverage in different Lithuanian regions

Recently the number of the owners, who have acquired land property in the most valuable areas in relation to nature and recreation, is increasing. Most of the landowners use the re-claimed land here or wish to use it not for agricultural or forestry purposes, but for active recreation and/or for new constructions. A rapid and essential change in land use changes traditional landscape structure, visual expression, threatens natural and cultural values.

The restitution of land, privatisation, development of democracy and market economy and a possibility to have one's own dwelling have determined changes in city land management. In 1990-1995 the areas of large cities increased notably (for example, the area of Vilnius increased by 73%, that of Panevėžys - almost twofold). At the same time the use and development of their territory (density of constructions) intensified. Seeking to rationally use city land, all new master plans of cities emphasise the priorities of qualitative internal development.

After 1990 the anthropogenic seashore pressure became more intensive - reconstruction of Klaipėda Sea Port and construction of Būtingė Oil Terminal were started. Development of recreation infrastructure and building of new houses became more intensive, too. In 1995, after the works of deepening Klaipėda Port were commenced, 1800 thousand m^3 of ground are dug up annually from the sail-in canal and taken into the open sea. Only one-third of sand drift moving from south to north reaches the north of Klaipėda. After the amount of migrating drift decreased, coastal abrasion intensified. In 1996 dune-end beaches in the north of Curonian Spit became twice as narrow, and abrasion processes became dominant between Klaipėda and Nemirseta. About 8 ha of the coastal area are lost every 10 years within the band of Šventoji-Būtingė. Due to drift deficit, the seashore beaches become not only narrower but also wetter.

After 1990 state, municipal and individual priority of Lithuanian land-management is related to encouragement

of versatile activities, development and investments. Intensification of urbanisation and fragmentation of land use patterns stimulate spatial competition between certain activities. Seeking to preserve the diversity of landscape and its unique complexes, state strategic actions were defined and the legal system oriented to Europe was rapidly created. Local initiatives were strengthened and more attention was devoted to public education.

The Lithuanian Environmental Protection strategy approved by the Parliament of the Republic of Lithuania in 1996 set the following state objectives as principal ones: co-ordination of the course of the land reform, balancing general priorities of state development and protection. It provided for specific action programmes for the implementation of these objectives. The formation of the structure of a rational, ecologically substantiated land use ensuring the stability of landscape occupies a special place in the strategy. It is aimed to preserve and form the nature frame of the country, to increase areas regulating natural balance of ecosystems, to increase forest coverage in the most important zones of the nature frame, to put a stop to invasion of construction into ecologically sensible and the most natural (picturesque) places, and to preserve the most fertile lands and forests. To form sustainable proportion of land cover and landscape structure the strategy emphasises the need for an optimal system of territorial planning documents creation.

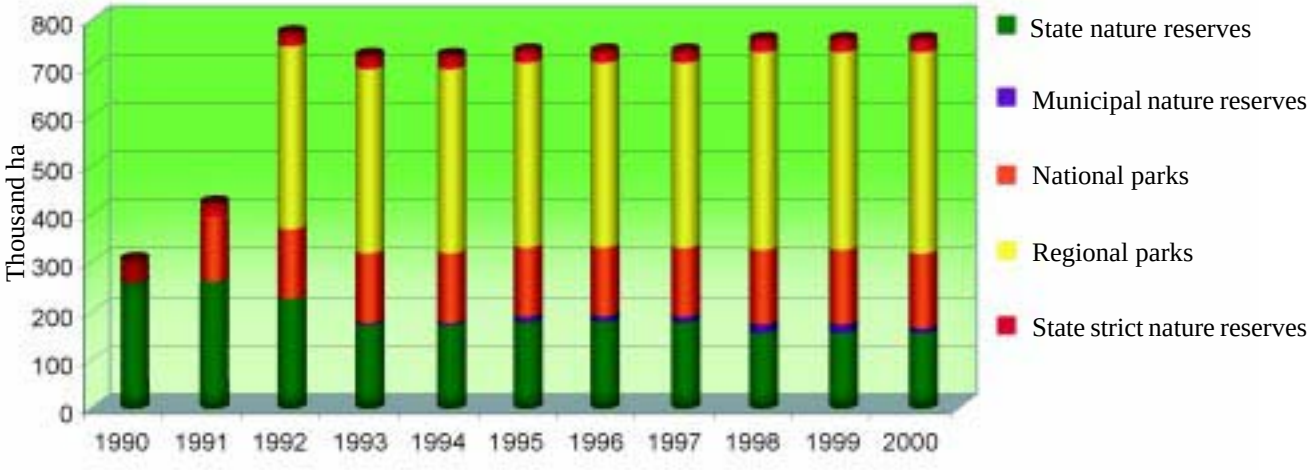
During the first years of independence a legal system of the country complying with the new requirements was begun to form. In 1992 the Law on Environmental Protection was adopted. It established legal fundamentals of landscape protection and its use. Specific conditions for land and forest use were approved. The fundamentals of state General land management policy were formulated after the Laws on Protected Areas (1993, 2001), Land (1994), Forestry (1994, 2001), Territorial Planning (1995), Environmental Impact Assessment (1995), Construction (1996, 2001) had been adopted.

Seeking to preserve the most valuable recreational forests and water bodies, these forests were decided not to privatise in 1996, and state water bodies in - 1998. Illegal unplanned construction intensified in 1993 and did harm to a valuable seashore landscape. This process was terminated in 1995 when the construction in the coastal zone had been prohibited. The Law on Protection of Marine Environment adopted in 1997 and the Regulations of the Seacoast Protection strengthened the protection and sustainable use of the seacoast landscape. These legal acts established the regime of protection, use and management of the coastal zone of the Baltic Sea and the Curonian Lagoon in 2000. After 1999 coast monitoring and dunes fastening works were carried out more intensively. According to the 2000-2004 Programme of the Government of the Republic of Lithuania, it is planned to regulate the protection and use of natural and cultural values of the seashore landscape by law, to establish conditions for land and sea use, construction regulations as well as limitations on other economic activities.

After the re-establishment of independence, a lot of attention was drawn to the development of protected areas system. Within a short time it was restructured in essence by creating a well developed, scientifically substantiated system of protected areas from the qualitative and quantitative point of view. During the past decade the territory of protected areas increased more than twice (from 4.7% to 11.9% of the territory of Lithuania) (Figure 5.21). In 1991 Dzūkija, Žemaitija and the Kuršių Nerija National Parks, Trakai Historic National Park and Viesvilė state strict nature reserve were established. 30 regional parks and about 100 nature reserves (Figure 5.22) were established in 1992-1995. During this period the number and area of state reserves decreased because some part of them became regional parks. Every year the network of state nature reserves is supplemented with nature reserves established by local governments.

The present structure of protected areas is given in Table 5.5. It shows that the present system of protected areas of Lithuania comprises 5 state strict nature reserves - their average territory is almost 5 thousand hectares, 5 national parks - the average territory is over 30 thousand hectares, 30 regional parks - the average territory is nearly 15 thousand hectares. The most abundant is the category of nature reserves, but most of them cover, in comparison, quite a little territory. The average territory of state nature reserves is about 580 ha, whereas the average territory of nature reserves of local authorities is 110 hectares.

The active creation of the system of protected areas, the improvement of their management at the beginning of the land reform created legal and institutional preconditions for the protection of unique and typical landscapes. In 1994 schemes M 1:50000 of zoning of all regional parks, boundary plans M 1:10000, planning schemes, which have become the most important documents of regulating protection and management of these protected areas, were begun to draw up.



5.21 Changes of the territories of protected areas

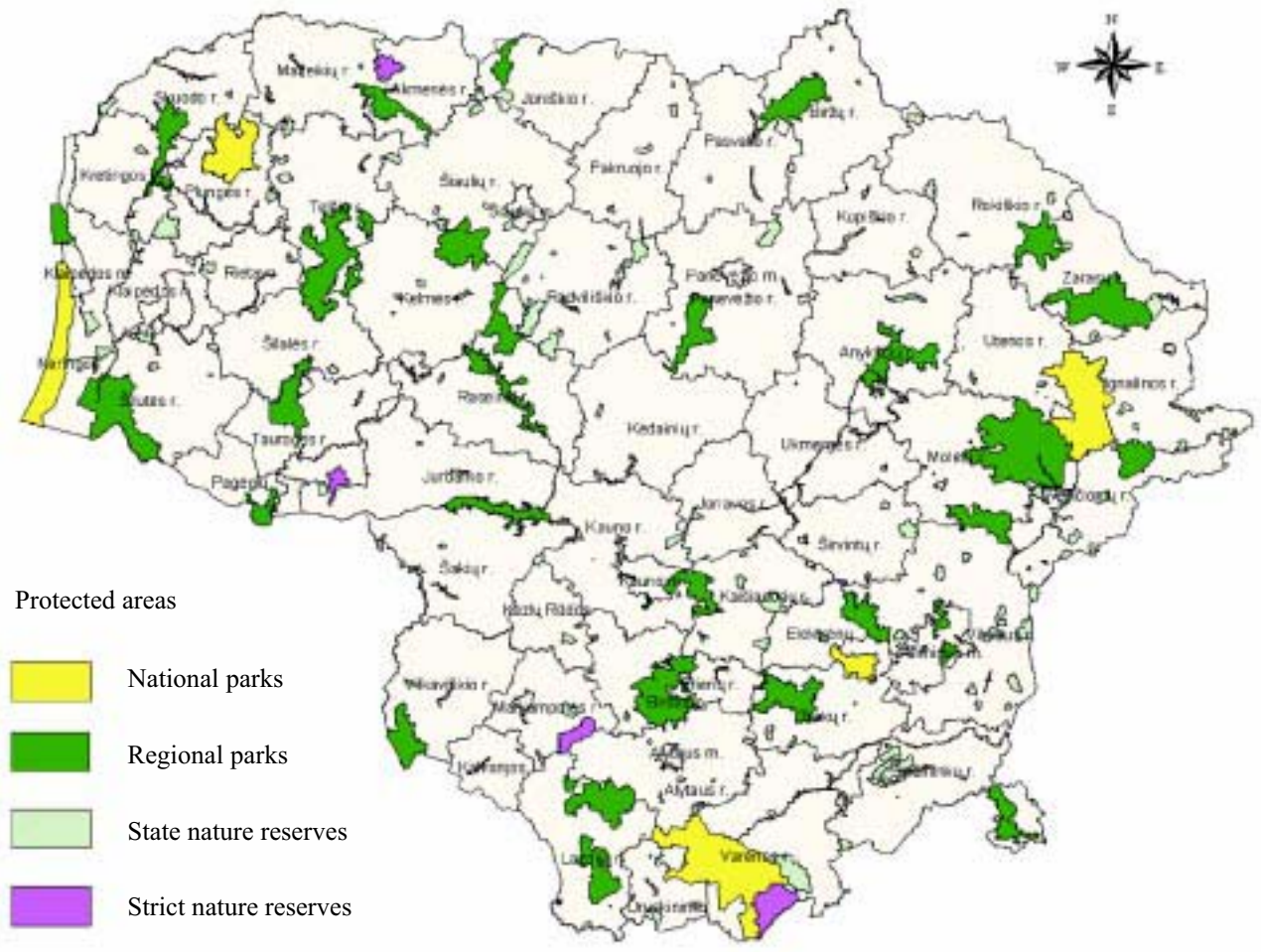
Though these planning documents are being prepared quite rapidly, they are not available to a large part of protected areas as yet (no plans of management of nature reserves and objects of natural heritage have been devised yet). Seeking to collect and systematise the information on protected areas, the Cadastre of Protected Areas was begun to develop in 1994. In the course of the implementation of the Project of the Development of Lithuanian State Park Institutions carried out in 2000 and supported by the Danish Environment and Energy Agency, a wide public relations campaign encouraging ecological education and ecological tourism in protected areas was organised. During this campaign a publications and an advertisement posters were printed, five short films about visits to protected areas were made and shown on national television, competitions for pupils were organised, an exhibition of contemporary art was mounted and activities of nature schools were initiated in three regional parks.

An especially significant instrument of rational land management and protection of landscape is the nature frame uniting all protected areas in a uniform territorial system legalised in the Laws on Environmental Protection and on Protected Areas. This is a general system of ecological compensation zones uniting all the natural protected areas and other ecologically important and sufficiently natural territories guaranteeing ecological stability of landscape. It consists of geoecological divides (territorial bands separating large geosystems and performing ecological compensation function between the systems), centres of geosystems stabilisation (areas responsible for ecological compensation within geosystems) and migration corridors (valleys where intensive geodynamic and bioinformational exchange is carried out).

The purpose of the nature frame is as follows: 1) to create a uniform network of natural ecological compensation areas ensuring geoecological balance of landscape and natural connections among protected areas; 2) to create preconditions for biological diversity preservation, to connect the habitats of the greatest ecological significance and the areas necessary for migration of animals and plants; 3) to protect natural landscape and recreation resources; 4) to increase forest coverage; 5) to optimise development of economic activities.

Implementing the concept of an ecological compensation system, in 1989 the scheme of nature frame M 1:300000 at national level and in 1993 at regional level were devised. In 1993 structures of nature frame M 1:50000 were adjusted and designed for all 44 administrative districts. The assessment of the potential of these areas to carry out the functions of ecological compensation was made. These schemes are used for preparation and analysis various documents of territorial planning and construction projects.

Seeking to balance regional differences, to formulate strategic objectives of the state and development trends, to determine activity priorities and establish territorial possibilities for their implementation, the Master Plan of the Republic of Lithuania was prepared in 1996-2001. The basic principle of the Master Plan is to ensure sustainable development of the country's territory, designating the best possible way to use the territory without harm to landscape and without violating interests of the present and future generations, preserving and strengthening the country's identity. On the ecological foreground the following objectives are singled out:



5.22 Lithuanian protected areas

- to keep and strengthen the present system of environmental healthiness, the protection of landscape and biological diversity and maintenance of the nature frame;
- to guarantee effective protection and rational use of natural and cultural environmental values forming the identity of the country and its regions;
- to ensure realisation of ecologically balanced land management programmes;
- to integrate the landscape and biological diversity protection requirements into the action plans of all economic activities.

By maintaining, protecting and increasing natural elements of landscape, the nature frame is the basis of ecological stabilisation of landscape. The Master Plan identifies structural diversity of the country's landscape, establishes the most valuable landscape complexes, iden-

Table 5.5 The structure of protected areas

Category	Number	Area (ha)	% of the country's territory
Strict nature reserves	5	24 004	0.37
National parks	5	152 728	2.34
Regional parks	30	436 000	6.68
State nature reserves	258	150 299	2.30
Municipal nature reserves	101	11 122	0.17
Total:	399	774 273	11.9

tifies the areas important for biological diversity protection and formulates general regulations on it.

The territorial system of sites important for the protection of biological diversity is identified on the basis of the recommendations for the development of ecological networks provided by the experts of the Council of Europe by making use of the material of the latest works on the protection of biological diversity (Ramsar sites, CORINE biotops, areas important to birds, Natura 2000 projects). The national ecological network consisting of bioecological nuclei of European and national as well as regional significance, bioecological connections (corridors) and buffer zones, has been established and localised on the basis of the nature frame.

The following priority tasks are provided for ensuring ecological balance of landscape and protection of its diversity in Master plan:

- optimisation of the general land use structure by strengthening the functions of the nature frame areas of ecological compensation;
- optimisation of protected areas network and preventing degradation of their natural and cultural values;
- protection of wetland and karst landscape;
- protection of elements of natural landscape in urbanised areas;
- sustaining natural recreation environment and preventing urbanisation of the most attractive natural sites;
- re-cultivation of exhausted quarries and re-naturalisation of peat-lands;
- protection of the structure of a natural hydrographic network.

The increase amount of natural territories (forests, natural meadows, etc.) is one of the most important measures to increase ecological stability of landscape. From the point of view of the ecological stability of landscape, forests are needed most and the priority is given to increase of forest area in the regions of central Žemaitija, western Aukštaitija and Suvalkija that do not abound in them. It is planned to plant forests in the most infertile agricultural lands and to increase forest coverage of Lithuania by 3-4 per cent during following two decades.

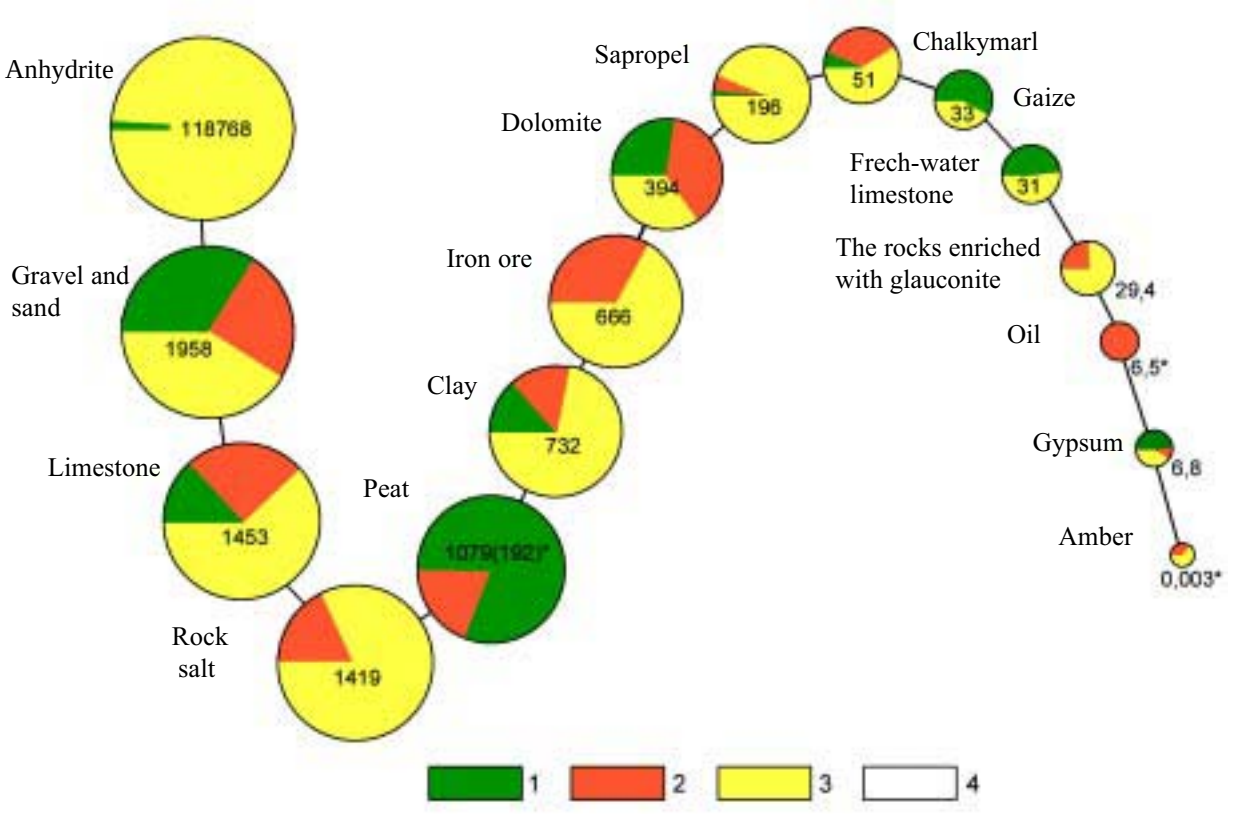
In 2000 Lithuania signed the Convention on European Landscape. This allows the country to develop protection and management of the landscape more intensively within the context of the system of European law, to formulate a more accurate state policy in this sphere, to draw attention of the public to the problems. It is necessary to encourage integrated application of the principles of landscape protection and rational land use in the development projects. In implementing the principles of sustainable development, currently it is most important to co-ordinate and balance the strategic objectives of the state, municipal needs and private initiatives to guarantee effective protection and rational use of natural and cultural environmental values preserving the identity of the country and its regions.

5.6. MINERAL RESOURCES

Lithuania abounds in mineral resources. These are mainly construction mineral materials or raw materials intended for their production, however, by the amount of their extraction and consumption as well as their value in the world, they are the most significant and main mineral resources.

Currenly 17 kinds of mineral resources have been explored in Lithuania differently in terms of accuracy. Eight of these 17 kinds (limestone, dolomite, sand, gravel, clay, chalky marl, peat and oil) are exploited, and the exploitation of two kinds of mineral resources - gaize and sapropel - was terminated in the 1980's of the last century (Figure 5.24).

facture of cement) and agriculture. The latter is one of the most perspective mineral resources that has no its investor yet. Its use is attractive in relation to economy and environment: extracted raw anhydride material would be widely applied and it would find market itself. Repositories for hazardous waste or resources necessary to the state could be installed in the cavities at the depth of several hundred meters. The renewal and extension of production of sapropel would also reap a double benefit - local and foreign markets would be provided with the natural fertilisers and additives in fodder manufacture and silted-up lakes would be cleaned.



5.23 Lithuanian mineral resources (mill. cub. m, * mill. t.) and degree of their investigation
1- resources explored in detail; 2 - resources explored in general;
3 - prognostic resources; 4 - resources.

In Lithuania, we have sufficient quantities of the most important resources - gravel and sand, dolomite resources to produce agregates, as well as limestone, clay, gaize, peat, anhydride suitable for industry (manu-

On the basis of geological information, application of iron ore, rock salt, chalky marl, glauconite-rich rock and fresh-water limestone can be problematic in relation to economy and environment. There-

fore, additional investigations are needed to elucidate perspectives of their use. Gypsum resources investigated in the karst region are inapplicable due to their unavoidable impact on the karst process. Moreover, our underground contains mineral resources insufficiently investigated or supposed to be there on the basis of geological presumptions. The investigation and application of them could be determined by future technologies and economic conditions.

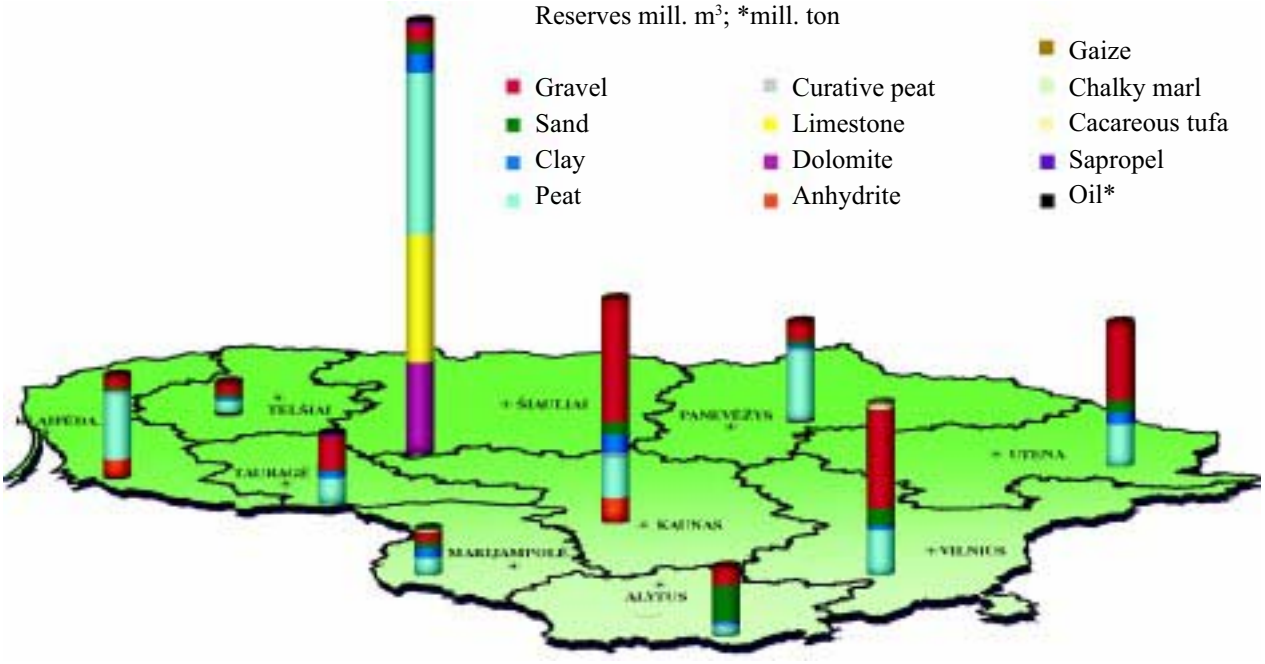
According to the procedure established in the country, only the resources explored in detail can be used. Today 570 mineral deposits could be used: 10 oil deposits, 70 peat deposits, 2 sapropel deposits and 488 deposits of construction raw materials. Licenses to consume underground resources in 336 mineral deposits have been issued to 183 enterprises. Lithuanian regions are unevenly provided with mineral resources. Distribution of the main mineral resources explored in detail is presented in Fig. 5.25.

Only as much as 60 per cent of earlier exploited mineral deposits are under operation, whereas the rest of them are out of use. Notable changes in the construction sector, increased import of construction materials, growing prices of energy resources, a lack of current asset, increased transportation expenses, a decrease in local demand and limited possibilities of the external market determined the fact that extraction of mineral resources decreased several times during the past decade. Extraction decreased most sharply from 1990 to 1996, later it increased insignificantly and became stabilised.

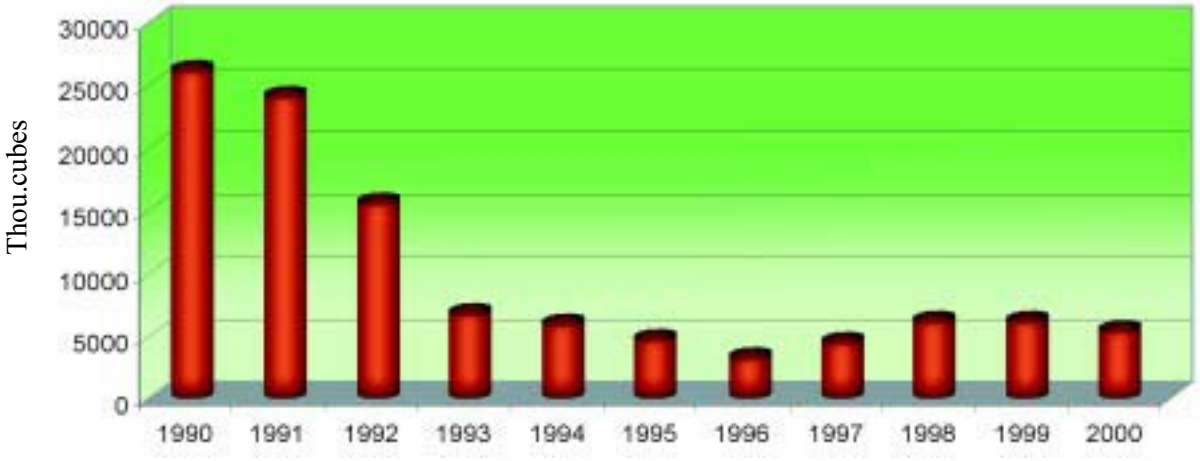
Trends in extraction of mineral resources during the past decade are presented in Figure 5.26

Data presented in Figure 5.26 show that extraction of mineral resources decreased rapidly till 1996 when their extraction dropped down to 3.5 mill. cubic metres. Compared with 1990, it decreased by over seven times. In 1996, with the country's economy and construction sector recovering, extraction of mineral resources started to increase gradually, however, nonetheless recently it has been four times smaller than at the end of the Soviet period.

The decrease in extraction caused one of the main current problems- derelict earlier exploited deposits, and areas exploited to the full, but not recultivated. When enterprises significantly reduced their extraction, they were not able to accumulate funds necessary for recultivation of big areas exploited earlier. Besides, a large number of mining enterprises that have gone bankrupt as well as ruined collective farms (the latter exploited several gravel and sand quarries each) also left a huge amount of non-re-cultivated plots.

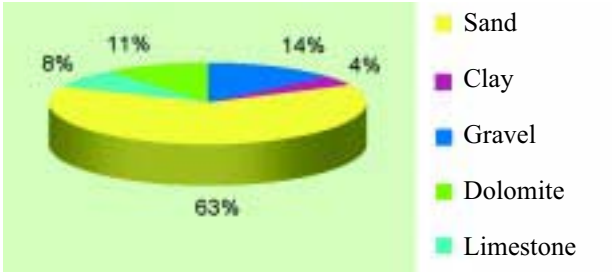


5.25 Distribution of resources explored in detail



5.25 Changes in extraction of mineral resources

In contradiction of this general decrease in extraction of mineral resources, oil extraction makes a striking contrast. Its extraction increased from 12 thousand tons in 1990 to 316.5 thousand tons in 2000 (Figure 5.28). Unfortunately, the explored oil resources amount to as little as 4.47 million tons. At a present pace of extraction, they would come to an end within less than 20 years.



5.26 Structure of extracted mineral resources

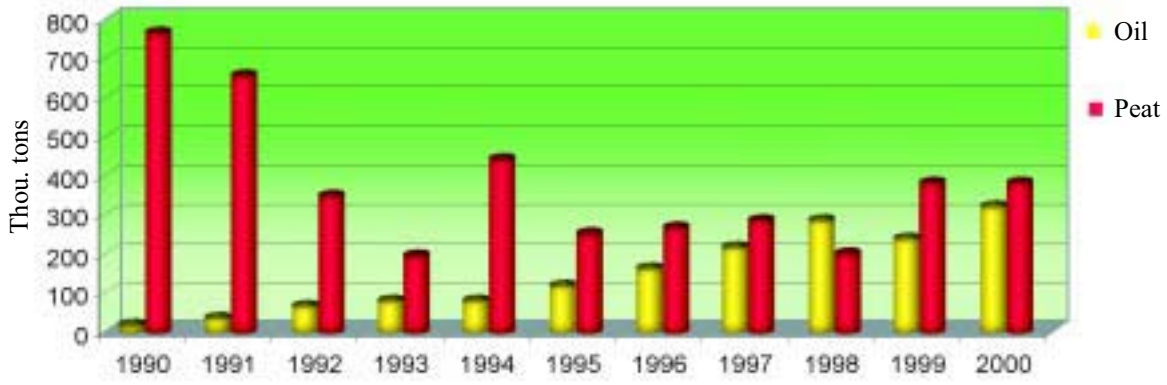
Extraction of peat decreased threefold during the same period. Peat bogs constitute one of the most characteristic elements of the Lithuanian landscape. The Lithuanian peat fund consists of 415 thousand hectares of peat bogs. That accounts for almost 6.5% of the total area of Lithuania. In 1990 investigations into Lithuanian peat bogs were completed. Peat resources of the peat bogs investigated constitute nearly one billion tons. After collective farms using large quantities of peat for fertilisers and litter had broken up, production of peat decreased by several times (Fig. 5.28). Recent peat extraction is oriented towards low-decomposed peat that is in demand on the foreign market. This raw material has already become a deficit in Lithuania.

Changes in the country's economy during the past decade adjusted the strategy of mineral resources investigation - only stages of initial investigation of mineral resources (reconnaisance, searches for the new kind) are financed from the state budget, whereas prospecting for ordinary mineral resources deposits and, exploration are financed by the consumer. The market and competition made enterprises explore small new deposits within a shorter distance from the consumer at their own expenses during the past decade.

Decrease of the extraction of mineral resources at first sight seems quite positive from the point of view of sustainable development. On the other hand, this causes many economic and social problems, therefore with the country's economy recovering, extraction and consumption of mineral resources should be on the increase. There is no real danger of exhaustion of many mineral resources and only low-decomposed peat, Devonian clay, mono-mineral quartz sand and oil make an exception here.

The impact of the extraction of mineral resources on the environment is of great importance. Extraction of mineral resources destroys the established balance, however, the nature and the scope of the impact depend on natural conditions and technical-economic possibilities. After mineral resources were mined, conditions to recultivate the damaged areas appear. Then mining consequences could be neutralised and the aesthetic value of landscape restored to some extent.

All mineral resources, with the exception of oil, are mined in our country in the open manner (in quarries). The depth of gravel, sand, clay, peat and dolomite quarries usually amounts to 6-12 m, that of limestone and gaize - up to 15-30 m; the deepest quarry



5.28 Changes in extraction of organic mineral resources

where Trias clay is mined is as much as 50 m deep. The level of groundwater is lowered by means of self-flowing or pumping up in several quarries only (peat, limestone and dolomite). Though deposits of solid mineral resources in Lithuania are often of different geological structure and are found in different natural conditions, their mining poses relatively small threat to the stability and integrity of geosystems. The impact is most often short-term and can be compensated by rational and effective recultivation.

The most important legal documents regulating protection and consumption of mineral resources adopted during the past decade are the Law on Environmental Protection, the Underground Law and Law on Environmental Impact Assessment. The Underground Law establishes the basic rights and duties of state and municipal institutions and legal and natural entities in consuming and protecting mineral resources of the land, continental shelf and economic zone in the Baltic Sea. By resolution of the Government of 1992 special conditions for use of land and forests regulating the economic activities were established. To accelerate recultivation of damaged lands in 1995 the Government approved the requirements for recultivation of damaged lands and preserving fertile soil layer. In 1996 the Ministry of Environment prepared the methodology of re-cultivating damaged lands after mineral resources have been mined. It established the procedure for re-cultivating areas being mined to all landowners, state land users and managers as well as to other legal and natural entities. Later methodologies were devised for the use of deposits of peat and non-metallic mineral resources.

Seeking to simplify the right of landowners to use construction materials (sand, gravel, clay) and peat contained in their land for their own needs, the procedure for installing, use and re-cultivation of so-called "small quarries" has been established. Actually the state system for regulating of mining has already been created. A worse situation is in the sphere of state regulation of oil extraction - the provisional rules of oil search, exploration and extraction prepared at the beginning of the last decade fail to comply with the present legal basis.

Significant changes in the Lithuanian economy during the past decade determined a decrease in the turnover of mining enterprises and sometimes even caused their bankrupt and created the problem of non-recultivated areas. Moreover, in each district there are from several to some tens of sand, gravel and peat quarries that belonged to the former collective and state farms. In most cases they were left without a user and non-recultivated. Often they are mined without permission or are turned into illegal landfills. According to the inventory data, at the end of 1998 the area of such damaged lands in Lithuania amounted to about 8900 hectares, and derelict peat quarries constitutes almost half of them due to considerably decreased peat extraction (Figure 5.28). After mining enterprises had been closed or had reduced mining areas, there was no economic subject left in charge of proper supervision of these areas - the implementation of preventive anti-fire measures. Fires that break out each year destroy large amounts of peat resources, devastate large areas of land and pollute the atmosphere. In 1995 final inventory of Lithuanian peat bogs was completed, and the cadastre of peat bogs was prepared. It contains data about the condition of every peat bog, type of peat and prevalent vegetation.

Seeking to implement the programme of use of exhausted quarries, peat bogs and land damaged in any

other way, approved in 1999, the plan for the use of exhausted quarries by their targeted purpose has been devised. The plan assesses the quarries of former agricultural enterprises in every district as well as other quarries left without the user. The specific purpose of use of that land, the scope of work and necessary funds for recultivation of land was established. The majority of quarries are planned to recultivate into forests, some part of them - into agricultural land use, water bodies, and 225 hectares are planned to leave non-recultivated for the purpose of preserving biological diversity and re-naturalisation. Provided that necessary financial assistance has been obtained, the implementation of the programme would make a considerable contribution to resolving environmental problems in Lithuania.

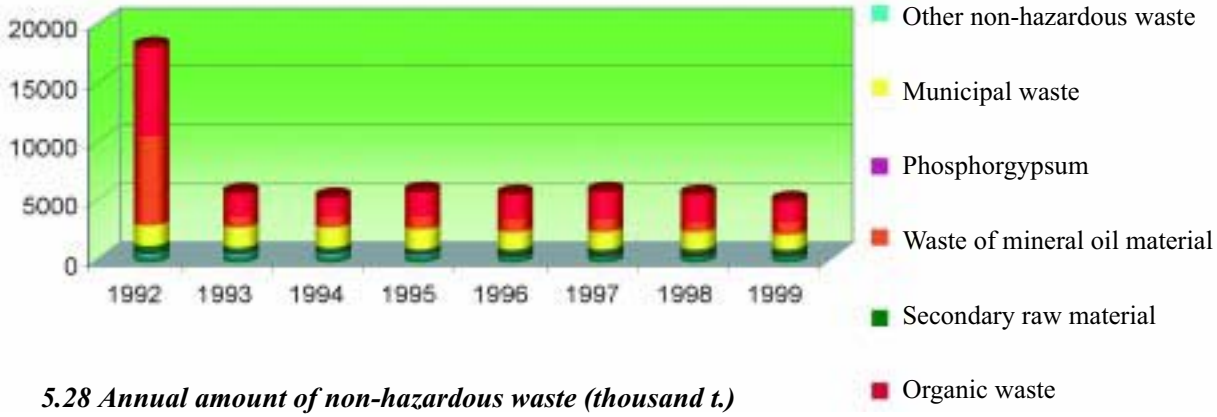
More intensive mining of a large part of mineral resources would be beneficial to the public - national industry would develop, new jobs would be created, revenue of the state would increase and funds for solving environmental problems would be procured. Extraction of unused mineral resources (e.g. anhydride) or the resources discontinued to consume (e.g. gaize, sapropel, etc.) should be encouraged. The assortment of goods made of local raw materials should be widened and their quality improved (e.g. high-quality ceramics and other goods, light-pipes, cosmetics and medicinal products, etc.).

Political, economic changes as well as changes in the legal basis determined notable changes in extraction of natural resources and an inevitable transformational decline. At present, after the new infrastructure of the consumption of natural resources and the legal basis have been formed, applying a defined tax system, future perspectives can clearly be forecast. The plan of measures to implement the programme of the Government of the Republic of Lithuania provides for the refusal of unnecessary restrictions placed on those who desire to explore the underground, to improve accounting of their resources seeking to rationally consume them. In implementing these measures, the Government will take specific actions to improve the legal basis, to prepare and implement the strategic trends. The EU accession processes also make positive adjustments to the processes of extraction of resources and their administration.

5.7. WASTE

Till 1992 no unified waste accounting system existed in Lithuania. Municipal services made an inventory of household waste on a regular basis and accounted hazardous waste periodically. On the basis of the Basel Convention, in 1992 the then Environmental Protection Department prepared the classifier of waste and established the procedure for making its primary inventory. In accordance with that procedure, the enterprises, where large amounts of non-hazardous and hazardous waste formed due to production and management, made its inventory. Over 1500 enterprises provided waste accounting data. Seeking to obtain more exact data, the procedure for making waste inventory has been changed since 2000. It is carried out by the enterprises recycling, disposing and exporting waste.

Annual amount of waste is presented in Figure 5.29. The data presented show that 17 mill. tons of waste were registered in 1992. Organic waste and mineral raw material waste constituted their largest part (over seven million tons each). Manure and slurry from large livestock farms constituted over two-thirds of organic waste, whereas mineral raw material waste - quarry waste - made up over 95 per cent. As a consequence of a decline in the economy and its reorganisation, the amount of waste of this category decreased by several times. Since 1993 annual amount of non-hazardous waste has changed insignificantly, fluctuating around five million tons.



5.28 Annual amount of non-hazardous waste (thousand t.)

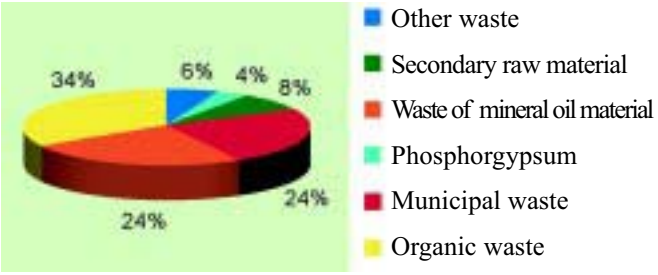
The composition of non-hazardous waste in 2000 is presented in Figure 5.30. The data presented show that non-organic waste constitutes about one-third of the total non-hazardous waste, mineral raw material waste and municipal waste account for one-fourth each, and the quantities of waste of other categories are relatively insignificant. Secondary raw material waste accounts for about 8% and phosphor gypsum accounts for 4%. Despite of different technical projects no acceptable ways of applying phosphor gypsum have been discovered so far, huge quantities of waste have accumulated near Kėdainiai Mineral Fertiliser Plant "Lifosa", is the only source of this waste.

Every year about one million tons of municipal waste is generated in Lithuania. At present by approximate estimation about 300 kg of municipal waste form per capita in large Lithuanian cities, this figure stands at 220 kg in smaller towns and in rural areas it amounts to about 70 kg.

Quantities of non-hazardous waste by the ways of its management are presented in Figure 5.31. The data presented show that nearly half (44%) of the total non-hazardous waste is taken to dumpsites. Since municipal waste has not been sorted in Lithuania so far, the largest part thereof is landfilled. Moreover, quite a large amount of non-hazardous waste of other categories such as street and road sweepings, biodegradable waste from food processing enterprises and catering institutions, construction and destruction waste is also disposed in landfills.

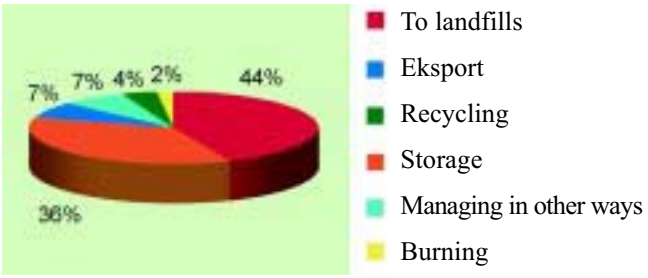
More than one-third of non-hazardous waste consisting of waste water treatment and other kinds of sludge as well as mineral waste is stored because at present no facilities for managing such waste is available and disposal in the landfills is prohibited. Mainly manure and slurry as well as other biodegradable waste used as

fertilisers in agriculture fall into the category of non-hazardous waste management in other ways.



5.29 Composition of non-hazardous waste

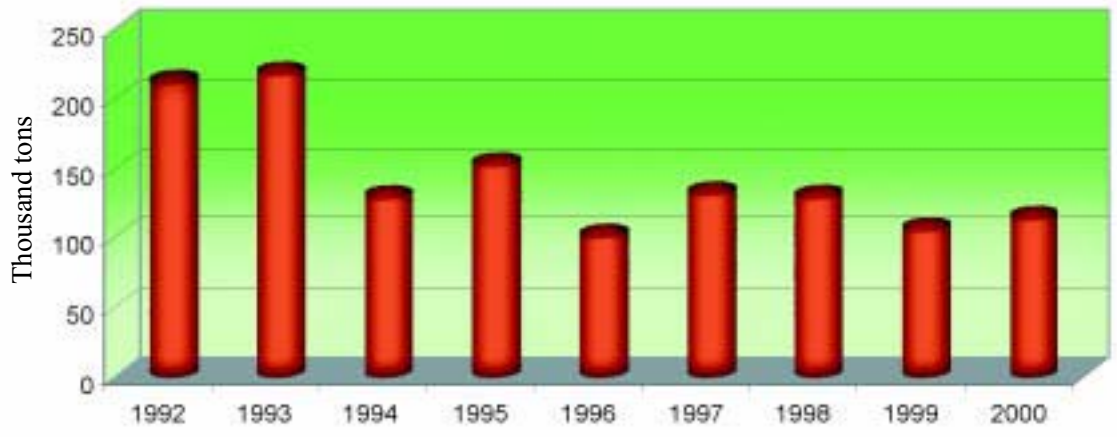
Data on the amount of hazardous waste are presented in Figure 5.32. The data presented indicate that the quantity of waste annually formed during the past decade decreased by nearly as much as twice. 212 thousand tons of hazardous waste were registered in 1992, in the year 1999 this figure stood at 106 thousand tons. In 2000 an insignificant increase in the formation of up to 114 thousand tons of hazardous waste was registered.



5.30 Management of non-hazardous waste

Data presented in Table 5.6 show that in terms of amount, waste containing heavy metals, including spent batteries and accumulators, comes in the second place after oil slime. Waste of chemical substances, used lubricants, ash and cinder constitutes a significant part of hazardous waste. Health care (infectious) waste constitutes about 2 thousand tons, however, its smaller quantities are specified in inventory because a larger part of this waste is disinfected in their formation places and is disposed of together with municipal waste.

The largest part of hazardous waste is either stored (49%) or recycled (48%) and approximately one per cent



5.31 Annual amount of hazardous waste

Oil and water mixtures - oil slime - constitute the largest part of hazardous waste. It accounts for nearly 95 per cent. Outdated pesticides currently amounts to 2 thousand tons. It is not included in the anual amount of hazardous waste. Over two-thirds of oil slime is formed at "Mažeikių nafta" and the remaining part - mostly at Klaipėda Oil Terminal. Quantities of other hazardous waste (excluding oil slime) are considerably smaller, however, they pose a great threat to the environment. Data about quantities of this waste are presented in Table 5.6.

of the total hazardous waste is incinerated or exported (mainly lead accumulators). When recycling waste of oil products of JSC "Mažeikių nafta", separated oil products account for about 9 per cent of the total quantity of waste, however, this does not ensure a complete elimination of danger posed by hazardous waste. Due to this, waste obtained after recycling is also hazardous and it is stored on the territory of the enterprise. This waste makes up the largest part of hazardous waste stored.

Waste management in Lithuania is one of the most pressing environmental problems. Their solution requires

Table 5.6 Composition of hazardous waste (excluding oil slime) (in 2000)

Waste	Amount, tons
Solvents and waste contaminated with them, including paint, glue, tar, etc. (excepting halogen solvents)	307
Halogenated compounds and waste contaminated with them	16
Oil, lubricants and waste contaminated with them	1134
Waste contaminated with heavy metals, including accumulators, dry batteries	3997
Waste of chemical substances, including acids, alkali, medicines	800
Ash and cinder	705
Infectious waste	59
Luminescence lamps and other waste containing mercury	76

large funds and many efforts. The major drawbacks of waste management are as follows:

- poorly developed system of municipal waste management, absence of waste sorting infrastructure, collecting secondary raw materials separately and preparing them for recycling.
- no proper hazardous waste management system has been created;
- an insufficiently developed legal basis and a lack of institutional capacities;
- insufficient training of waste managers and education of public.

Storage of waste in landfills is the only way of waste disposal so far. Currently about 850 landfills of municipal waste have been registered in Lithuania, with 350 of them being in use. The majority of landfills currently in use do not comply with elementary environmental and sanitarian-hygienic requirements because of wrongly chosen places, their poor engineering equipping and improper use and insufficient control of waste taken to the landfills. Such a large number of landfills are determined by poorly developed system of municipal waste collection, especially in small settlements and villages where residents themselves take waste to small, technically unequipped and improperly controlled dumpsites.

Since a main part of municipal waste is not sorted and the quality of collected secondary raw materials is unsatisfactory, waste recycling enterprises often refuse to accept low-quality secondary raw materials and import them from abroad. In 2000 imported and recycled paper and cardboard waste accounted for 41%, plastic waste accounted for as much as 80% of the total quantity of recycled raw materials (Table 5.7). The amount of paper and cardboard waste formed and recycled in Lithuania came to as little as 25%, that of glass - 18%, and plastic waste accounted for only 6%. The remaining part of these raw materials is taken to landfills.

Till 1998 actually there was no legal basis in Lithuania regulating waste management. This basis has not been completely created yet. There is a great lack of requirements determining management of flows of such problematic waste as end-of-life vehicles, electronic scrap, used lubricants, etc. Preparation and implementation of legal acts regulating waste management at local level is one of the most acute problems of municipal waste management.

Table 5.7 Formation of secondary raw materials within municipal waste, their recycling and import in 2000

Secondary raw materials	Formation, thou. tons	Recycling		Recycling of imported secondary raw materials	
		Thou. tons	%	Thou. tons	of recycled quantity %
Paper and cardboard	150	37	25	26	41
Glass	56	10	18	0	0
Plastic	50	3	6	12	80

Municipal waste management systems have been managed inefficiently so far. Municipal administration divisions responsible for municipal waste management lack labour force and qualification. So far too little attention has been paid to education and the provision of information to the public about the importance of waste sorting and management as well as about the danger the unmanaged and inadequately managed waste poses.

Essential improvement in the legal basis of waste management started in 1998 after the Law on Waste Management had been adopted. The Law established basic waste management priorities (prevention, recycling, utilisation for the production of energy, safe disposal), the principle "polluter pays" as well as the principle of the producer's responsibility were enforced, the institutions in charge of waste management were identified as well as their competence. Later a number of legal acts were adopted necessary to implement the Law on Waste Management and regulating waste inventory, issuance of permits to waste managing enterprises, registration of the enterprises, waste recovery and recycling operations, construction and exploitation of landfills, peculiarities of hazardous waste management, etc. In 1999 the Government approved the State Hazardous Waste Management Programme and the Outline of the State Waste Management Strategy. Recommendations for devising waste management plans at county and local level and municipal co-operation in implementing regional waste management system have been drawn up. It was planned to increase recovery of biodegradable waste by applying the following technologies: in the immediate future - composting; production of biogases and waste incineration with energy recovery are planned for the further future.

At the beginning of 2002 another important step forward was made - the Amendment Law on the Law on the Tax on Environmental Pollution was adopted. It introduced taxes on packaging, batteries, accumulators, tyres and other products. All these, having become waste, caused environmental problems. The Law established a manufacturer's liability - a manufacturer must organise the management of taxed waste or pay a tax. This tax would be used for the development of waste collection and recycling. The Law on the Tax on Environmental Pollution together with the Law on Packaging and Packaging Waste Management adopted at the end of 2001 constitute the legal basis for significant extending separate collection and recycling of secondary raw materials. Their largest part is packaging waste.

In the sphere of packaging waste management and specific waste flows it is planned to extend manufacturers' liability for management of waste forming after the life-cycle of products has ended. The Law on Packaging and Packaging Waste Management established that from the beginning of 2003 manufacturers will have to carry

out tasks of collection, recovery and recycling of packaging waste set by the Government or its authorised institution or to pay the tax. The assigned tasks of recovery and recycling of packaging waste are presented in Tables 5.8 and 5.9.

The tax on products that will come into force from 2003 is to encourage collection, recycling or safe disposal of flows of other specific waste - used tyres, batteries, accumulators and other hazardous waste.

Strategic documents of the Ministry of Environment provide for construction of 10 regional waste management systems by 2010, closing down the landfills that are currently in use and installing a new dumpsite complying with all environmental protection requirements in every county and implementing an effective waste collection and sorting infrastructure. Measures to gradually develop collection and recycling of biodegradable waste will be planned to implement in all regional waste management systems.

Table 5.8 Tasks for recovery of packaging waste

Packaking waste	Recovery % (by weight)				
	2002	2003	2004	2005	2006
Paper and cardboard	18	23	35	40	55
Glass	20	25	35	40	60
Plastic	2	10	16	18	25
Metals	5	10	15	25	40
Total	16	21	32	37	52

Recently waste management has played an ever-increasing role in the activity of municipalities. Therefore much attention is paid to the possibilities of municipalities to organise and control municipal waste management systems. In 2000 a new modern landfill with bottom insulation, collection and treatment of filtrate was completed to build in the city of Kaunas. It complies with the requirements of the EU and Lithuanian legislation. At present a project of collecting and utilising dumpsite gases in the landfill of the city of Kaunas is under preparation. In 2001 Waste Management Division within the municipality of the city of Kaunas was established. It was the first one in Lithuania. Its functions and responsibilities of the staff were defined and a working programme devised.

Table 5.9 Tasks for recycling of packaging waste

Packaking waste	Recycling % (by weight)				
	2002	2003	2004	2005	2006
Paper and cardboard	16	20	30	35	40
Glass	20	25	35	40	60
Plastic	2	10	15	15	20
Metals	5	10	15	25	40
Total	15	20	29	33	43

All landfills recently equipped or being currently built (e.g. Mažeikiai, Visaginas, Plungė) comply with the set requirements. Monitoring systems have been installed in the majority of the large landfills that are currently in use, and control over waste accepted is stricter.

After regional landfills conforming to the set requirements have been started to use, it is planned to immediately terminate taking waste to the other landfills of that region. It is planned to complete recultivation of the closed-down landfills by 2012. Plans for recultivation of the landfills being closed down and the funds for carrying it out will be provided for in the documentation of regional waste management systems (feasibility studies and other documents).

It has been assessed that about 200 m Litas will be needed to set up new landfills, and another 270 m Litas will be necessary to close down and recultivate the existing ones. This programme is planned to finance from the ISPA (Instrument for Structural Policies for Preaccession) Foundation, the state and municipal budgets and loans. Three applications for the ISPA financing have already been submitted and a positive decision to finance these projects has already been received. At present investigations in other three regions are being carried out.

It is planned that by the year 2004 the provision of public waste management services must be ensured to all the inhabitants of cities, small towns and settlements (with population of over 1000) and economic entities (enterprises, institutions and organisations). In 2007 this service will be offered to all natural and legal entities.

Hazardous waste management still poses an especially pressing and urgent problem. As far back as 1982, according to the complex programme, Palemonas Ceramics Plant started accepting galvanic slime and non-regenerated waste of oil products from enterprises. These kinds of waste were used in production process. However, with the increase in energy and transportation costs, Palemonas Ceramics Plant raised the fee for the management of this hazardous waste, and therefore this work practically stopped. Hence, galvanic waste management, though its quantities have decreased considerably, further makes a serious hazardous waste management problem.

In 1989 the Ministry of Environment obliged enterprises to store hazardous waste in places of their production if no safe ways of its management were available. Therefore some larger enterprises had temporary hazardous waste repositories. De-mercuration enterprise "Liuksitis" was built in Vilnius. It accepted luminescence lamps for recycling, however, due to high prices of the services, large quantities of this waste were stored at many enterprises and institutions. Kėdainiai chemical enterprise "Lifosa" accepts accumulator electrolytes free of charge and regenerates sulphuric acid from them. There are also other enterprises managing hazardous waste, however, either their capacities are insufficient or their services are too expensive. Consequently, large quantities of hazardous waste formed (nearly half of them) are stored, and a large part thereof together with municipal waste is often taken to dumpsites.

Since oil products and sludge contaminated with them constitute the largest part of hazardous waste in Lithuania, the Ministry of Environment established an enterprise called "Grunto valymo technologijos" (Ground Treatment Technologies) to manage this waste. This enterprise is engaged not only in waste management but also in research work and upgrading technologies for managing waste of oil products. Several private enterprises also work successfully in the sphere of oil product management. Nearly all oil products and soil contaminated with them are recycled and biologically cleaned.

In 2001 a regional collection and transfer station of hazardous waste was completed in Šiauliai. It will service two counties - Šiauliai and Panevėžys. The station has a unit where waste is accepted, equipment for sorting waste and for its primary processing as well as devices for their short-term and long-term storage. In the course of the implementation of the project, a network of stations collecting hazardous waste intended for hazardous waste collection from inhabitants and small-sized commercial enterprises was built in all local governments of Šiauliai district. Collection and transfer stations of hazardous waste are nearly completed in Alytus and Klaipėda.

With the restructuring of Lithuania's economy going on, another hazardous waste management problem emerged - hazardous waste accumulated and not managed for many years. One of the most illustrative examples of this problem is outdated pesticides. During the recent decade large quantities of this hazardous waste were managed. However, 502 tons of not banned pesticides, 214 tons of banned pesticides and 1 347 tons of unidentified pesticides - the total of 2 063 tons - are still stored in 165 warehouses of the former collective farms in Lithuania at the beginning of 2001. Their largest quantities have been stored in Marijampolė (386 tons) and Klaipėda (302 tons) districts, and the smallest ones in Telšiai (17 tons) and Kaunas (72 tons) counties. The fact that inventory has not been made of all hazardous waste and that neither their exact amount nor their exact composition are known make the problem much more acute and formidable. Furthermore, no equipment for processing or recycling a large part of accumulated hazardous waste as well as hazardous waste currently being formed is available in Lithuania at present. Besides, a small Lithuanian market unable to ensure work for powerful and effective equipment from the economic point of view makes its implementation really difficult.

In 2001 the Ministry of Environment devised the draft State Strategic Waste Management Plan. There it was planned to create a rational unified waste management system satisfying the needs of the public, ensuring good quality of the environment and not violating the principles of market economy. Hazardous waste management stations in operation at present and planned to put in operation in the immediate future will be incorporated into an integral hazardous waste management system covering the entire territory of the country. It is

planned to develop and modernise the capacities of the most abundant hazardous waste category, that is, waste management of oil products, to create new hazardous waste processing, recycling and disposal equipment. By 2006 it is intended to create the infrastructure (equipment for incineration of hazardous waste, a hazardous waste dumpsite, other devices for hazardous waste collection and management) necessary for ensuring safe utilisation and disposal of hazardous waste.

Radioactive waste is singled out in a separate special category of hazardous waste. This kind of waste is accounted and managed separately from other hazardous waste. Ignalina Nuclear Power Plant is the principal source of radioactive waste. Over 2000 m^3 of radioactive waste, excluding used nuclear fuel, form at the Plant annually. Solid waste constitutes the largest part of this waste - 1100 m^3, bituminous waste amounts to 700 m^3 and evaporation concentrates, filtering powder and mixtures of ion exchange resins make up 200 m^3.

Apart from Ignalina Nuclear Power Plant, several cubic metres of medicinal, industrial and scientific research radioactive waste form in Lithuania every year. Before 1989 this waste had been accumulated in Maišiagala radioactive waste repository built in 1963. About 120 cubic meters of waste was accumulated there. Its total activity was about 5x1015 Bq, including 4,2x1015 Bq of tritium and 2x1011 Bq of highly radiotoxic and long-lasting plutonium. Since 1989 the repository has been conserved and all radioactive waste has been stored together with waste from Ignalina Nuclear Power Plant. Since 1996 the increased quantities of tritium have been detected in underground water in that territory. That shows that the repository is neither leak-proof nor sufficiently safe, so this problem will have to be definitely solved in the immediate future.

After the re-establishment of independence, Lithuania inherited the normative base of radioactive waste management from the former Soviet Union. It did not comply with current international requirements and safety standards. Necessary infrastructure was not created in the country. The radioactive waste management system did not readily comply with the international practice, and the capacities of waste repositories of Ignalina Nuclear Power Plant were insufficient for accumulating the newly formed waste. Assessments of the existing radioactive waste repositories showed that not only the repository in Maišiagala but also the repositories in Ignalina Nuclear Power Plant were unsuitable for a long-term storage of radioactive waste.

During the past years a legal basis for radioactive waste management was created in Lithuania: Lithuania signed the Joint Convention on Safety of Used Nuclear Fuel and Radioactive Waste, adopted the Law on Radioactive Waste Management, implemented Basic Safety Standards, approved the new system of radioactive waste classification. The Radioactive Waste Management Agency has been founded. It effectively introduces new waste management methods.

Storage of used radioactive fuel constitutes the most complicated problem in relation to radioactive waste management. Ignalina Nuclear Power Plant has resolved this problem in part - a repository of used dry-type nuclear fuel has been built and metal or ferro-concrete containers for storing fuel up to 50 years have been started to use.

According to the Radioactive Waste Management Strategy adopted in 2002, it is planned to implement a number of measures allowing to reduce a threat posed by radioactive waste to the environment:

1. to improve the legal basis of radioactive waste management;
2. to restructure radioactive waste management at Ignalina Nuclear Power Plant;
3. to make preparations for managing decommissioning waste of Ignalina Nuclear Power Plant;
4. to modernise the infrastructure of radioactive waste management of small manufacturers;
5. to set up new radioactive waste depositories.

It is planned to use "dry" containers meant for two purposes (suitable for long-term storage and transportation) to store used nuclear fuel. The present radioactive waste depository will be extended by 2011. Possibilities to set up the radioactive waste repository as well as to build a regional repository (of several countries) will be analysed.

Cementing technology application will solidify all liquid radioactive waste and used tars as well as concentrate sediments. Possibilities to restructure the bituminous waste depository or turn it into a repository will be considered.

A new radioactive waste classification system will be introduced in Ignalina Nuclear Power Plant. A waste management system will be upgraded taking into consideration the plan of use termination of the Plant.

6. Ekonomic development

6.1. GENERAL TRENDS OF ECONOMIC DEVELOPMENT

The past decade for Lithuania was especially complicated and difficult in relation to economic development. The country's economy developed in the conditions of intersection of two economic systems: a centrally governed system and the system of a free market. Transformational processes of the economic systems started before the re-establishment of independence. In 1988 Lithuania prepared for a gradual transition from centrally governed economy to a free market economy. The concept of a reform was formulated and definite trends of the future reform established. According to the concept, the Draft Law on Economic Independence was drawn up. It was adopted by the then Supreme Council in 1989. It was emphasised that the economic reform must be carried out rapidly and in an all-embracing manner, at the same time taking measures to mitigate contradictions of the transitional period and reduce their negative impact on the economic system.

After the re-establishment of independence the economic reform acquired a distinctly different nature. The very process became much faster, though more risky, because inevitable and hasty decisions did not always give the expected positive results. Transformation of economic systems is a very complicated process consisting of three elements: microeconomic liberalisation, macroeconomic stabilisation and systematic transformation. Microeconomic liberalisation creates conditions for the formation of market prices, free movement of goods and capital. By means of macroeconomic stabilisation it is sought to create conditions for the growth of liberalised economy because a decline in economy inevitably follows liberalisation. Privatisation is the most important component of transformation because only private ownership forms the basis for the functioning of market economy.

Opinions of the economists from different countries on the nature of the reform and particularly on its optimal pace were divided. In fact two ways were proposed: one of a slow evolution seeking to adapt the institutions of centralised economy to market economy conditions and the other one was the way of rapid reforms or so-called "shock therapy". Lithuania, like other Baltic States and many countries of the former Soviet block, chose the way of rapid reforms. It was not and is not easy but today it is obvious this is much more effective than the way of slow institutional reforms.

At the beginning of the transition period of economic systems it was thought that economic growth and effective macroeconomic stabilisation will occur as if an automatic consequence of transition to market economy system, and economy will start to grow fast. The experience of Central and Eastern European countries in carrying out the reforms of the past decades showed that economic growth was determined not only by objective but also by subjective factors. After new economic possibilities have been created, a certain period of time is necessary for the society to acquire enough information and knowledge allowing making efficient use of these possibilities.

The beginning of the decade that followed the re-establishment of Independence was noted for a sufficient "social agreement" between state institutions and the society. It was regarded as one of the basic reasons to successfully start economic reforms. The decisions made in the course of a further development of economic system were not rational at times. Their consequences and political instability that were sometimes observed slowed down the rate of the economic growth and caused dissatisfaction of some part of the society. The analysis of these results shows that quite a number of mistakes were made in carrying out privatisation processes vital for the country's economy.

After the statehood of Lithuania has been re-established, the Provisional Constitution of the Republic of Lithuania was adopted. It established that the economy of Lithuania shall be based on the property of the Republic of Lithuania consisting of the private property of its citizens, the property of groups of citizens, and the state property. Two forms of transformation of the state property into private property were provided for: returning the existing property to its former owners and privatisation of the state property. Privatisation of the state property plays a decisive role in forming the basis for market

economy. The Law on Primary Privatisation of the State Property adopted in 1991 regulated the conditions and requirements for primary privatisation of industrial, constructional, transport, energy, recreation, services and other enterprises. The law stipulated that following primary privatisation more than a half value of the object being privatised must belong to private entities. The remaining part of the object can be privatised later applying other forms of privatisation. Information about the first stage of privatisation of the state property is presented in Table 6.1.

Table 6.1 Primary Privatisation of the State Property in 1991-1995

Item No.	Indicators	Number of objects		Capital	
		number	%	Mill. LTL	%
1.	Total state property	8044	100	13547.4	100
2.	Privatised property	5710	70.98	3491.0	25.77
3.	Privatised by stock purchase warrant	2923	36.34	2627.7	19.39
4.	Privatised at auction	2726	33.89	79.1	0.58
5.	Privatised by tender	15	0.19	499.3	3.69

Privatisation of the large industrial enterprises that lost markets of realisation for their raw materials and production caused major problems. Their consequences are still felt today. In the course of privatisation of such enterprises the necessity to reorganise them was absolutely obvious. A large part of property was privatised using the funds that were not transparent enough because no strict requirements to declare the sources of finance used for privatisation were set.

During the second stage of privatisation that started in 1996 the State Property Fund began the privatisation process of the state and municipal property. It governs a part of state-owned shares of the enterprises entered on the list of objects to be privatised and makes decisions concerning their sale. The analysis of the second stage of privatisation revealed the following problems: identification of objects being privatised, reorganisation of an enterprise prior to its privatisation, selection of an adviser on privatisation, establishment of a minimal selling prices, and assessment of the credibility of investors. Some decisions made during the second stage of privatisation are considered as controversial.

Privatisation processes, their rationality and effectiveness have an impact on the formation of the fundamentals of the market economic system. Many important processes influence further trends of the Lithuanian economy developing in accordance with the principles of market economy. The nature and course of these processes were complicated, controversial and difficult during the past decade.

Gross Domestic Product (GDP) - the most universal indicator generalising the development of the country's economy - shows the nature of the economic development, its rate, possibilities and trends in the rise of wellbeing of the society. The changes of Lithuania GDP during past decade are presented in Figure 6.1.

In Lithuania, like in all other Central and Eastern European countries, Gross Domestic Product (GDP), after the transformation processes of economic systems have started, was on the rapid decrease. In 1994 it accounted for 59.5% of the level of 1991. Prior to the re-establishment of the independence, production volumes of the industry manufacturing the largest share of GDP decreased nearly threefold from 1991 to 1994. Its contribution to GDP decreased from 42% in 1991 to 26% in 1994. Production volumes in the agricultural sector that underwent significant processes of the reform decreased by as much as two and a half times. A decline in production in this sector during the aforementioned period considerably exceeded the average decline in the Lithuanian economy. The first years of the transition period had a negative impact on the changes in construction volumes as well. Only the services sector constituted an ever-increasing share within the structure of GDP. The share of the GDP created in this sector in 2000 accounted for nearly as much as 60% of the total GDP.

The carried-out analysis of general tendencies in Lithuania's economy showed that in the first half of the 1990-2000 period the decline in GDP had been determined by the following: a general economic crisis in the economic zone of the former USSR, economic pressure of that zone on Lithuania, difficulties encountered in moving to the new economic system as well as insufficient control of the reform processes.

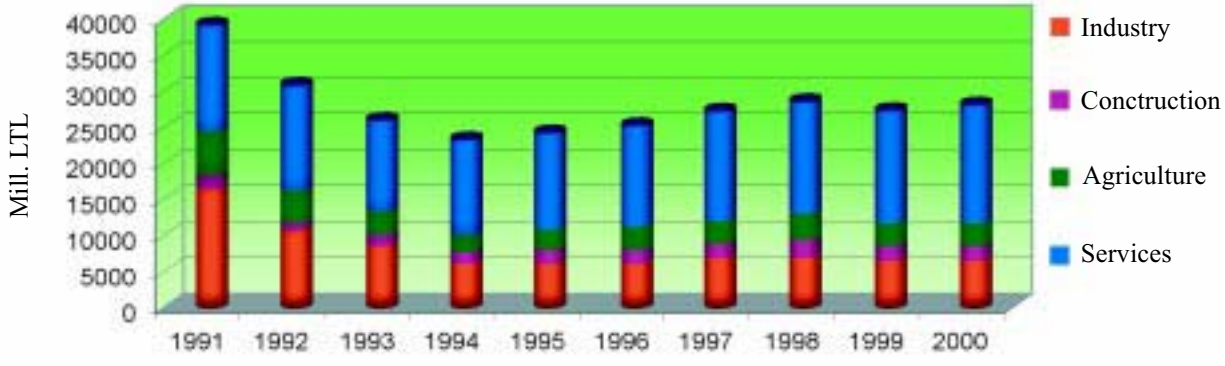
The year 1995 is regarded as the turning point in the Lithuanian economy. Then the increase in GDP of 3.3 per cent was registered for the first time after the re-establishment of the independence. This trend remained unchanged during the following three years when the

increase in GDP accounted for 4.7% in 1996, 7.3% in 1997 and 5.1% in 1998, respectively. The 1998 economic crisis in Russia had a significant negative impact on a further development of Lithuania's economy. Due to the crisis, the loss of nearly one billion Litas was inflicted on the country's economy. This also had influence on a 3.9% decrease in GDP in 1999. This negative trend, however, was short-term, and in 2000 GDP increased by 3.3. per cent again. Still better changes in this indicator exceeding the forecasted ones were registered in 2001 - GDP of that year increased by 5.7 per cent.

During the first years following the re-establishment of the statehood the Lithuanian economy experienced considerable structural changes. After the share of GDP created in the industrial and agricultural sectors decreased, the importance of other sectors increased. The increasing share of GDP created in the services sphere corresponds to the general trends of economic development in other Central and Eastern European countries. During the decade the share of the GDP created in the agricultural sector was gradually on the decrease. If in 1990 agricultural production accounted for 15.5 per cent of GDP, in 2000 this figure stood at 10.9 per cent. During the period under analysis the share of the GDP created in the private sector continuously increased. This corresponds to the objectives of the country, that is restructuring its economy according to the requirements of market economy.

The share of almost steadily increasing GDP per capita testifies to the increasing standard of living in the country, however, when comparing this indicator to the average of that indicator in the European Union member states, it was three times less (using estimates of purchasing power parity) in 2000.

A black economy constituted quite a large part during the transition period. It has a profound impact on economical processes and exerts a negative influence on their development. Black economy is defined as an economic activity that brings profit, however, due to various reasons, the profit is not declared or reflected in statistics. Studies of the volumes of a black economy carried out according to the international methodology in 1995 showed that its volumes accounted for almost one-fourth of GDP of that year. Processes of prevention of a black economy in Lithuania are positively influenced by the development of the activity in the field of accession to the EU.



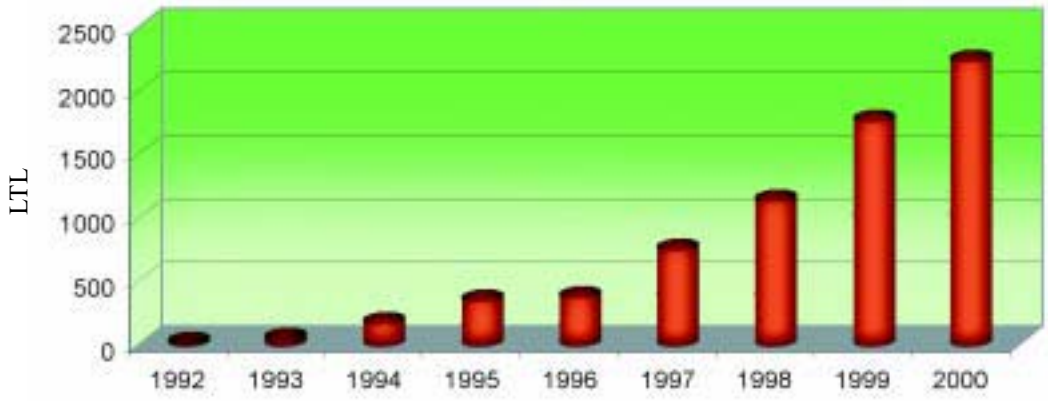
6.1. Changes of Gross Domestic Product in Lithuania

Afflux of foreign capital into the country's economy is one of the key factors determining economic growth. Direct foreign investments are of particular significance. They are defined as investments of foreign capital in production and non-production objects. On their basis long-term relations between the investor and the recipient of the investment form. A direct investor seeks to influence the governing of the object the capital has been invested in. This makes these investments different from portfolio investments. Lithuania, like other Central and Eastern European countries, is oriented towards attracting foreign capital to the country's economy. First and foremost, this was related to more advanced technologies. They would make it possible to improve the quality of goods and services and at the same time increase their competitive ability on the markets. Foreign investments also create new jobs, raise the qualification of human potential and reduce unemployment in the country. By taking part in control of enterprises the investors implement new progressive systems of management. Direct foreign investments have a positive impact on strength-

ening the environmental functions of an enterprise. Most Lithuanian enterprises certified according to environmental management standards are joint foreign capital enterprises or are governed by foreign capital. The most important indicator characterising the economic growth is a part of direct investments per capita (Figure 6.2).

other negative economic processes as well. During the first decade, after the re-establishment of the statehood, Lithuania's import exceeded export and determined the formation of the trade deficit (Figure 6.3).

The first positive changes were recorded in 2001 when the increase in export exceeded the increase in import. The increase in a competitive ability of the Lithuanian economy



6.2. Direct foreign investments per capita in Lithuania

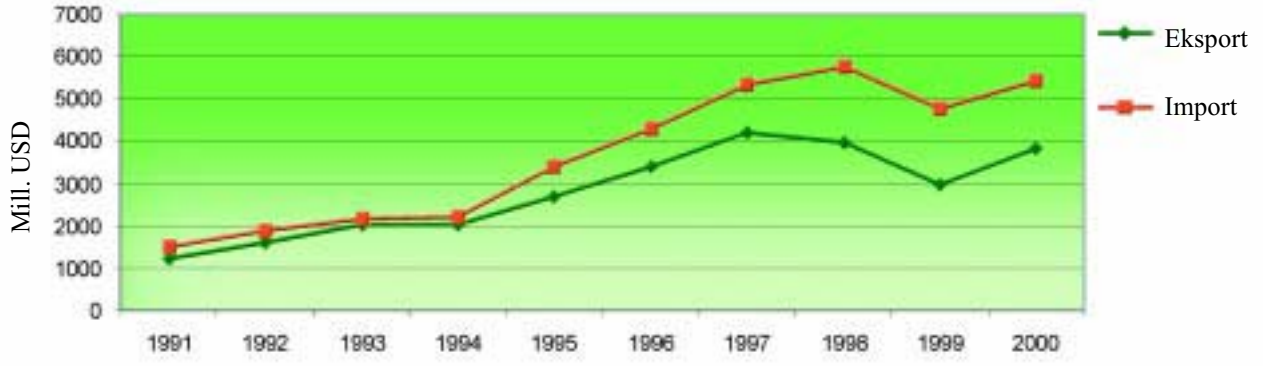
Absolute indicators of direct investments per capita in Lithuania show a positive trend in their development. However, as compared with analogous indicators of other Central and Eastern European countries, it is obvious that foreign investors did not regard Lithuania as the country offering good prospects for foreign investments. This had a negative impact on the total economic situation of the country because interior financial resources necessary for the restructuring of economy were insufficient. In the first half of the last decade total investments in the country's economy decreased nearly threefold. Recently an amount of direct foreign investments have been on the increase. The new Law on Investments that came into power in 1999 exerted a positive impact on direct foreign investments. It established the provision that Lithuania was open to investments and their conditions for home and foreign investors were equal.

Foreign investment policy in the processes of economic development is closely related to trading policy. Trade liberalisation, decrease in taxes, abolishment of quantitative restrictions, application of equal conditions to imported and exported goods encourage growth of bilateral trade. During the period under analysis Lithuania's economy was greatly dependent on export because the income received constituted a large share of GDP volume. With the decrease in export volumes, the country's GDP decreases, too. That in turn influences on the world markets is to make a positive impact on the changes in the trends of foreign trade balance.

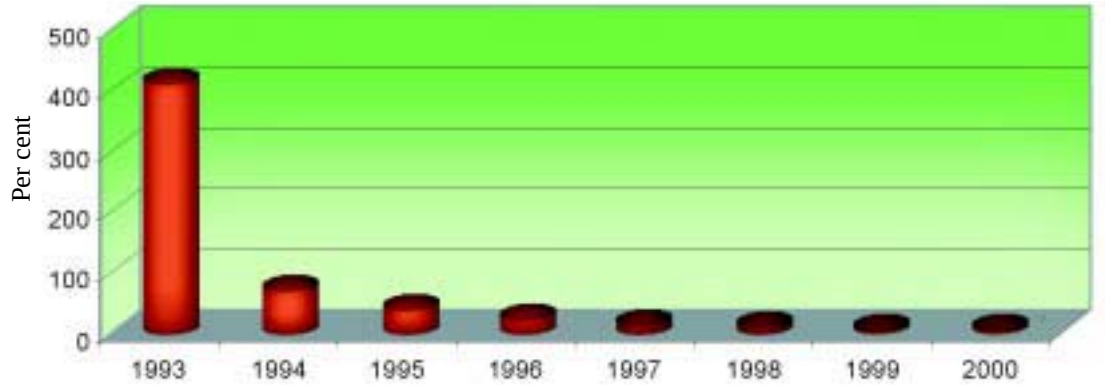
Success in financial system activity has a profound impact on general economic trends. Changes of financial system during the first decade following the re-establishment of the independence were especially complicated in Lithuania. Rapid reforms of the financial system and the necessity to introduce national currency appeared in 1991. Then price liberalisation caused rapid inflation that reached the limit of 483 per cent. The following year, after the necessary measures were not taken on time, inflation moved to another level, that is, the level of hyperinflation, and accounted for 1263%. After the national currency was introduced in 1993, inflation rates started to decrease. General inflation trends in Lithuania during the past decade are presented in Figure 6.4.

The decrease in inflation was closely related to the Currency Board Arrangement introduced in 1994 and pegging the Litas to the USA dollar. Under the influence of the processes of accession to the EU, at the beginning of 2002 the Lithuanian national currency was pegged to the Euro. The indicators of the last decade being analysed reflect a rational course of the monetary policy and strict control exerted over the financial system.

The rate of the economic growth is influenced by the rate of interest on loans proposed by the banks of the country. Due to high inflation, distrust of the national currency



6.3 Export and import volumes in Lithuania in million of US dollars



6.4 Inflation changes in Lithuania

and financial institutions, very high interest rates prevailed in Lithuania till 1994. Only very few economic subjects could make use of the bank loans with high interest. Following the crisis processes that took place in 1994-1995 interest rates in the banking sector of Lithuania started to decrease (Table 6.3).

Table 6.3 Short-term and medium-term interest on loans in the Baltic States (in per cent)

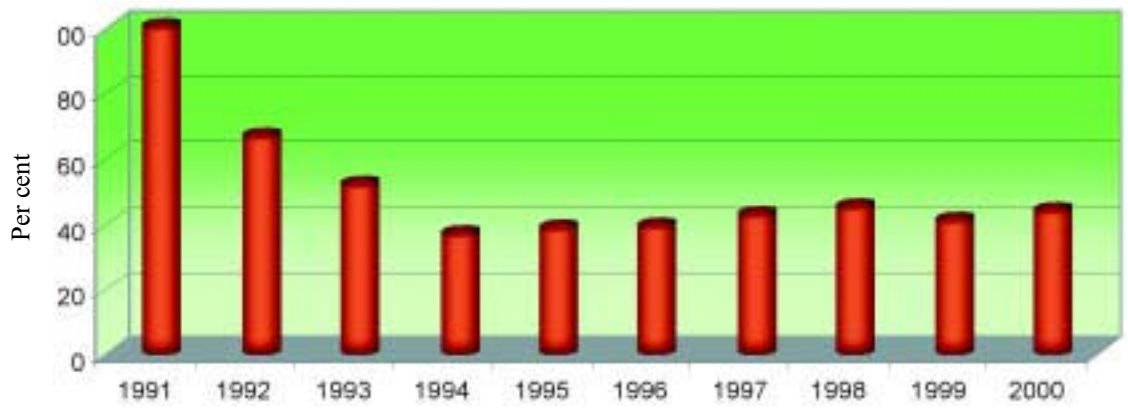
State	1993	1994	1995	1996	1997	1998	1999	2000
Lithuania	91.9	62.3	27.1	21.6	14.4	12.2	13.1	11.2
Latvia	86.4	55.9	34.6	25.8	15.3	14.3	14.2	12.3
Estonia	27.3	23.1	16.0	13.7	19.8	16.6	8.7	8.6

Though during the recent year interest rates have considerably decreased, they are still higher than those that are in effect on the international financial market. Afflux of foreign capital into the banking sector of Lithuania raised the efficiency of these institutions and increased the public's trust in them.

At present a long-term Strategy of the Development of the Lithuanian Economy till 2015 is drawn up. During the first decade, following the re-establishment of the independence in Lithuania, 81 strategies for the development of certain economic sectors were devised and approved in Lithuania. However, they were not co-ordinated between themselves, and too little attention was paid to their implementation. The devised over-all Strategy for the Development of Economy embraces possible development trends of all the most important branches of economy. It has been drawn up on the basis of a unified methodology. Its separate parts are co-ordinated between themselves. A moderate economic growth (4-5%) is stipulated in the Strategy for the forecasted period, and in many cases basic principles of sustainable development are taken into consideration.

6.2. INDUSTRY

The industrial sector was developed relatively well in Lithuania and before the re-establishment of independence almost half GDP was created within it. Since that sector was most closely integrated into overall economy of the former Soviet Union, including military industry, it was the sector that suffered the most serious decline during the transition period (Chapter 6.1). Relative changes in production volumes in the industrial sector by GDP created in the industrial sector at comparative (1995) prices are presented in Figure 6.5. The Figure shows that the country experienced the sharpest decline at the beginning of the transition period and reached the lowest point in 1994 when production in the industrial sector decreased by nearly three times as compared with those in 1991.



6.5 Changes in GDP created in the industrial sector (1991 = 100%)

In 1995 the industrial sector started gradually to recover. However, in 1999 when Lithuania faced serious negative consequences of the economic crisis in Russia to the greatest degree, the industrial sector, like the entire economy of the country, suffered a repeated decline. However, in 2000 volumes of mining, quarrying and manufacturing industry compared to 1999 increased by nearly 11%, and according to preliminary data, the industrial increase of nearly 20% was registered in 2001.

Restructuring of economy that took place in 1990 -2000 was the most important factor to Lithuania's economy, and industry in particular, determining the success of creation of market economy. It embraced such important spheres of the reform as the creation of the private property and its legalisation, the reform of the management structure assuring a fast transition from a centrally-planned model of management to liberal market economy, the formation of a new structural model of economy with small and medium-sized businesses playing a significant role, restructuring of economic subjects with respect to industrial production, etc. Nearly all the most significant legal preconditions for the development of industry were created - almost all enterprises were privatised, the legal basis regulating the activity of enterprises was created. Competition is actually going on.

Changes in the structure of manufacturing industry, with the industrial sector recovery (1995-2000), are presented in Table 6.3.

Data presented in Table 6.3 show that with industry picking up, contribution of manufacture of electrical machinery and electronic equipment, furniture, paper and cardboard as well as publishing manufacture increased mostly, whereas the contribution of manufacture of refined petroleum products, machinery and equipment as well as textiles decreased most significantly. However, in 2001, due to constant supply of raw materials, manufacture of petroleum products, as compared with 2000, increased by over 40 per cent.

Lithuanian industrial enterprises started more actively penetrating into foreign markets and orient their production towards export. Export is an important indicator of international competitive ability. In this aspect the most competitive are the following branches

Table 6.3 Changes in the structure of manufacturing industry
(Share of GDP in per cent, out of the total GDP created in manufacturing industry)

Branch of industry	1995	1996	1997	1998	1999	2000
GDP in manufacturing industry, in per cent	100	100	100	100	100	100
Manufacture of food products, beverages and tobacco products	22.4	29.8	29.8	27.0	29.8	26.3
Manufacture of textiles and wearing apparel	19.8	14.8	15.7	13.5	15.3	15.2
Manufacture of wood and wood products (except furniture)	4.0	3.4	4.3	4.6	5.6	5.9
Manufacture of paper and paperboard, publishing, printing and reproduction of recorded media	4.7	5.3	5.8	8.8	7.6	7.2
Manufacture of refined petroleum products	19.0	10.5	8.7	7.7	4.5	5.0
Manufacture of chemicals and chemical products	5.2	9.0	6.3	6.6	5.3	4.6
Manufacture of non-metallic mineral products	4.3	4.0	4.1	4.8	4.6	3.8
Manufacture of metal products, except machinery and equipment	2.6	2.4	2.3	2.5	2.5	3.9
Manufacture of machinery and equipment	3.7	4.9	4.3	3.5	3.5	2.6
Manufacture of electrical machinery and electronic equipment	5.0	4.8	6.1	7.1	5.7	8.2
Manufacture of transport equipment	2.2	2.4	2.3	3.8	3.2	3.0
Manufacture of furniture; manufacture of n.e.c.(not elsewhere classified)	2.2	3.3	4.2	4.1	4.7	4.6

of industry: textile industry exporting 81 per cent of the total production manufactured, manufacture of wearing apparel exporting 93 per cent of its production, manufacture of wood and wood products (except furniture) exporting 70 per cent of the manufactured production, manufacture of refined petroleum products exporting 66 per cent of its products, manufacture of chemical products exporting 81 per cent, manufacture of machinery and equipment exporting 62 per cent, manufacture of electrical machinery and equipment exporting 74 per cent, manufacture of electronic equipment - 76 per cent and manufacture of other transport equipment - 91 per cent. The total export of industrial production manufactured in Lithuania in 2000 accounted for 58 per cent, and in 1995 exported production accounted for as little as 42.5 per cent.

Investments, especially direct foreign investments, have a positive influence on changes in the trends of industrial development. As of 1 July 2001 direct foreign investments in Lithuanian economy constituted 10122.7 m LTL. The largest part of that amount - 2834 m LTL or 28 per cent of total investments - were invested in manufacturing industry. Among the branches of the manufacturing industry the largest investments were channelled into manufacture of food products and beverages and tobacco products (40.1 per cent of total investments in the manufacturing industry), light industry - 15.2 per cent, respectively, and in manufacture of refined petroleum products and chemical products - 5 per cent.

According to the level of technologies used, the situation in Lithuanian industry is not satisfactory enough. Production based on high technologies accounts for about 13% of total industrial production, whereas this indicator in Western European countries amounts to 20-25%. The part of industry using low technologies in Lithuania accounts for as much as 73%. The growth potential is enormous in this sphere.

Lithuanian manufacturers constantly feel great competitive pressure from the EU market. Only competitive production can resist this pressure. Therefore in the Governmental policy of recent years a particular attention has been paid to the creation of specific competitive advantages. That was ensured by the following:

- concentration of investments in a non-tangible sphere, research capabilities and means protecting the author's rights;
- a better application of the human capital in implementing educational and training measures, that is, encouragement different forms of investment and solidarity of the public;
- encouragement of Lithuanian business people to enter the world markets, to make a better use of the competitive advantage of the domestic market;
- improvement in financing possibilities by eliminating institutional and legal restrictions on risk capital, improving payment conditions.

Table 6.4 Direct foreign investments to manufacturing industry (as of 1 July 2001)

Branch of industry	Number of enterprises	Millions LTL	Share in percent
Manufacturing industry	406	2834	100
Manufacture of food products, beverages and tobacco products	66	1137	40.1
Manufacture of textiles and wearing apparel	90	428	15.1
Manufacture of wood and wood products (except furniture)	55	128	4.5
Manufacture of paper and paperboard, publishing, printing and reproduction of recorded media	24	107	3.8
Manufacture of refined petroleum products and chemicals and chemical products	20	142	5.0
Manufacture of non-metallic mineral products	18	195	6.9
Manufacture of metal products, except machinery and equipment	29	58	2.0
Manufacture machinery and equipment	13	43	1.5
Manufacture of electrical machinery and electronic equipment	23	252	8.9
Manufacture of transport equipment	12	204	7.2
Manufacture of furniture, manufacture of n.e.c.(not elsewhere classified)	27	39	2.0

The implementation of the Industry Development Medium-Term Policy and the strategy for its implementation approved by the Government in 2000 creates real possibilities for improvement of competitiveness of enterprises and their production. The state assistance bears positive results by encouraging investments, presenting production of enterprises and disseminating information abroad, creating conditions for the development of applied research, improvement of quality and its propagation, training of managers, the implementation of principles of effective management, improvement of market information systems and services, etc. Workshops and conferences on the issues of quality management, as the basis of competitive business, are held and competitions for the National Quality Prize are organised. The implementation of international "Eureka" projects largely contributes to increasing competitive ability of industry. These are research and technological projects encouraging innovations in industry. It is planned to further form the environment favourable to investments, to create an infrastructure using state (municipal) funds when investments are made in "an open field".

Seeking to create conditions for making use of the Structural Funds of the European Union intended for the development of business and at the same time for increasing competitive ability of industry and business, it is planned to strengthen institutional-administrative abilities necessary for the management of such assistance, development of partnership with all the institutions and help to make preparations for using such assistance.

Assistance to institutions and enterprises making the conformity assessment and ensuring the implementation of the new attitude directives will be provided through PHARE project "Strengthening Administrative and Technical Capabilities Encouraging Free Movement of Goods". In this way compliance with the European Union standards and norms will be achieved and integration into the EU market will speed up, where the requirements set to the quality of production and services are very high.

The infrastructure of supervision and conformity assessment of non-food products is being strengthened. On 21 November 2001 the National Accreditation Bureau became a member of the European Association for Accreditation. This status means that the performance results of laboratories and product certification institutions accredited by the National Accreditation Bureau (test protocols, calibrator certificates and conformity certificates) will be recognised in the EU and EFTA countries. That should create more favourable conditions for Lithuanian manufacturers to export their products to these countries. It will also have an essential impact on the export-import balance.

Sustainable development in the industrial sector is related to changing industrial processes and products aiming at reducing their negative environmental impact during the life cycle and improving economic and social conditions of enterprises. It is very important that industrial enterprises should consume raw materials and water and energy resources more effectively.

This enables costs relating to production and environmental protection as well as prime costs of production to be reduced and competitive abilities of enterprises to be increased. At present energy consumption of many Lithuanian enterprises per production unit is quite high, therefore there is a huge potential for increasing competitive ability.

So far Lithuanian industrial enterprises have paid too little attention to the issues of sustainable development and this may have an impact on the country's industry when competing with the enterprises in other countries. It is obvious that only the enterprises with the activities complying with the international requirements will manage to successfully integrate into the European and the world markets. Obstacles to the implementation of measures of sustainable industrial development can be found both within (lack of information, resistance to any changes, etc.) and outside the enterprises (low prices of raw materials, problems relating to the implementation of laws on environmental protection and others). In implementing advanced manufacturing methods financial problems often are of far less significance compared with the problems relating to unwillingness to change and the lack of managerial and technical knowledge. Without solving these problems, subsidies, soft loans and other kind of assistance will not change anything in essence.

Despite different obstacles, the number of industrial enterprises implementing preventive environmental protection measures are constantly on the increase (Figure 6.6). Out of 100 the most advanced Lithuanian enterprises - business leaders, as many as 40 enterprises have participated in different projects and programmes related to sustainable industrial development. Among 100 business leaders there are 13 textile enterprises, including 12 enterprises that have taken part in the aforementioned programmes.

The Environmental Engineering Institute of Kaunas Technological University has initiated the first projects for the implementation of cleaner production in Lithuania. It is also the chief institution developing this activity in the country. Measures of cleaner production were mainly applied to solve problems of energy efficiency - 93 projects and 70 projects to reduce water costs. Projects for reducing water pollution, waste and emissions into the air were distributed almost equally - 34, 36 and 37, respectively.

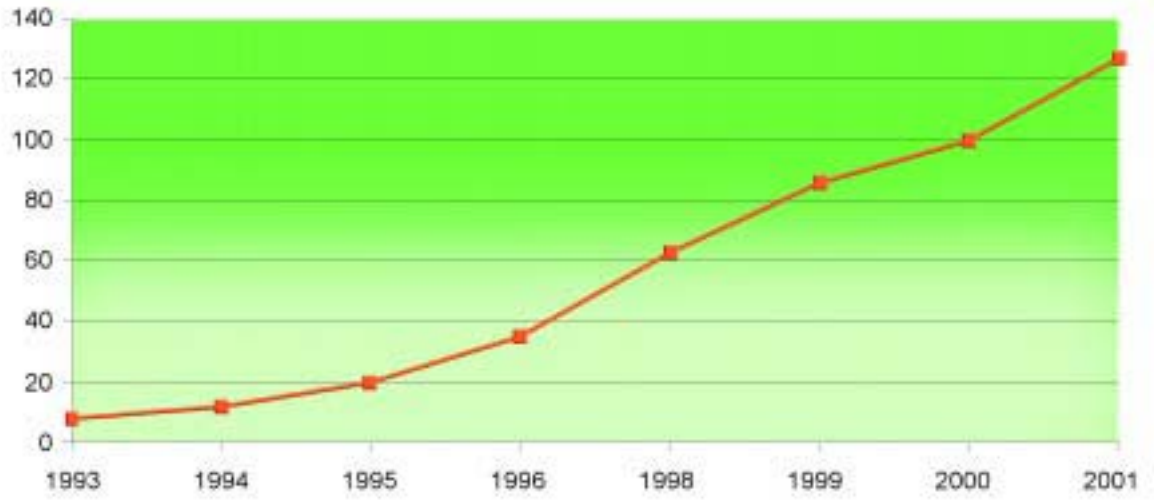
The implementation of projects for cleaner production does not always require large investments. The payback period of such projects is usually short, and investments are often possible to make from the current asset of the enterprise. However, financing of larger investments is often problematic, and flexibility of local financial institutions with respect to the types of projects is often limited.

Measures were taken to resolve this problem in Lithuania. In order to finance investment projects for cleaner production in Lithuania the Nordic Environment Financing Corporation (NEFCO) has established a special fund to finance investments in cleaner production. As of December 2001 financing was allocated to 29 projects. Three groups of projects can be distinguished: when the payback period is shorter than one year, when it amounts to 1-2 years and to 2-3 years (Figure 6.7).

Till 2002 over 150 Lithuanian industrial enterprises participated in the implementation of different projects and programmes on cleaner production, pollution prevention, reduction of waste and environmental protection management systems. Measures of cleaner production were mostly applied to reduce water consumption and wastewater - the total of 104 projects. Projects for water sources sustainability account for over 30% of the projects implemented in textile, food, metal processing and paper and paperboard manufacturing enterprises. These projects enabled industrial enterprises to save about 0.5 m m^3 of water per year.

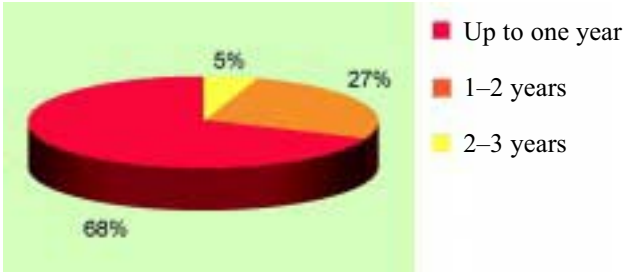
For example, JSC "Linų audiniai", after introducing a repeated use of water in a dry spinning section and applying mechanical water treatment, saves 19500 m^3 of water (17.4% of the total water amount consumed for technological processes). JSC "Silva", having introduced a repeated use of cooling water, a secondary use of rinsing water and a secondary use of dye solution when dying in the same colour, saves 35000 m^3 of water per year (15% of the total amount of water consumed). JSC "Kauno audiniai", after water flows in the dyeing section had been separated, the amount of water consumed and the amount of wastewater reduced by 90000 m^3 (40% of the total water consumed). JSC "Klaipėdos kartonas", after implementing the system of repeated water use, consumes about 39 m^3 of water per one ton of production (prior to that the enterprise consumed 72 m^3/ 1 t.). After implementing all the measures established during the audit, the enterprise plans to reduce discharges of wastewater as much as by 75 per cent.

Seeking to create a technical potential in the system of environmental protection management, the Environ-



6.6 Increase in the number of Lithuanian industrial enterprises applying preventive environmental protection measures

mental Engineering Institute in co-operation with the Norwegian Consulting Company Det Norske Veritas and the Ministry of Environment implemented the project "Creation of Technical Potential of Environmental Protection Audit in Lithuania" financed by the Government of Norway. In the course of the pro-ject, 19 environmental protection auditors were trained in accordance with the EARA requirements. At the end of 2001 there were 18 enterprises in Lithuania having introduced certified systems of environmental protection management in compliance with ISO 14001 standard.



6.7 Project groups of cleaner production financed by NEFCO

The process of implementing quality management systems in Lithuania started earlier and at the end of 2001 there were 176 enterprises having introduced certified management systems in compliance with ISO 9000 series standard. At present there is a sufficient number of organisations in the country providing consultations on the quality management systems to industrial enterprises. However, a number of the organisations providing consultations in the sphere of environmental protection management systems is limited.

With Lithuania's accession to the European Union, the need for introducing environmental protection management systems in accordance with the environmental protection management and audit system EMAS of the European Community will increase. The national project of the programme for the implementation of EMAS that has been drawn up is a significant step forward in creating the legal basis and other conditions for effective functioning of the system.

Interest in safer products in relation to environment and measures encouraging their production and use also began to increase in Lithuania. In the context of Lithuania's accession to the European Union legal acts regulating environmental labelling, waste (packaging, in particular) management and the introduction of taxes on manufactured products have been prepared.

In 1996 by the Order of the Ministry of Environment "Concerning Environmental Labelling of Manufactured Products" labelling systems were started to create in Lithuania. The adopted procedure for environmental labelling of manufactured products established the state procedure for environmental labelling and the mark of the manufactured product that is not dangerous to the environment - "A water lily under a roof" has been created. By 2002 the Ministry of Environment established criteria for awarding of label to the manufactured product that is not dangerous to the

environment to 16 groups of products. These environmental criteria are in essence based on the criteria for awarding the environmental mark of the European Union. In 2001 seeking to ensure the efficiency of the environmental labelling system, the improved "Procedure for awarding of the mark to the product that is not dangerous to the environment" was adopted.

So far none of the Lithuanian industrial enterprises has labelled or filled an application for establishing the criteria for awarding of the mark to the product that is not dangerous to the environment for its production. Unpopularity of environmental labelling may be related to insufficient popularisation of the environmental labelling, a low level of public awareness, strict environmental criteria and duties to be paid for awarding and making use of the mark.

In the future Lithuanian industrial enterprises will have to pay ever-growing attention to the implementation of the principles of sustainable development. At the end of last year the project of the Sustainable Industrial Development Programme was devised. It defined the role of industrial enterprises, state institutions and other interested parties and planned specific measures seeking for sustainable industrial development. The following main trends in the activity of the sustainable industrial development programme were planned:

1. Creation of conditions encouraging the implementation of sustainable industrial development (legal, economic and information measures and strengthening of co-operation between different interested parties);

2. Development of technical potential and assistance to industrial enterprises in implementing measures of sustainable industrial development (preparation of training programmes and methodological material, demonstration projects and ensuring their sustainability, financing the introduction of sustainable development technologies, technical assistance to enterprises);

3. Encouragement of advanced scientific research and innovations;

4. Assurance of sustainable development of regions and effective use of their potential;

5. Preparation and implementation of the monitoring system.

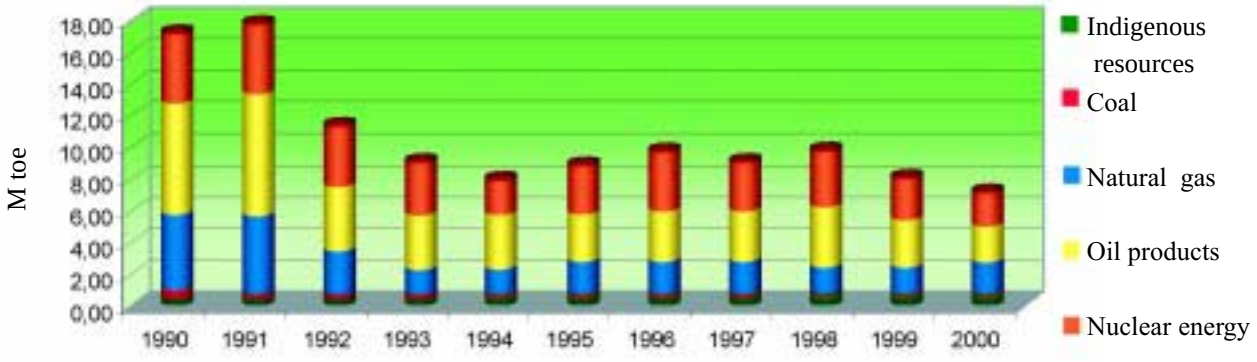
These principles are also included in the Strategy of Lithuanian industrial development aimed at achieving the goal that as many as possible enterprises functioning in Lithuania should be able to compete at international level by 2015, and to make the structure of industry and relating business as well as the share of the national product close to the European Union indicators.

The Strategy for Lithuanian Industrial Development is being formulated taking into account new challenges determined by the trends of common market: business globalisation, formation of knowledge and information society and a rapid change in technologies.

6.3. ENERGY SECTOR

The existing Lithuanian energy sector was largely created up to 1990 and was addressed towards the fast pace growth of energy demand not only within the country, but also in the North-western region of the former Soviet Union as well as towards an increasing energy export. After Lithuania has regained its independence and the essential change in political and economic conditions has taken place, the efficiency and the structure of the existing energy sector no longer meet the present requirements and its modernisation requires a lot of time and great investments.

As a result of the recession of the economy, during the transition period the consumption of energy decreased more than twice. Prior to the re-establishment of independence, primary energy consumption per capita in Lithuania amounted to 4.6 tons of oil equivalent (in toe). This indicator was 1.3 times higher than the average of energy consumption in the European Union countries at that time. Meanwhile, in 2000, primary energy consumption per capita in Lithuania amounted to 2.0 tons or nearly twice less than the present average in the European Union countries.



6.8. Changes in the consumption of primary energy resources

Changes in the consumption of primary energy resources (in mill. tons of oil equivalent) over the last decade are presented in Fig. 6.8. Nuclear fuel is a very important energy source to Lithuania - its share in the country's energy balance fluctuated from 24.7% in 1994 to 36.9% in 1996. In 2000 nuclear fuel accounted for 30.3% of the primary energy consumption.

Oil products in Lithuanian energy sector play an important role as well, though their share in the general balance of energy resources decreased to 30.8% in 2000. The share of natural gas as one of a long-term perspective fuel types fluctuated approximately about 20% during the transition period. It decreased greatly from 26.8% in 1990 to 16.1% in 1993, however, in 2000 it increased to 28.5% again.

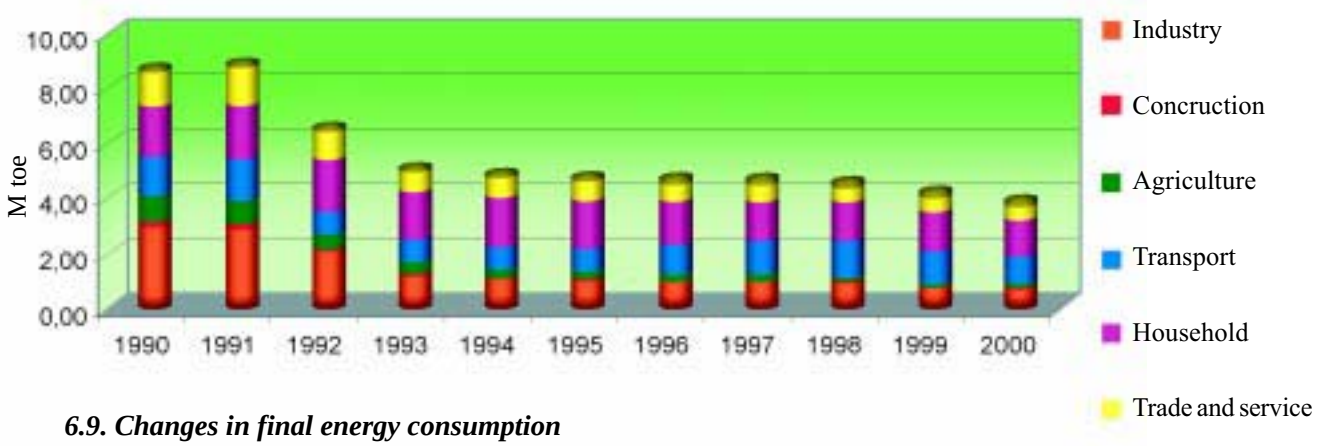
During the last decade the consumption of coal decreased by as many as 10 times. In 1990, 782 thou. tons of coal (including 362 thou. tons consumed in household economy) was consumed in the different branches of the country's economy, whereas in 2000 only 79 thou. tons were consumed. Nearly 70% of this fuel was consumed in the sector of trade and service and only a very small part was consumed in the household. Coal played a great role in the household till 1990 - its share in the energy balance of this sector accounted for approximately 20%. Meanwhile in 2000 the consumption of coal made up just 1%.

Though Lithuania has relatively meagre indigenous energy resources, their role is important to the country's energy sector and economy. Their share has grown in the total balance of primary energy resources over the recent years and currently accounts for about 13% (including extraction of local oil). Wood and other local renewable energy recourses make up more than a half of this amount.

Over the recent decade total consumption of final energy has changed substantially (Figure 6.9). Final energy means a part of primary energy (coal, natural gas, oil, etc.) and secondary energy (electricity, oil products, district heat, etc.) consumed for the production of certain products or seeking to ensure the de-

sired level of services provided. It is directly consumed by final consumers (industrial and agricultural enterprises, transport and enterprises of the service sector, individual consumers, etc.). The data presented in Figure 6.9 show that total consumption of final energy decreased by more than two times - from 8.7 m tons in 1990 to 3.8 m tons in 2000. During this decade energy consumption was falling in all economy branches, however, these changes were different. Energy consumption in agriculture decreased most substantially (by about 10 times), in construction and industry - about fourfold. Energy consumption in trade and service sector remained nearly unchanged, whereas in the household and transport sectors it decreased slightly - by about 25-30%. Therefore, the share of these sectors within the balance of final energy consumption greatly increased - from 21 and 17% in 1990 to 36 and 28% in 2000.

When analyzing the changes in the consumption of final energy by energy forms (electricity, heat, fuel), it is obvious that over the recent decade the consumption of district heat has decreased the most - by more than three times, whereas consumption of electricity and fuel fell by approximately two times.



6.9. Changes in final energy consumption

After the re-establishment of the independence, Lithuania inherited technologically backward and energy intensive economy when final energy consumption for production per GDP unit is 1.5 times higher than on overage in the European Union countries (GDP value has been established using estimates of Purchasing Power Parity). This means that environmental pollution for the production per GDP unit is also higher.

One of the most important problems of energy sector is reliability and security of energy supply. Nearly 90% of primary energy is imported from the only supplier - Russian natural gas and oil fields as well as nuclear fuel plants. Lithuanian electricity and gas networks do not have direct interconnections with the energy systems of Central and Western Europe. Due to similar transformation economy recession of our country and neighbouring countries, there are no possibilities to rationally realise the excessive potential of electricity generation.

Over the last decade poor investments have been allocated to the modernisation of the infrastructure of energy sector - a great number of electricity networks, substations and pipes are physically and morally obsolete. This can also be a partial explanation of a relatively big electricity and heat losses in the networks. A wider use of effective and relatively clean fuel - natural gas - is limited not only by the absence of the gas supply alternative and the underground storage, but also by the specific features of the Lithuanian gas supply system. Lithuania has inherited a rather well-developed network of the main gas pipes from the Soviet times. However, distribution networks are underdeveloped, and a relatively large part of the country's towns and settlements is still not connected to the natural gas supply system.

Seeking to have more sustainable development of the Lithuanian energy sector, one of the most important measures is to efficiently use and save energy resources. Efficient use of energy as well as the encouragement of producers and consumers to use efficiently indigenous, renewable and waste energy resources are some of the main goals of energy policy specified in the Law on Energy, National Energy Strategy and the National Energy Efficiency Programme.

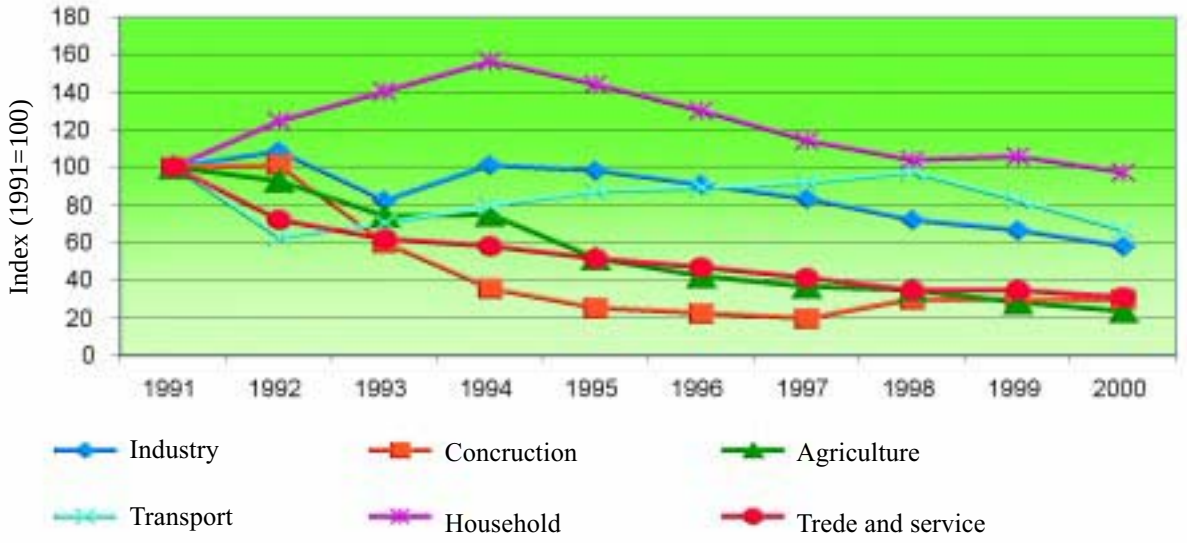
Though, due to the aforementioned reasons, the efficiency of energy consumption in Lithuania is not high, during the recent years a significant progress in increasing the efficiency of energy consumption was registered - in 1990-2000 the intensity of final energy decreased by 35%, and this is a major achievement.

Real changes in energy intensity in the different branches of economy are presented in Figure 6.10. They characterise the change in the ratio of final energy consumed in every branch of economy and the gross value added produced in that branch. Classical indicator - the ratio of energy consumption in a household and the total country's GDP - is used for the assessment of energy intensity in this sector only. Despite the some uncertainty of the assessment of energy intensity determined by the change in the principles of GDP evaluation related to the implementation of the National Accounting System, it is possible to assert that currently the energy is consumed much more efficiently. The data presented in Figure 6.10 show that the most significant changes in energy intensity took place in agriculture - in 2000 the amount of energy consumed per unit of gross value added was 4.2 times smaller than in 1991. In the construction, trade and service sectors, energy intensity dropped by 3.2 times, in industry - by 1.7 times and in transport sector - by 1.5 times. In a household, energy amount per GDP unit in 2000 was only 2.5 per cent smaller than in 1991. However, during the recent years the trend of decreasing energy intensity was registered in this sector as well.

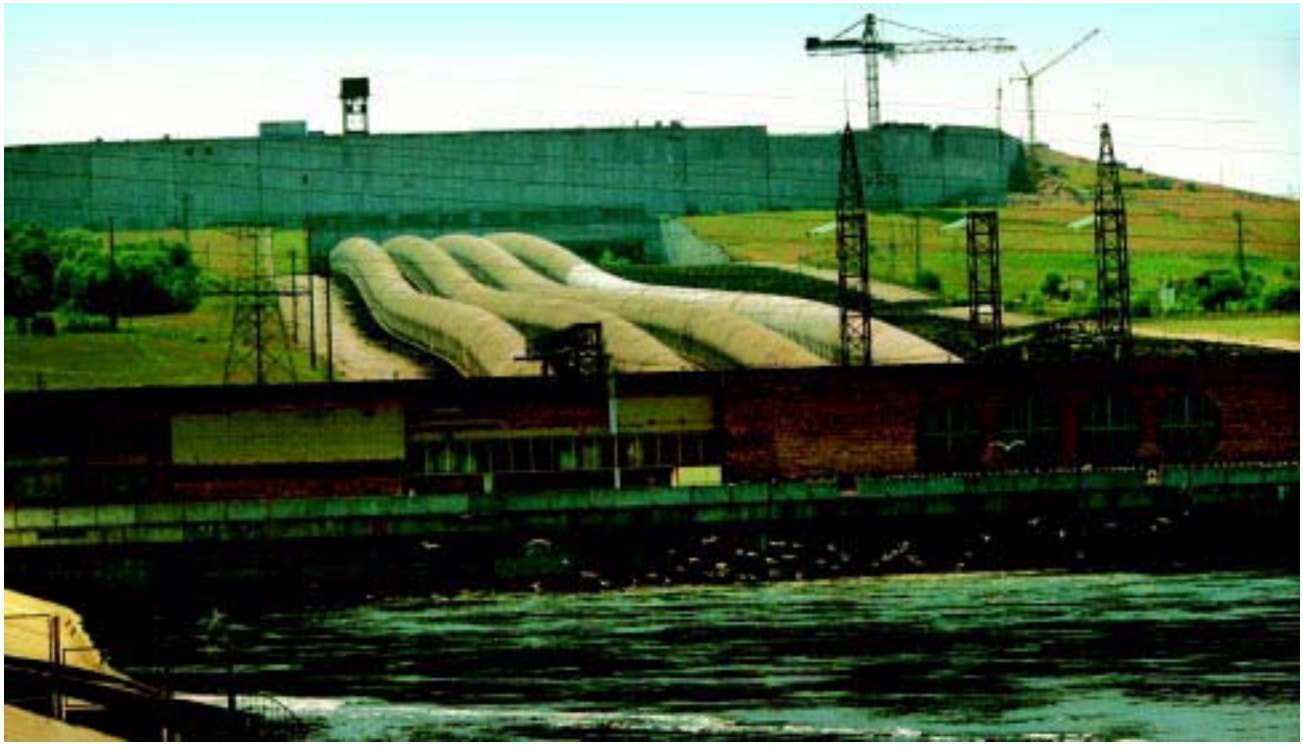
Over the last decade much attention has been devoted to wider use of indigenous and renewable energy resources in Lithuania. In 2000 their share within the balance of the country's primary energy accounted for 9.1%. Wood, waste of wood processing (bark, branches, sawdust, etc.), biomass of rapidly growing trees and bushes, waste of agricultural production (straws, boon, etc.), hydroenergy and biogas are currently used for meeting energy demands. Data on the potential use of these and other indigenous, renewable and waste energy resources and their contribution to the balance of the country's primary energy are presented in Table 6.5.

Energy of waste incineration is some potential for supplementing energy resources. Municipal and industrial waste can be used as local fuel in the country. The use of biomass for district heating is increasing most rapidly out of all renewable energy resources. With the assistance of PHARE programme, the governments of Denmark, Sweden and other countries, local industry is developed producing the equipment of biomass incineration in the country and providing preconditions in the future to satisfy the requirements of the European Union concerning the development of the use of renewable energy resources. However, the delayed gain of experience in the modern technologies using geothermal, wind and solar energy can limit to in time and efficiently use these local renewable energy resources in the future.

The following two factors will have the greatest impact on the further development of the energy sec-



6.10. Change in the intensity of energy in different economy branches



Kruonis Hidro-Accumulation plant

tor: the development pace of the different branches of the country's economy and the terms of the decommissioning of Ignalina Nuclear Power Plant. The pace of the Lithuanian GDP growth, its structural changes, development of social indicators, volumes of the implementation of new technologies and the pace of implementing different measures of energy saving are in principle the most important factors to the greatest extent affecting the growth pace of energy demand in economy branches (in industry, construction, agriculture, transport, household, trade and service sector). A new version of energy demand model MAED has been used to forecast energy demand. It provides more possibilities to analyse energy demand scenarios on the basis of mutual relationships between energy consumption and social, economic and technological fac-

Table 6.5 Energy generation using indigenous and renewable energy resources

Item No.	Types of resources	Possible energy generation, Thou.toe/year	Generated in 2000, Thou. toe	Share of energy generated in 2000, %
1.	Wood	850	615	8.5
2.	Peat	120	11	0.15
3.	Straws*	130	2.5	0.03
4.	Municipal waste	70	–	–
5.	Bio-gas	30	2.4	0,03
6.	Geothermal energy	70	–	–
7.	Hydroenergy	130	29.2	0.40
8.	Solar energy	130	–	–
9.	Wind energy	20	–	–
	Total:	1550	660	9.1

* – using 10% of straws received in a year for the fuel

tors determining them and evaluating the scheduled trends of their changes.

Seeking to encompass a wide range of possible scenarios of economic development, energy consumption has been forecasted in accordance with three economic growth scenarios:

1) fast economic growth scenario - GDP growth rate is 7% per year till 2010, 3% after 2010 or on average 5.7% during 2000-2015;

2) basic scenario - GDP increases 4.7% per year till 2010, 3% after 2010 or on average 4.1% during 2000-2015;

3) slow economic growth scenario (2% per year till 2010, 3% after 2010 or on average 2.3% during 2000-2015).

Energy consumption has been specified in this model not only by economic sectors but also by industrial processes, elements of the transport system and social demands of the population.

Future final energy demand established by modelling feasible scenarios of the country's economic development show that final energy demand will grow much slower than the country's GDP (Table 6.6) due to a more efficient energy consumption. The highest final energy demand would be in the case of the fast economic growth scenario. However, energy consumption in this case would be the most efficient. In this case energy demand in 2015 would be by 70% higher than in 2000, but it would account for just around 75% from the level of 1990.

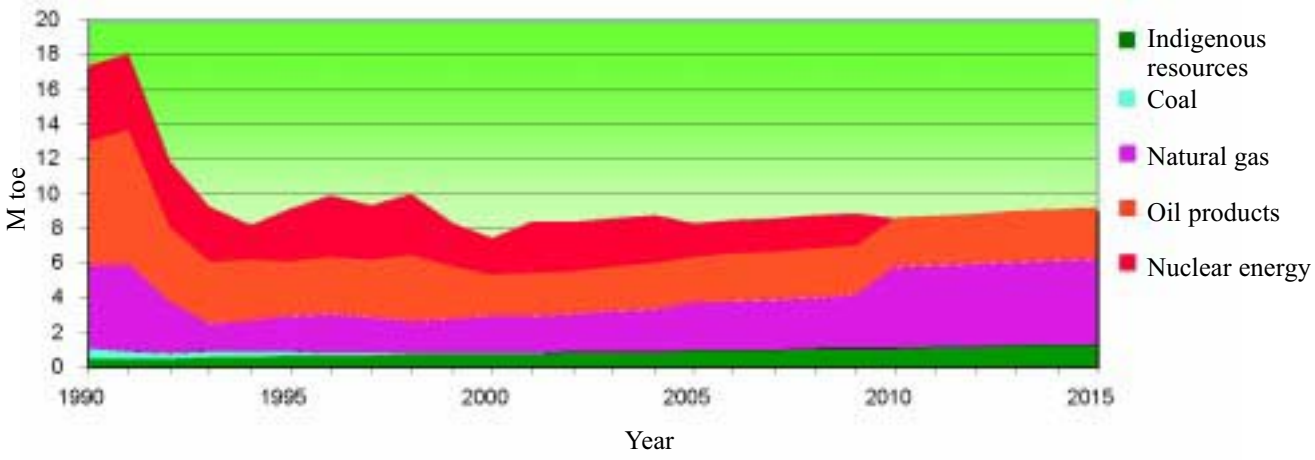
Consumption of electricity has decreased over the recent decade less than consumption of other energy forms. However, Lithuania is lagging behind the developed European Union and many Central and Eastern European countries in terms of electricity consumption per capita. In 1999 electricity consumption per capita in Lithuania was 2.5 times less than on average in the countries of the European Union, about 6 times less than in Sweden and Finland. Therefore, in the forecasts it is assumed that modernisation of the Lithuanian economy will determine a rather rapid growth of the electricity consumption. It is anticipated that total net generation of the Lithuanian power plants (total generation minus Lithuanian own needs of power plants) would reach the level of 1990 in the case of the basic scenario till 2015. However, the average of electricity consumption per capita would remai1 notably lower than in the countries of Western Europe.

Envisaged changes in the primary energy demand and its structure greatly depend on the terms of decommissioning of Ignalina Nuclear Power Plant. Preliminary forecast of primary energy demand presented in Figure 6.11 corresponds to the scenario when the first unit of Ignalina Nuclear Power Plant is shut down at the end of 2004 and the second - at the end of 2009. In this case the total primary energy demand with the basic scenario in 2000-2015 would increase only by 1.3 times. However, the consumption of fossil fuels would increase by 1.8 times over this period - from 5 million toe in 2000 to 8.9 million toe in 2015. The share of natural gas would increase from 32% in 2005 to 54% in 2010-2015 and could compensate for this increase. It is foreseen in the forecasts that the share of indigenous (excluding local oil) and renewable resources will increase within the balance of primary energy up to 13 percent at the end of the period. The share of oil products (mostly motor fuel) will account for 32 percent. Moreover, oil products will remain the main reserve fuel in thermal power plants and large-scale district heating systems.

Optimisation calculations of power system development have shown that following the decommissioning of both units of Ignalina Nuclear Power Plant, the cost of electricity generation will increase (on average about 3 cents/kWh). In addition, CO_2 emission related to electricity generation will greatly increase. Provided that electricity demands corresponded to the forecasts of the basic scenario, CO_2 emissions related to electricity generation would not exceed the obligations of the Kyoto Protocol. However, if economic

Table 6.6 Average forecasted growth rates for the period of 2000-2015, %

Indicator	Fast economic growth scenario	Basic scenario	Slow economic growth scenario
Gross Domestic Product	5.7	4.1	2.3
Final energy	3.8	2.8	1.7
Electricity	4.5	3.3	1.9



6.11 Forecast of primary energy demand (basic scenario)

development corresponded to the fast economic growth scenario, Lithuania would have to implement additional measures to reduce CO_2 emissions in the energy sector.

Another urgent environmental problem will unavoidably arise following the decommissioning of Ignalina Nuclear Power Plant and having increased the consumption of fossil fuel in thermal power plants. That is a possible increase in sulphur emissions if the increase of primary energy resources due to the conjuncture of prices or other reasons were to be compensated not only by increasing the use of natural gas but also by burning liquid fuel. Following the directives of the European Union, the fuel oil with sulphur amounting less than 1% will have be used starting with 1 January 2004 or the concentrations of sulphur dioxide in exhaust gas amounting not more than the established limit values will have to be achieved. That will require great additional investments.

Having decommissioned both units of Ignalina Nuclear Power Plant, a modernised Lithuanian Combined Heat and Power Plant with units that can be kept in operation no less than 20 years will become the main source of electricity generation. The main advantage of this power plant is the possibility to use three types of fuel (natural gas, heavy fuel oil and orimulsion) and ensure better reliability of energy supply. However, in order to satisfy the environmental requirements it is necessary to install facilities to decrease emissions of SO_2 and NO_x - technology of flue gas desulphurisation and new burners and fans blowing hot air. Having installed the equipment cleaning the burning products in the Lithuanian Combined Heat and Power Plant and Vilnius and Kaunas combined heat and power plants, oil products will be able to compete with natural gas and protect consumers from monopolistic increase in prices.

Additionaly to serious economic and environmental problems will arise following the decommissioning of Ignalina Nuclear Power Plant. Lithuania will also face complicated social problems related to requalification, employment, etc. of the employees of the nuclear power plant. Lithuania alone is incapable of timely solving all these complicated problems.

The main goal of the Lithuanian energy sector is to create a modern energy sector that would safely and reliably supply energy at an acceptable price to all branches of economy, provide favourable conditions for further development of the country's economy, would be integrated into Western and Eastern energy systems, would be able to compete in the open energy market and would not pose risk to the environment. Over 1990 - 2000 much was done to achieve this goal. The main energy companies JSC "Lietuvos Energija" (Lithuanian Energy) and JSC "Lietuvos Dujos" (Lithuanian Gas) were restructured. Generation, transmission and distribution activities were separated. It was sought to approximate the structure of companies to the requirements of the European Union. Principal legal acts regulating the activity of the energy sector were adopted, the necessary supervision system of the activity of companies and the necessary institutional structures were created. This will have to ensure efficient management of this sector.

6.4. TRANSPORT

During the transition period the transport sector suffered the least transformational decline. Therefore the share of GDP created in that sector increased and accounted for nearly 9% in 2000. About 81100 people are employed in the transport sector, and they account for 5.1% of the total employed population of Lithuania. Final energy consumtion decreased more than twofold in Lithuania during the period from 1991 to 2000 (Chapter 6.3), energy consumtion in the transport sector decreased by as little as one-fourth during the same period. At the same time a contribution of transport to air pollution increased: transport emission into the air constituted nearly three-fourths of overall emission in 2001.

In 1991, after the re-establishment of independence in Lithuania, dramatic changes started taking place in the transport sector. During the first five years over 120 transport enterprises were privatised and new enterprises providing transport services were set up. At that time investments into the transport infrastructure were channelled to improve it, to complete the started projects as well as to build and reconstruct the objects necessary to ensure communication with European countries.

Since 1995 the second stage of privatisation of transport enterprises has been going on. Upon the completion of the restructuring and privatisation of these enterprises, only the objects of the transport infrastructure having a strategic significance (roads, railways, the seaport, airports as well as systems assuring traffic safety) will remain state-owned.

Changes that took place in the course of the decade are presented in Table 6.7.

Data presented in Table 6.10 show that road infrastructure was developed most rapidly. Due to unprofitableness, many railway lines were closed down. Currently the density of blacktop state roads amounts to 3.26 km/1000 population or 185 km/1000 km^2.

The number of vehicles increased especially rapidly during that period - in 1991 there were 128 cars per 1000 population and in 2000 this figure stood at 297. More detailed data on changes in the number of different types of vehicles during the period from 1991 to 2000 are presented in Figure 6.12.

Data presented in Figure 6.12 show that the number of trucks and buses during these ten years changed comparatively insignificantly. A rapid growth in the number of vehicles took place mostly because of the rapid increase in the number of cars.

The number of railway means of transportation decreased nearly by one-fourth during that period. Since emissions of railway transport to carry the same quantity of passengers or cargo are considerably smaller comparing to the emissions of cars and in relation to the environmental impact, this trend should be assessed negatively.

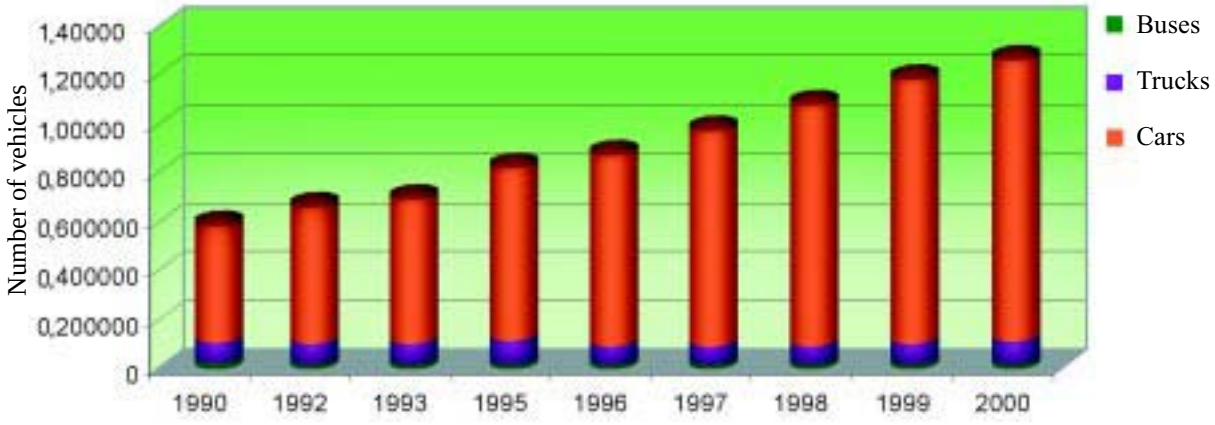
The data presented in Figure 6.13 show that as little as 2 per cent of all cars were produced less than five years ago, whereas 85% of cars are more than 10 years old. The average age of cars produced in Western Europe is over 13 years. Cars made in the East are even older: their average age amounts to 18 years. Cars produced after 1990 account for as little as 2.5%.

The present-day Lithuanian fleet of trucks can be divided into two groups:

Table 6.7 Changes in the transport infrastructure in 1990-2000

Kind of infrastructure		Length at the end of the year (km)		
		1990	1995	2000
Railways		3042	2900	2502
Including electrified		122	122	122
Roads		48734	62513	75243
Including:	state	20904	21121	21313
	local*	23273	36666	48152
	urban	4557	4726	5779
Inland waterways		628	369	380
Trolley-bus lines		242	242	267

* - differences in the network of local roads arose due to the changing of registration procedure

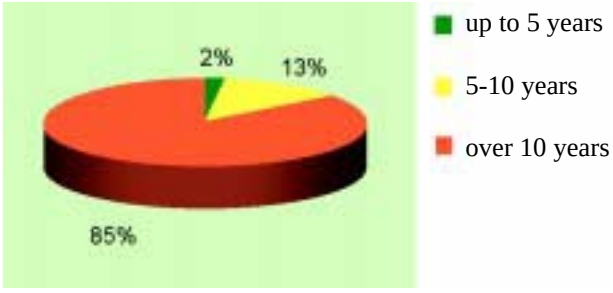


6.12 Changes in the number of vehicles

- vehicles used for international transportation are usually new, diesel. They pollute the air insignificantly and comply with EURO I or EURO II standards;
- vehicles used for local transportation are usually old, produced in the former Soviet Union, they run on petrol and heavy pollute the air.

The analysis shows that cars with diesel engines account for about 27%, buses - for 84%, light-weight (up to 3.5 tons) trucks - for 78%, average (3.5-12 tons) trucks - for 54%, large (over 12 tons) trucks - for 98%.

Energy consumption by different types of vehicles are presented in Table 6.8. The data presented show that road transport consumes the largest part of energy (currently over 90%). Data presented also show that energy consumption of road transport decreased at the beginning of the transition period by about twofold. It started to increase in 1995 with the country's economy picking up and in 1998 it nearly reached the 1991 level. Therefore due to a repeated decline in economy, energy consumption of road transport have decreased again, though not very significantly, since 1999. In the meantime energy consumption of all other kinds of vehicles is permanently on the decrease during the period under analysis. During those 10 years it decreased by about 30% in railway transport, whereas that of air transport - by more than three times. Since modernisation of the latter means of transportation requires larger contributions, the period of its depression lasted longer.



6.13. Age structure of cars

Changes in consumption of main types of fuel in the transport sector from 1992 to 2000 are presented in Figure 6.14.

The above-presented data show that overall fuel consumption in the transport sector, though the number of vehicles increased, was on the decrease till 1993. The consumption of petrol decreased most significantly at the beginning of the transition period. The decrease in the consumption of other kinds of fuel was not so obvious. In 1994 the consumption of fuel in the transport sector started to slightly increase, and from 1995, with the recovery of the country's economy, the growth rates of fuel consumption were on the rapid increase. In 1998 the overall consumption of fuel in the transport sector exceeded the level of 1992 and was one-fourth lower than the fuel consumption in 1991. At the same time, the contribution of transport into air pollution increased (Chapter 5.1). In 1999 due to a repeated decline in economy, fuel consumption decreased significantly again. In 2000, however, after the economic growth took place (Chapter 6.1), fuel consumption in the transport sector decreased further and in 2000 fuel consumption in the transport sector was by 10% lower than that in 1999. Currently about 20% of total organic fuel used in the Lithuanian economy is consumed by the transport sector.

During that period the composition of fuel being used changed rapidly. In 1994-1996 petrol consumption increased most speedily. That accounted for about 60 per cent in the total fuel balance of 1996. From 1997 the

Table 6.11 Energy consumption by kinds of transport (thou. tons by oil equivalent)

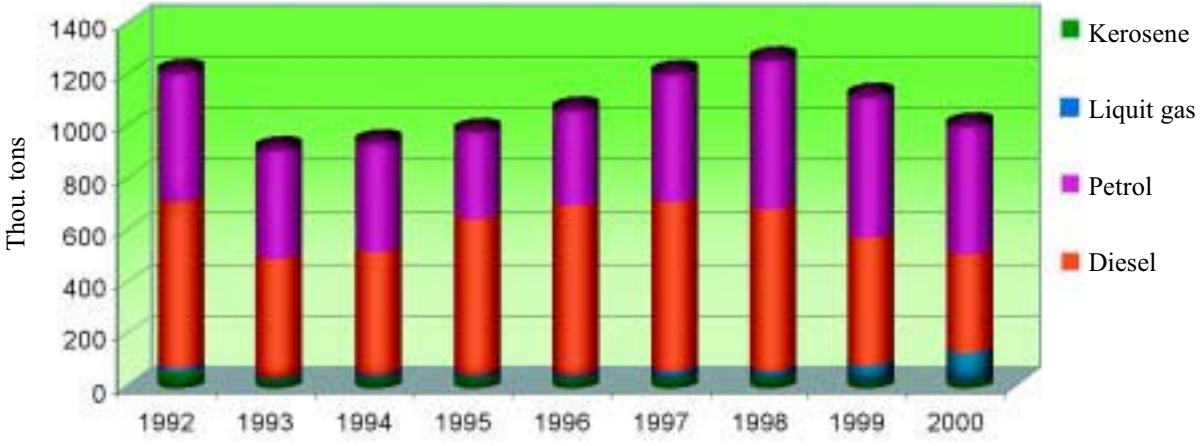
Kind of transport	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Railway	110	106	120	124	110	88	80	77	68	72
Road	1270	724	660	548	606	992	1126	1198	1071	945
Waterway*	288	216	257	215	159	5	8	5	3	3
Air	84	54	45	38	38	32	32	28	26	26

* - since 1996 excluding sea transport

amount of diesel fuel consumed began to increase rapidly and in 2000 diesel fuel constituted about half the total amount of fuel consumed. Since the largest part of the vehicle fleet consists of over 10-year old vehicles, and cars that run on petrol have no catalysts, in this situation a negative impact exerted by diesel cars is lower of that for petrol. A rapid increase in the consumption of liquid gases during the past years should be assessed quite favourably in relation to environment. The data presented in Figure 6.14 show that the consumption of liquid gases increased by more than three times during the past 3 years and currently it accounts for over 10% of the overall fuel consumption.

As it has already been mentioned, road transport consumes the largest part of energy in the transport sector. That accounts for about 90% of the total energy consumed. Transport consumes about 98% of the total amount of petrol consumed all over the country. Comparative fuel consumption of trucks with petrol engines constitutes about 85 g/t.km, whereas trucks with diesel engines - about 50 g/t.km, that is, by 40% lower. In carrying passengers with vehicles with petrol engines comparative fuel consumption is about 18 g/passenger km, whereas in carrying passengers by cars with diesel engines - about 13 g/passenger km, that is, by 27% lower. This consumption is considerably larger than that in Western European countries (in Germany, when carrying cargo by road transport comparative diesel fuel consumption amounts to 39 g/t.km only) because of a relatively old vehicle fleet of Lithuania. Moreover, comparative fuel consumption in road transport is many times larger than consumption in railway and waterway transport. Since road transport is the main pollutant of the environment, the best results in reducing emission to air can be achieved by upgrading the road transport.

Despite certain possible errors in accounting fuel consumption in the transport sector, the decreasing trend in energy intensity in the transport sector during the past two years should be assessed especially favourably (Chapter 6.3). It is expected that with a further rapid development of the transport sector, fuel consumption and at the same time pollution of the environment will either increase insignificantly or will not increase at all.



6.14 Changes in consumption of the main types of fuel in the transport sector

The Lithuanian Sea navy consumes about 200-230 thousand tons of fuel per year. Heavy fuel of vessels with sulphur bearing ranging from 1.5 to 3.5 % accounts for over 65 % of the aforementioned amount. The amount of fuel consumed in the Baltic Sea region does not ex-

ceed 50-60 thousand tons per year, and low-sulphur (S lower 0,2%) diesel fuel constitutes over a half of that amount. From the environmental point of view it is very important to know where air pollutants are emited from the vessels. According to preliminary studies carried out, established annual quantities of pollutants emited from vessels in Klaipėda Port amounts to about 1600 tons of pollutants per annually. The use of low-sulphur fuel would be the most effective way to reduce emission from vessels.

Taking into account the principles of sustainable development, organisational, institutional, legal and technical measures were taken to modernise the transport sector and reduce its environmental impact from the very beginning of the re-establishment of independence in Lithuania.

The legal basis regulating transport activity, the use of infrastructure, licensing, recognition of certificates, safe traffic as well as ensuring reduction of a negative environmental impact was created. This process especially intensified after Lithuania signed the Europe Association Agreement in 1995. During the past two years Lithuania achieved great progress in harmonising its legal acts with the EU transport acquis and in implementing them. Laws on Territorial Planning, Environmental Impact Assessment, Cartage Transport, Safe Road Traffic, Transportation of Dangerous Cargoes, Aviation, Trading Navigation and their amendments were adopted. Resolutions of the Government concerning control of transportation of dangerous cargoes on roads, orders of the Minister of Communications concerning the limitation of noise made by aircraft and the creation of monitoring systems in Lithuanian airports deserve mention within this context.

The implementation of the adopted legal acts has a direct influence on increasing the efficiency and safety of transport and reducing its negative environmental impact. After the Law on Environmental Impact Assessment has been adopted, all the projects must be approved by environmental protection institutions. Therefore decisions having the least environmental impact are chosen. Since 1998 only unleaded petrol has been sold in Lithuania. A reasonable tax policy is being carried out. It provides for applying a reduced excise tax on liquid gases. Therefore the consumption of liquid gases in the transport sector is rapidly on the increase in Lithuania.

Since the beginning of the re-establishment of independence, Lithuania has taken an active part in the activity of international organisations. Currently Lithuania is a member of 18 main international transport organisations (ECMT, IMO, ICAO, IRF, UIC, ECAC, IATA and others).

In implementing the principal tasks of sustainable transport development Lithuania follows the requirements of the Europe Agreement, international treaties and conventions, the UN Framework Convention on Climate Change and the Kyoto Protocol, the Convention on the Baltic Sea Protection HELCOM, Vienna Regional Conference "Transport and Environment" organised by the UN European Economic Commission in co-operation with the Ministers of Transport and Environment of the European countries as well as the declarations and documents adopted at the conference "European Environment" organised by Ministers of Environment in Arhus in 1998 that provided for the ways of reducing the negative impact of transport on the environment and human health and established the commitments of the countries.

Lithuania's participation in the Auto-Oil programme was started to be devised by the 1994 resolution of the European Commission. It unites transport and oil industry in a co-operative way and could be mentioned as one of the examples of co-operation. The programme is aimed at drawing up the strategy for reducing emission of road transport in order to reach the level of the requirements for clean air by improving engine technologies and the quality of fuels.

Issues of reducing a negative environmental impact of transport will further remain the most significant trends in the general policy of transport. Taking into account a favourable geographical position of Lithuania, it is planned to make use of the country's possibilities in developing a well-balanced network of transport, transit services, creating strong legal environment for transport services and reducing a negative environmental impact. Goals and tasks of the Lithuanian transport policy are laid down in the National Transport Development Programme, the Plan of Strategic Tasks of the Ministry of Communications, and the Programme for Lithuania's Preparation for Accession to the European Union. It is planned to completely harmonise the Lithuanian legal basis with the requirements of the European Union by the beginning of 2004, with the exception of the spheres with negotiated transition periods.

Basic priorities in the transport sector are as follows:

- development of a sustainable Trans-European transport network (TEN-Tr) by gradually improving the quality of roads;

- integration into the European Union market of transport services;
- institutional reforms by further restructuring and privatising transport companies;
- safe and environment-friendly transport encouraging less polluting kinds of transport and vehicles using fuel without sulphur.

In implementing the principles of sustainable development in Lithuania it is planned the following:

- to develop the network of transport infrastructure complying with technical standards and transportation needs of the European Union. By 2015 by-passes of about 120 km are planned to build around cities and settlements as well as to modernise the infrastructure of cities: to connect major transport junctions by highways in Vilnius, Kaunas and Klaipėda. Transit traffic will be directed to the newly built roads. That will reduce traffic jams and emission. It is planned to pave about 2300 km of gravel roads and achieve the density of a network of blacktop state roads constituting 225 km/1000 km^2. It is planned to build a railroad from the Lithuanian-Polish border to Kaunas and to install a multi-modal terminal near Kaunas. After this project has been implemented, a large part of cargo currently carried by trucks will be transferred to railway transport. Therefore air pollution should decrease significantly.
- to make limitation of emission of transport harmful pollutants stricter by improving the quality of fuel, encouraging the use of the environment-friedly vehicles. Currently it is very important to create a fuel quality control system in Lithuania - one of the most important constituent parts of the quality management system. This measure should be implemented by organising the implementation of the National Quality Programme and paying particular attention to the development of the activity of institutions of state regulation, standardisation, metrology and compliance assessment of the liquid gases quality;
- to encourage the development of environment-friendly transport by improving the tax system. The number of cargo vehicles with the engines complying with the EURO I, EURO II and EURO III standards is expected to increase, the fleet of medium-sized trucks will be renewed and their largest part will have diesel engines;
- to assure the implementation of measures increasing safe traffic. In approximately 2010 it is planned to start forming regional networks of bicycle ways in Vilnius, Kaunas, Kaipėda, Šiauliai and Panevėžys suburban zones, to complete the formation of these networks by the year 2015, to illuminate roads, to build grade-separated pedestrian crossings and road intersections;
- in constructing and reconstructing roads to implement modern environmental protection measures - to build water treatment facilities and equipment of surface settled sewage, noise barriers, to fence large forests, install passages in animal migration places;
- to increase the efficiency of energy consumption. The consumption of energy by different kinds of transport can be reduced by 20% applying technical measures, effective transportation or by giving priority to lighter, low-power vehicles as well as developing public transport;
- to assure accessibility to the transport infrastructure, carrying and other services of transportation to all users. Public transport of the cities is planned to improve - to renew bus and trolley-bus fleets, to increase the number of lanes in the streets for public transport, to improve the organisation of public transport traffic and the quality of services, to develop communication by bicycles in towns;
- to strengthen control of transportation of dangerous cargo;
- vto implement innovation processes in the transport sector and encourage advanced cargo transportation and distribution technologies;
- to increase the provision of information to the public about a negative impact of transport on human health and the environment;
- to increase the use of alternative fuels in internal combustion engines. Ethyl alcohol and bio-diesel fuel extracted from renewable resources are alternative fuels that are most suitable in our natural and economic conditions.

Scientific research carried out in Lithuania is aimed at reducing a negative environmental impact of transport. Prospects of using alternative fuel from renewable resources - ethyl alcohol and bio-diesel - are studied and programmes for their production are devised. According to a preliminary assessment, this local ecological fuel could meet up to 15% of the overall energy needs in the transport sector. A special commission has been set up to resolve the issues of the creation of bio-fuel industry and its use.

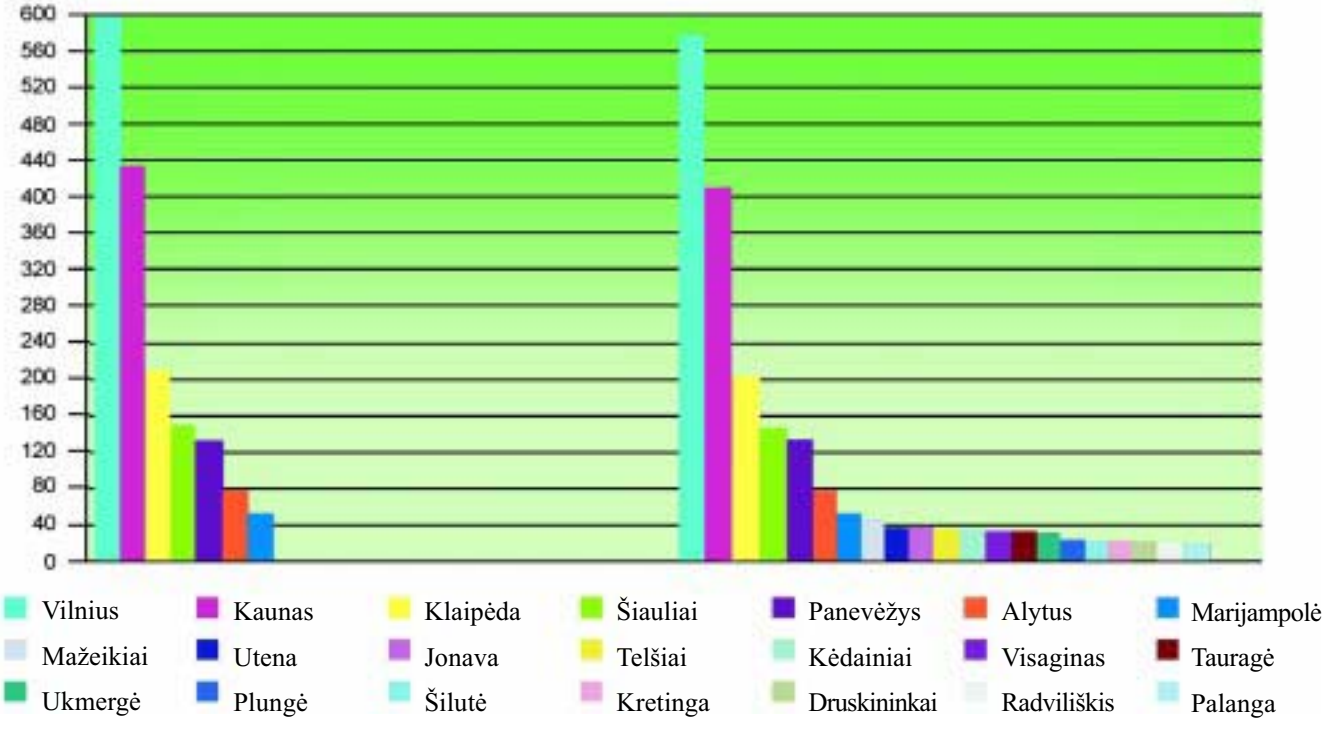
6.5. URBAN DEVELOPMENT

Urban development of Lithuania has its specific character. Due to particularity of historical development of the state and its economy, its urban network is not so dense as in some Western European countries. Agriculture through ages has always played and still plays an important role in the economy of the state.

From olden times Lithuania had historically-formed and quite an even network of human settlements as well as quite an even territorial distribution of population. After World War II a rapid increase in the number of towns and cities and urban population was regulated by territorial planning work carried out quite quickly. The urbanisation process itself was not only a consequence of natural development phenomenon. People moved to the cities not only looking for job opportunities, education and for other natural reasons. Deportations, land expropriation and collectivisation of private farms drew people to the cities, too. The change in the population number in the country might illustrate the process. In 1939 urban population comprised 22,9% and in 1970 the number of urban population comprised 49,9% of total population, that is during 30 years the number of urban population increased by more than twice. At present urban population accounts for nearly 70% of the total Lithuanian population. This shows the scale and rate of changes that the urban system of the country had to adjust.

From 1960's, 10 centres able to perform regional functions were developed according to the urban development proposals. They were not new cities but developed on the basis of already existing ones, important from various points of view (history, economy, social and cultural issues, accessibility, etc.) centres of local administrative districts (Fig. 6.16). This permitted to distribute Lithuanian urban network more evenly. Population and investments did not concentrate in one or two cities.

The differences in number of population between the capital city and the other next biggest cities are not so big. Therefore the curve of the number of population of the citizens in Lithuanian towns and cities is comparatively slow to descend (see Fig. 6.15). This is



6.15 Number of citizens in Lithuanian cities (1992 and 2001)

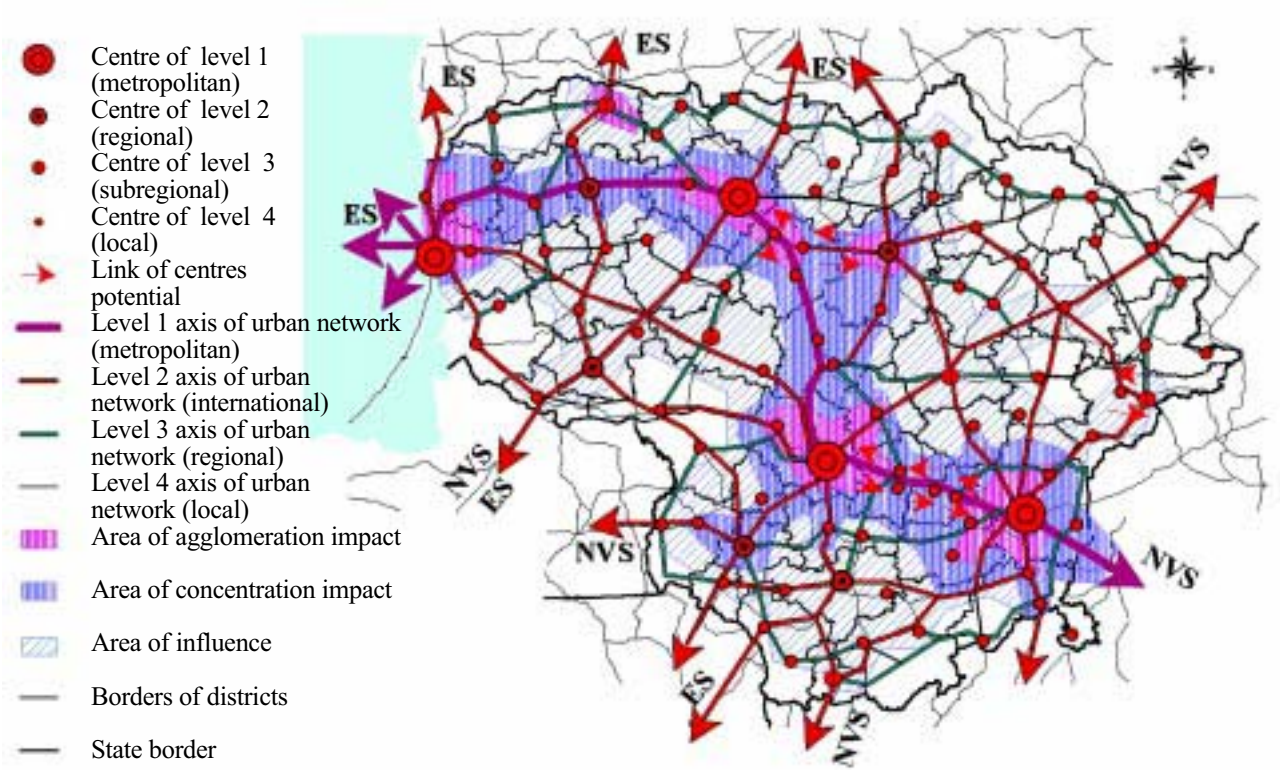
not the case in lot of countries. Thus the policy of urban decentralisation that started to be carried out earlier, despite the fact that it was not fully implemented, creates favourable conditions for further sustainable urban development.

In 1990 the country came having two-tear administrative system: State and local municipalities. At that time there were 44 local municipalities of administrative districts. Their respective urban centres performed their administrative functions. After the restoration of independence a decision was made to prepare an administrative reform of Lithuania. Its goal was to deconcentrate administrative power, bring administrative services nearer to those for whom they were meant, further develop democracy and lend more real power to the citizens in everyday life.

In 1994 the Law on Administrative Units and Their Boundaries of the Republic of Lithuania was adopted by the Seimas (the Parliament). By this Law 12 urban local municipalities were established. Thus the total number of local municipalities was increased up to 56. Accordingly the number of cities performing the functions of administrative centres of local municipalities increased from 44 to 56. In 1999 during the next stage of the administrative reform the previous number of local municipalities increased from 56 to 60.

An important part of this reform was newly introduced tier of administration, creating 10 counties. Part of responsibilities of central institutions was transferred to the regional level.

It is important to admit that 10 earlier successfully developed centres with regional service functions (Fig. 6.16) now became administrative centres of the new counties.



6.16 System of Lithuanian settlements

All the process and procedures of planning of the territories and at the same time the processes of territorial development are regulated by the Law on Territorial Planning of the Republic of Lithuania adopted in 1995 and its secondary legislation. Seeking to ensure sustainable territorial development, the established principle of public participation in decision-making process in this Law is very important. After this Law had been adopted, "Regulations on Public Consideration of Drafts of Territorial Planning Documents" were developed and approved in 1996 by the Resolution of the Government.

Another important provision of the Law on Territorial Planning is a demand for assessment of the

consequences of a proposed economic activity and urban development in relation to social, economic, environmental and other aspects. This demand is legally validated. All the comprehensive plans prepared according to the Law on Territorial Planning have parts of assessment of planning consequences.

Despite a quite even distribution of inhabited localities, the main and largest cities of Lithuania (and the number of population) are located along the Eastern–Western transportation axis. At present it is approved as a Trans-European transport IX B railway corridor. This urban axis made of Vilnius-Kaunas-Šiauliai-Klaipėda with smaller towns between them is like some kind of a state urban spine. The 1st Trans-European transport corridor (Via Baltica) crosses the country in Northern-Southern direction. Marijampolė, Kaunas and Panevėžys are located along it. The rest of the Lithuanian regions, especially the territories bordering with Belorus, Latvia and Russia, are urbanised to a significantly lower degree. Large Lithuanian cities attributed to the category of metropolitan centres have very different development potentials. Vilnius is no doubt the first, Klaipėda and especially Šiauliai still have no necessary development potential in order to play a part in urban development sustainability in the western part of Lithuania. Some problems arise concerning the excentric position of the capital.

A practical instrument for co-ordinated urban development based on sustainable development principles at national level is the Master Plan of the Territory of the Republic of Lithuania.

In the sphere of urban development, the main objectives of the Master Plan of the Territory of the Republic of Lithuania are as follows:

- to optimise the urban system of Lithuania;
- to form the network of human settlements seeking to ensure the most favourable conditions for social (and cultural), economic, ecological development of the country and high quality of living standard;
- to seek to overcome the trends of depopulation and population concentration as well as reach sustainability through strengthening weak parts of the urban network;
- to ensure favourable conditions for development, functioning and interaction of rural and urban systems;
- to create preconditions for interaction of the Lithuanian urban system with urban systems of other European countries.

The basic principles of urban network development of the country are as follows:

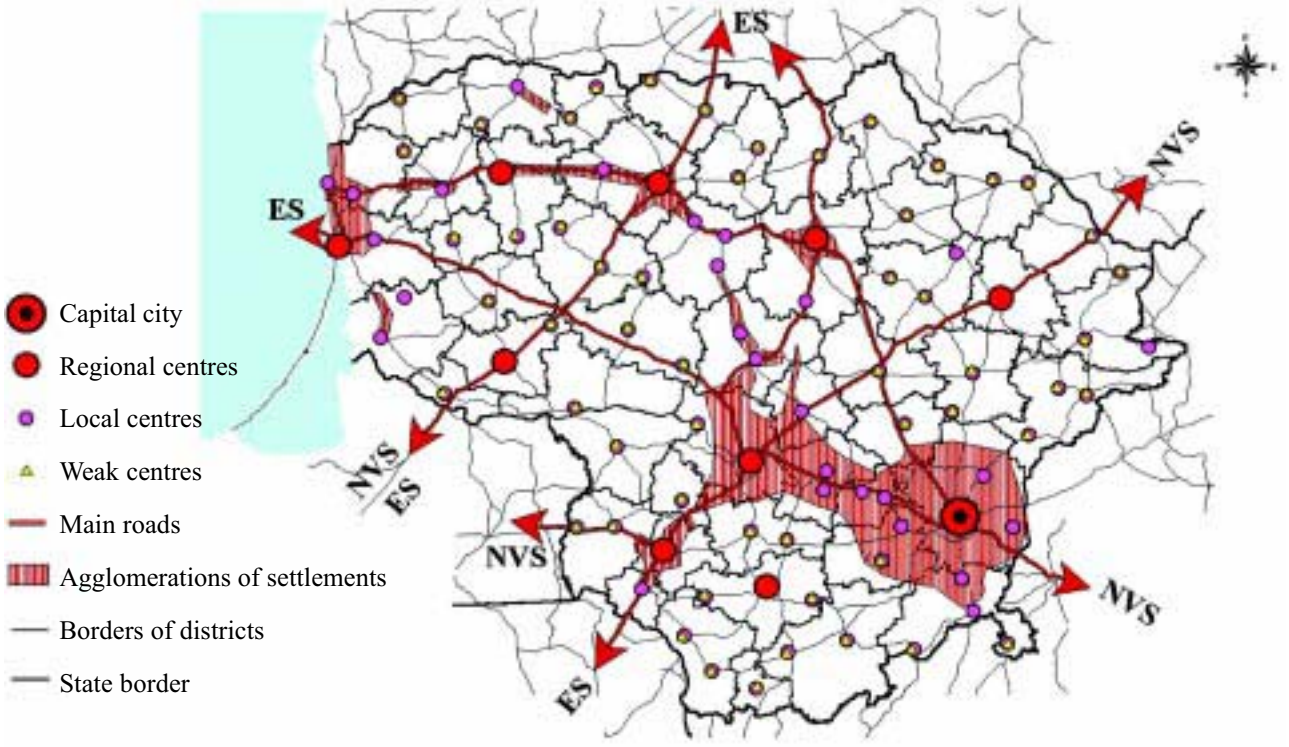
- Ensuring sustainable development in relation to social, cultural, economic and environmental aspects.
- Development of urban network qualitatively, not quantitatively,
- The main direction of the development of cities is to use the existing territories of the cities and regenerate the already built-up territories.
- Development and improvement of technical infrastructure, especially of urban territories, and of general network of protected areas of the country.
- The relation between urban and rural structures is to be developed further on.

In accordance with the concept proposed in the Master Plan, a polycentric and hierarchical system of co-operating centres acting according to the functions attributed to them should be formed, planning that in the future they will work in co-operation and uniting their potentials in order to achieve common objectives. Urban development axes connect all the structure into a unanimous system of development and stabilisation (Fig. 6.17). Technical infrastructure system ensures vitality of the urban system and its ability to act. Such a sustainable system of urban centres is methodological approach of forming an overall national urban system.

Seeking to avoid the trends of great population concentration along the main urban axis Vilnius-Kaunas-Šiauliai-Klaipėda and to ensure even and balanced location of urban centres in the whole country's territory, in accordance with the Master Plan of Lithuania it is intended to develop a hierarchical network of human settlements consisting of centres of 3 levels (Fig. 6.17).

Level 1 – metropolitan centres. These are centres of national and European importance. In Lithuania they are: Vilnius, Kaunas, Šiauliai, and Klaipėda, but only Vilnius and Kaunas in the case of joined potentials are able to become an Eurocity. The development of the cities of Klaipėda and Šiauliai should be supported and enhanced so that in the future they became fully able metropolitan centres.

Level 2 – regional centres. These are centres of the counties (Alytus, Marijampolė, Panevėžys, Tauragė, Telšiai and Utena) and other larger towns – the administrative centres of the present local authorities that are granted the status of regional centres



6.17 Scheme of development of Lithuanian urban network

developing the county's urban system. Seeking to more evenly distribute the potential of urban development, Biržai, Mažeikiai, Raseiniai, Rokiškis, Švenčionys (together with Švenčionėliai) and Ukmergė are proposed to become one of the alternatives in this category. This decision would allow to more evenly distribute demographic and financial resources and would create more favourable conditions for more rapid development of the depressed regions. Out of all the planned regional centres existing at present only Alytus, Marijampolė and Panevėžys have sufficient potential for performing regional functions. Other towns have to be developed using state legal, financial and orga-nisational means.

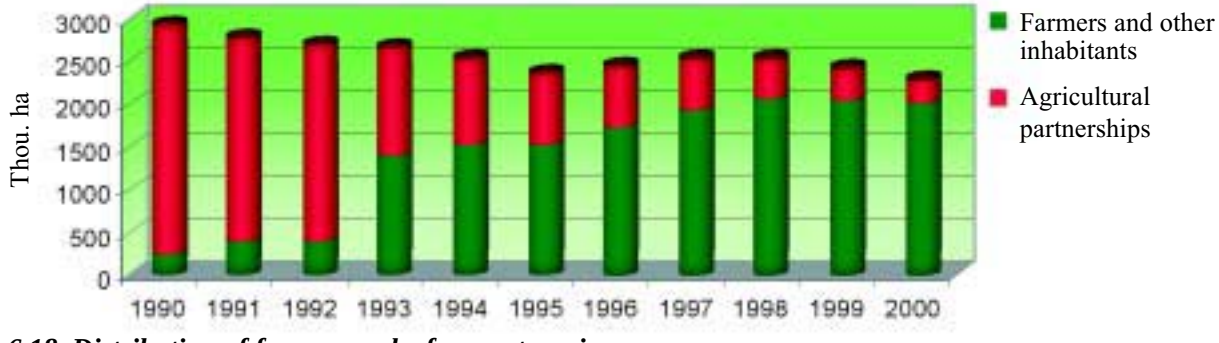
Level 3 local centres. Depending on the implementation of the administrative territorial reform in the country, the number of local centres could be increased up to 85. New local centres would be created on the basis of small towns.

At city level the priority in urban development is given to the use of the reserve of the existing territories, possibly decreasing the occupation of free natural territories. It is especially important to preserve the green massifs of cities and towns including protected areas in the territories of cities and towns (regional parks, historical Old Towns) from elemental urbanisation. The urban development deriving from the second half of the 20th century does not comply with modern requirements of sustainable development. Therefore, urban development renovation is one of the important factors while striving for sustainable development. The rapidly increasing number of cars, imperfect system of communications notably increase of air pollution make a lot of inconveniences for urban inhabitants. Striving for sustainable development it is planned to develop multimodal transport systems, to give priority to public transport, to develop bicycle transport. In order to improve the quality of urban environment, diversion of transit transport flows to bypasses, their development and optimisation of transport flows will be of great significance.

6.6. AGRICULTURE

The past decade was the period of cardinal changes for the Lithuanian village. With the system of collective farms falling down and private farms rapidly forming, not only agricultural production but also the entire life of the rural population changed in essence. The first steps of the land reform were made in Lithuania as far back as 1989 after the Law on Peasants' Farms had been adopted. After the re-establishment of Lithuania's independence in 1991 laws were drawn up. They definitively established private land ownership - the Law on the Procedure and Conditions of the Restoration of the Right of Ownership to the Existing Real Property and the Law on Land Reform. In 1992 after the property of collective and state farms had been privatised, along farmers' farms agricultural partnerships and other agricultural enterprises were established. In 2000 an average farm of a farmers amounted to 12.6 hectares and over 80% of the farms were smaller than 10 hectares.

Data presented in Figure 6.18 show that farm crops of farmers and other inhabitants increased almost tenfold during that decade. In 1999 the areas of farm crops belonging to that category accounted for 8.3%, in 2000 this figure constituted over 87% of the total area of farm crops. Most agricultural partnerships collapsed during that period, and their farm crops currently constitute as little as one tenth of the total area of farm crops.

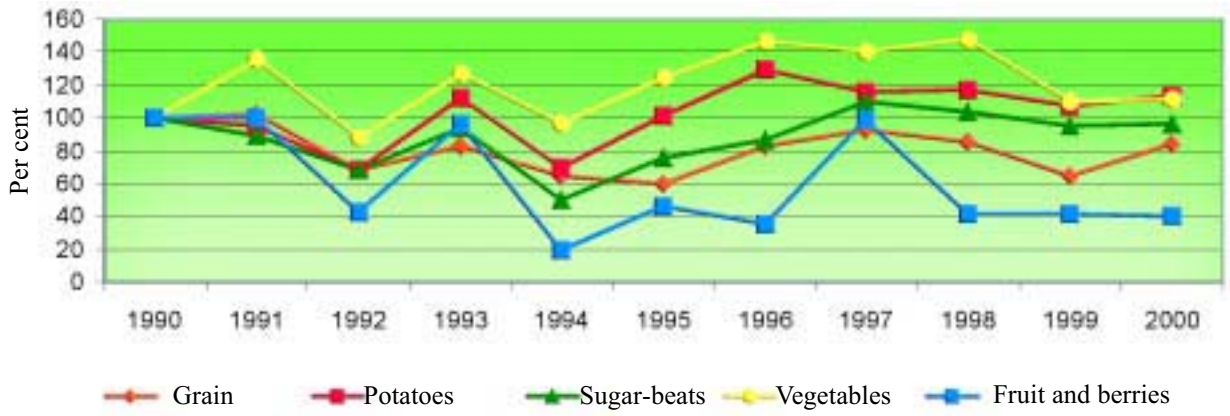


6.18. Distribution of farm crops by farm categories

The above-presented data also show that the total area of farm crops was on the decrease till 1995 and the areas of wastelands were on the increase. In 1996, with the country's economy picking up, areas of farm crops began to increase, too and in 1998 total area of farm crops constituted almost 90% of the total area of former farm crops that existed at the end of collective farming system. However, due to a repeated decline in the country's economy in 1999 mainly determined by the economic crisis in Russia and the decrease in the eastern market, areas of farm crops in Lithuania decreased again. In 2000 their total area was 20% smaller than that in 1990. It is expected that with the country's economy recovering, the total area of farm crops will increase insignificantly. However, it is planned to plant forests in a large part of barren unproductive lands (Chapter 6.7) or use them for other purposes.

During the past decade amount of agricultural production and the structure of production changed rather significantly. Changes in harvest during that period are presented in Figure 6.19.

Winter and spring cereals are the main agricultural crops in Lithuania. Their areas remained almost unchanged during the decade under study, every year cereals are sown in the area covering about one million hectares. However, after the total crop area had decreased (Figure 6.18), a relative part of cereal area increased from 34 to 44 per cent. Data presented in Figure 6.19 show that the total harvest at the beginning of the transitional period was gradually on the decrease. In 1995 it accounted for only 60% of the harvest in 1990. However, in 1996 cereal harvest started to increase and in 2000 it reached 83 per cent of the 1990 harvest. During the recent years average cereal yield amounts to 3 tons per hectare and traditionally it is nearly twice less than the average cereal



6.19. Changes in agricultural production (1990 production = 100%)

yield in the European Union countries. This comparatively low cereal yield is determined by the fact that Lithuanian farmers usually grow mainly local cereal species, apply out-dated technologies, have no proper agricultural machinery and use relatively little fertilisers and chemical protection measures.

Nearly all the residents of Lithuania having at least some land grow potatoes. However, the average potato yield is comparatively low (about 15 tons per hectare). That is 2-3 times lower than that in the European Union countries. The assortment of potatoes used for food is quite wide and their quality is good, however, the quality of potatoes grown for processing does not always comply with the set requirements. Figure 6.19 shows that the total potato harvest somewhat decreased at the beginning of the transitional period, but recently about 20% more potatoes have been dug than at the beginning of the transitional period.

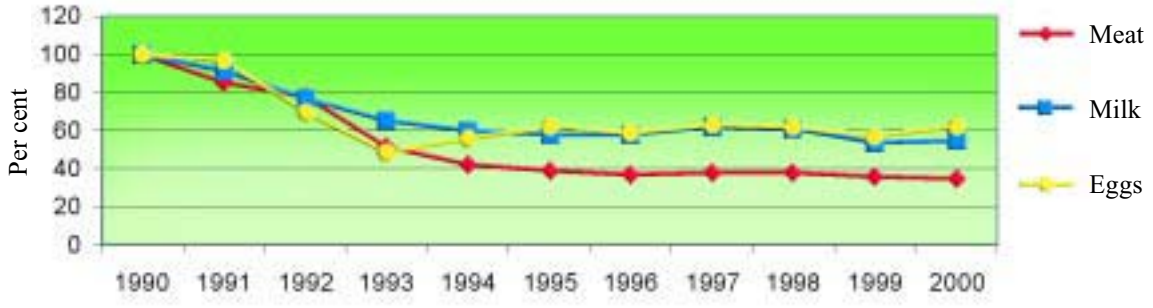
Lithuania has enough fertile lands suitable for growing sugar-beet producing the yield of up to 40-50 tons per hectare. Actual sugar-beet yield depending on agro-technology and climatic conditions ranged from 17 to 32 tons per hectare during the past decade. The total sugar-beet harvest was somewhat lower at the beginning of the transitional period. However, during the recent years it is about 15-20 percent higher than that in 1990 (Figure 6.19). The area under sugar-beet changed insignificantly during that period and constituted 30-35 thousand hectares.

The largest increase during that decade was registered in vegetable production. Areas under vegetable crops and their yield increased by nearly 40 per cent, however, in 1999-2000 a decrease in the areas, where vegetables grow, was registered. Since the climatic conditions of Lithuania are favourable for cultivating many species of vegetables, it is forecasted that an ever-growing attention will be paid to the cultivation of vegetables in the immediate future and their production will increase.

Climatic conditions in Lithuania are also favourable for the development of horticulture and berry plantations. However, currently small amateur orchards occupy the largest part of the total area of orchards and berry plantations. Orchards and berry plantations of high quality account for 15 per cent of their total area. Data presented in Figure 6.19 show that production of orchards and berry plantations has decreased during last years.

Areas of rape have increased considerably (7.5 times). This has been determined by a wider use of rape not only for food and perfumery industry but also for the production of bio-fuel. In summing up the trends in the development of plant production, the conclusion should be drawn that the agricultural sector has recovered quite rapidly after the shock of the reforms. Since 1995-1996 it has grown rapidly, though in 1999 a certain decline in some branches of plant production was registered.

Data presented in Figure 6.20 give an accurate picture of the changes taken place in the animal production sector. They show that animal production decreased rapidly in the first half of the transitional period. In 1994, as compared with 1990, only about 40% of meat and 60% of milk and eggs were produced. However, contrary to the plant production sector, so far no increasing trends in the agricultural production have been observed. During the past decade the number of cattle decreased by 63%, that of pigs - by 66%,



6.20. Changes in animal production (1990 production = 100%)

the number of sheep and goats - by 44.0% and that of birds - by 64%. The main reasons for the decrease in the number of livestock are as follows: restructuring of the agricultural sector and essential changes in domestic and foreign markets. It is necessary to draw attention to the fact that during the years of the collective-farm regime, seeking to provide the deficit market of the former Soviet Union with animal products, Lithuanian agriculture was thrown off balance. The animal production sector was developed hypertrophically and for the most part was provided with imported rather than local fodder.

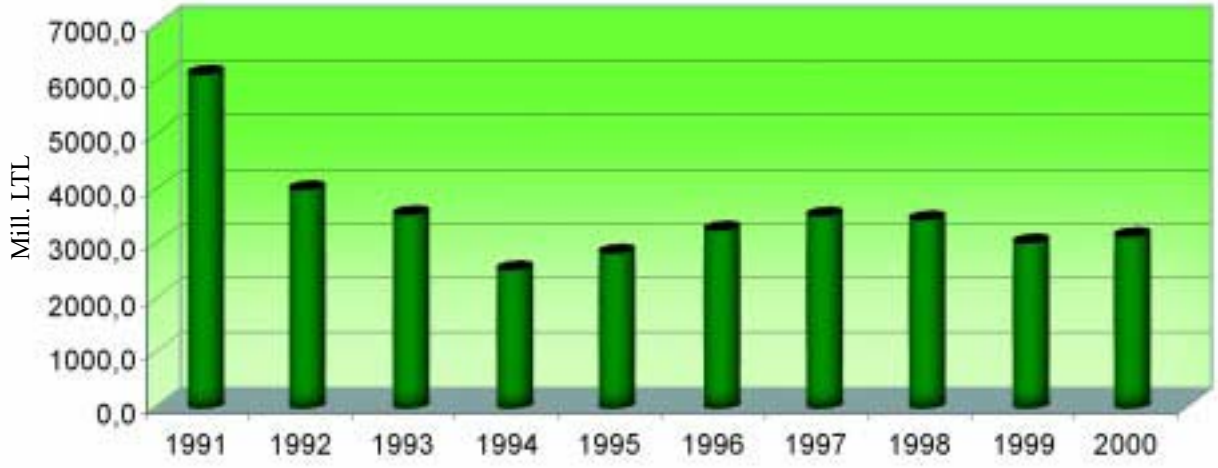
Milk sector traditionally dominates the Lithuanian livestock sector because it has a great economic and social significance. 232.8 thousand economic entities and about 49 per cent of all farmers' and personal farms as well as agricultural partnerships produced milk in 1999. They kept 494.3 thousand cows, and the milk yield amounted to 1714 thousand tons. In 1999 milk production per cow was 3228 kilograms, that is 43 per cent less than that in the European Union countries where average milk yield per cow was 5652 kg in 1999. With the economic situation rapidly improving and the purchasing power of the population growing, the consumption level of milk and dairy products should equal that of the developed countries and in 2006 it should reach 370 kg.

Cows account for 55 per cent within the structure of cattle herd. This shows the prevalence of milk production in cattle breeding. The increase in dairy cattle is less suitable for meet production, and beef cattle as well as hybrids hardly account for 5 per cent of the total number of cattle. At the end of 1999 the part of beef cattle within the herd of the total number of cattle raised in the country was 0.2 per cent, whereas in some Western European countries this part amounts to 20-25 per cent. Expensive meat products are unable to compete not only on the domestic markets but also on traditional eastern markets where cheap subsidised products are supplied by the developed countries. Lithuania is able to export pork, beef and their products to the EU countries because there are 3 meat-processing enterprises in Lithuania having the EU veterinary certificates. The quota of meat export to the European Union has not been used up, because the quality of meat and its products does not comply with the EU requirements. The consequence of all this is a decreased export and increased import of cheap meat and its sub-products from Western countries. The EUROP system of settling accounts with cattle and pig breeders has been implemented in 29 Lithuanian meat-processing enterprises since 1 May 2002.

It is forecasted that the number of pigs and birds in 2006, as compared with 2000, will increase by one-fourth, the number of sheep - by nearly three times (the fastest growth rates among all breeds of animals). The average number of cattle will remain almost unchanged. Changes will take place in the breeds of cattle only: the number of beef cattle will increase.

Due to the above-mentioned changes in agricultural production, the structure of agricultural production changed significantly during that decade. In 1990 livestock production constituted the largest part (about 55 per cent) of the gross agricultural production, in 2000 nearly 60% of agricultural production was produced in the crop production sector.

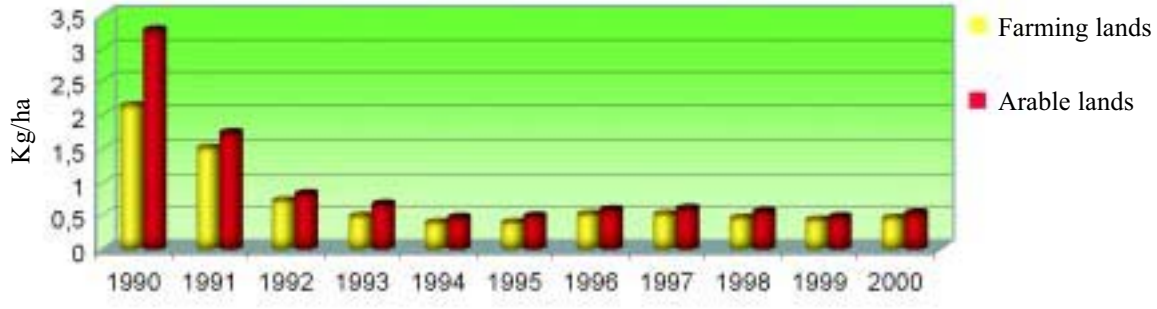
Changes in the GDP in the agricultural sector during the past decade are presented in Figure 6.21. It is obvious that Lithuanian agriculture reached the lowest point by the GDP created in 1994. Since 1995 this indicator has started to increase rapidly, however, in 1999 due to a repeated general decline in Lithuanian economy, it decreased again and currently the GDP created in the agricultural sector is about twice as little



6.21. Changes in GDP created in the agricultural sector (by comparable prices of 1995)

as it was at the beginning of this decade. The GDP created in the agricultural sector currently accounts for 10 per cent. By this indicator Lithuania is approaching the structure of the GDP of the EU countries.

During the decade under study not only volumes of agricultural production and its structure but also the quantities of fertilisers and agricultural chemicals used changed tremendously. Data on changes in the amout of pesticides used in agriculture are presented in Figure 6.22. The data show that during that period the quantity of pesticides used in arable lands decreased from 3.3 kg/ha (by the preparation) to 0.53 kg, that is, by more than six times. Besides, the quality of pesticides used improved considerably.



6.22. Changes in the use of agricultural pesticides

Quantities of mineral fertilisers have also decreased notably. In the EU countries fields are fertilised twice as intensively as in Lithuania. In 1998 the quantity of active substances of NPK fertilisers was 126 kg/ha in the EU countries and in Lithuania this figure stood at 56.2 kg/ha.

At present the number of livestock bred in Lithuania is smaller than that in the EU countries. In 1999 the number of cattle per 100 ha of farming land was 32, that of pigs - 42 per 100 ha of arable land. In the EU countries - respectively 61 heads of cattle and 152 pigs. Less intensive livestock production determines smaller point and non-point pollution.

Prior to 1990 in Lithuania agricultural production was sought to intensify disregarding environmental impact. Due to the enlargement of fields, destruction of homesteads and green plantations, about 14 per cent of farming lands were effected by erosion. About 19 per cent of the country's territory are lands sensitive to deflation. Their largest areas are found in the Baltic Sea coastal districts. The largest areas of soil affected by water and wind erosion are in the regions of eastern and western Highlands. Due to a abundant use of mineral fertilizers and nitrogen fertilisers particularly, on average 15-20 kg of nitrogen compounds were leached into ground waters from one hectare of soil and speeded up eutrophication of surface water bodies.

With Lithuania's accession to the European Union, it is necessary not only to produce competitive agricultural products but also to achieve that farming meth-

ods should be economically useful, environment-friendly and socially acceptable. From this point of view, one of the most promising farming systems is organic (ecological) farming. The number of organic farms in Lithuania is constantly on the increase. The year 1993 is the first year of the certification of organic farming. 230 organic farms, 8 processing and 11 trading and other enterprises were certified in 2000. However, so far the area of the certified organic farms accounts for as little as 0.2% of the farming lands. The average size of an ecological farm amounts to 20 ha.

Grain (40 per cent), potatoes (25 per cent) and vegetables (12 per cent) constitute the largest part of organic farms production. Milk (90 per cent) forms the basis of animal production. However, milk, beef and poultry are usually sold as usual production without the label of certified ecological products. There is no single certified enterprise processing organic animal production in Lithuania. The State provides support for the engaged in organic farming. Direct payments are made for a hectare of crops obtained from a certified plot of land. This support has been provided to farmers since 1997 and encouraged the increase in the ecological production.

The demand for ecological products in Lithuania is on the increase. However, the infrastructure of the trade in ecological products has not been formed yet. According to the data of the survey, 45 per cent of certified ecological production were sold as ecological and 20-40 per cent of price premium was received. Lithuania started to export ecological products (berries, honey). However, the assortment of ecologicaly grown production in Lithuania is not sufficiently market-oriented. Its small amounts as well as its irregular supply to the customers create considerable inconveniences to sellers and growers.

Seeking to encourage the development of organic farming, as far back as 1990 the special assosiation of organic farming "Gaja" was established. It united all those who took interest in organic farming, and the legal basis was begun to create. On 17 September 1993 the Resolution of the Government of the Republic of Lithuania "Concerning Measures for Improvement the Condition of Karst Region of Northern Lithuania" was

adopted. On its basis, the Organisation of Organic Farming of north-east Lithuania "Tatulos fondas" was established. In 1997 it was reorganised into public enterprise "Tatulos programa". On the basis of the experience of foreign countries and the IFOAM (International Association of Organisations of Organic Farming) standards, in 1994 the first book "Rules of Bio-Organic Farming and Product Processing" was published. In 1997 the standard of organic farming and processing of ecological products was issued. Seeking to meet the international standards, in 1997 the Ministries of Agriculture and Health Care founded a specialised institution that certified farms - public enterprise "Ekoagros". It became a member of IFOAM in 1998, and in 2000 "Ekoagros" was awarded IFOAM accreditation. In 2000 by the Order of the Minister of Agriculture "Concerning the Approval of Rules of Organic Farming and Certification of Production and Industrial Process of Organic Farming Products" rules of organic farming production were approved.

The sector of organic farms in Lithuania is stimulated financially, too. Through the Rural Support Fund the following amounts were paid to implement investment projects and subsidise certified organic farms: in 1997 - LTL 171.8 thousand, in 1998 - LTL 389.2 thousand, in 1999 - LTL 423.4 thousand, in 2000 - LTL 446 thousand and in the year 2001 the Special Rural Support Programme allocated LTL 900 thousand to support organic farming. Product certification, purchase, processing and the development of market infrastructure are financed from the funds of the programme. Moreover, before 1999 measures to put a stop to point pollution in the karst region were financed through public enterprise "Tatulos programa".

Laws regulate the development of organic farming in Lithuania. The Law on State Regulation of Agricultural Economic Relations establishes the procedures for management of organic farming and elimination the sources of point pollution as well as the activities of organisations certifying organic farms.

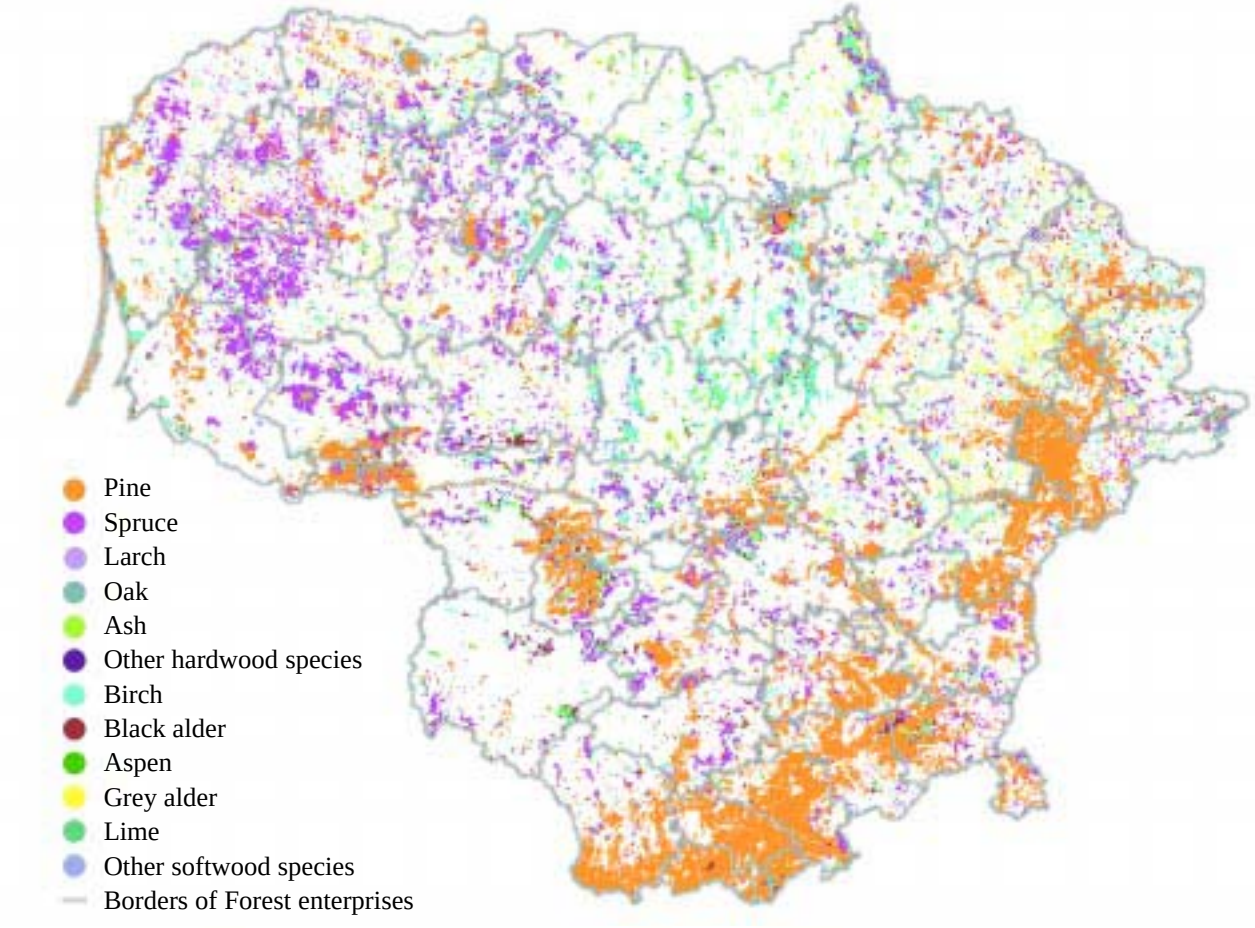
The Government of the Republic of Lithuania plans to further develop and support organic farming. It is intended to allocate over one million Litas for this purpose in 2002. Besides, beginning with this year Lithuania starts to receive funds from the EU SAPARD Foundation. Therefore some part of investment projects of organic farms will be financed from these funds giving priority.

1 January 2004 is regarded as the day when the Lithuania must be ready to assume the European Union obligations in the sphere of organic farming. Till the accession to the EU, legal acts regulating organic farming will be completely transposed into the national legal basis of Lithuania. Up to 2010 it is planned to make up to 15 per cent of the total farming lands of the country as organic farms.

It is intended to implement more environment-friendly farming not only in organic but also in traditional farms. The National Agro-Environmental Protection Programme is being devised. This programme covers the system of measures to reduce the negative impact of farming on environment, to restore ethnic landscape and increase biological diversity, that is, to stimulate sustainable development of agriculture.

6.7. FOREST SECTOR

Important political, economic and social changes that took place in Lithuania during the past decade affected the forest sector, too. With market relations establishing themselves in the country's economy, processes of privatisation and restoration of property developing rapidly, harmonisation of the protection and rational use of biological diversity and natural resources, that is, the implementation of the principles of sustainable development, becomes of paramount importance. In the forest sector the measures to preserve biological diversity and increase the productivity of natural resources and their use should be balanced. The increase in the forest productivity is of significance not only from the economic but also from the ecological point of view as one of the factors stimulating the consumption of carbon dioxide and reducing the input to global climate changes. In the meantime the protection of biological diversity quite often determines the decrease in the productivity of forest ecosystems. Therefore one of the main objectives of the present-day forestry - to increase the productivity of forests by preserving their biological diversity. Moreover, it is important to develop social functions of forests by raising possibilities for an ever-wider use of forests for recreational and educational purposes, solving the employment problem of local people.



6.23 Map of Lithuanian forests

In order to resolve these problems reliable and effective information on the changes in the state of forests, the biological diversity and productivity is necessary. Improving Lithuanian information system of forest resources during the last decade, important work has been carried out: technologies of Geographical Information Systems (GIS) and the Establishment of Global Positioning system (GPS) were inroduced, the system of national forest inventory based on sampling methods was implemented. After the national forest inventory has been introduced along the traditional forest stand inventory, a unified and reliable forest resources monitoring system has been created, which enabled to obtain accurate and reliable data on the timber volume, its increment, structure and other indicators that help efficiently reveal positive and negative changes in forest resources.

The data below present the changes in Lithuanian forest area and timber resources during the last decade. The data presented in Table 6.9 show that forest cover increased by more than one per cent during that period and today it amounts to 31.2%. Forest areas increased mainly because neglected agriculture land and the land meant for other purpose became covered with forests.

The species composition of forest stands remained almost unchanged during that period. Pine, spruce and birch stands prevail in Lithuanian forests (Figure 6.24). Black alder, grey alder, aspen, oak and ash stands constitute about 20 per cent. All other species account for as little as one per cent. Mixed forest stands make up quite a great part of Lithuanian forests.

The average growing stock volume per hectare during 1993-2002 year period increased from 180 m^3 to 195 m^3, and the total volume of trees growing in Lithuanian forests increased by 44 million cubic meters, that is, by about 12 per cent (Table 6.9). The average age of forest stands during these years increased by four years, and the current annual increment decreased slightly and accounts for 6.1 m^3 per hectare.

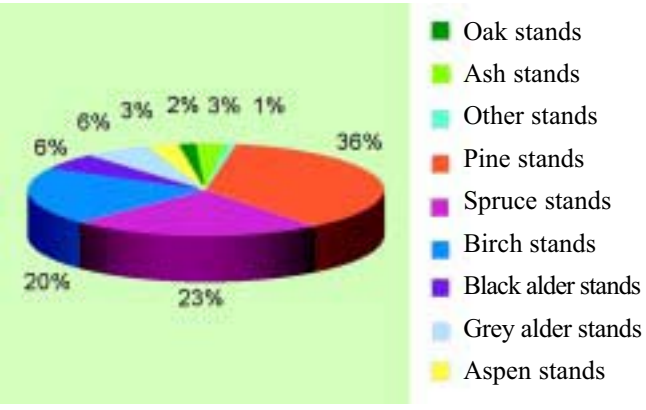
In summing up the above-presented information the conclusion can be drawn that during the past decade positive changes in forest resources took place, not only forest areas but also their productivity was on the increase.

According to a preliminary assessment, currently there are about 500 thousand hectares of land that is not suitable to agriculture in Lithuania. The Lithuanian Forest Strategy being prepared provides for planting forests in these lands within the immediate 20 years, which would allow the forest coverage of Lithuania to be increased by 3 per cent.

Land (forest) reform is an important process that took place during the recent decade. As far back as 1992 the first private forests were legally registered. 521 thousand ha of private forests, which accounted for nearly

Table 6.9 Changes in forest resources in 1993-2002

Indicators	1993 01 01	1998 01 01	2002 01 01
Forest area, 1000 ha	1919.7	1978.4	2034.4
Forest stand area, 1000 ha	1860.3	1888.0	1938.2
Forest coverage, %	30.1	30.3	31.2
Forest area by forest types,			
Pine	695.3	702.1	710.7
Spruce	450.2	441.9	447.4
Birch	363.4	375.2	386.8
Aspen	50.4	52.4	54.4
Black alder	104.0	108.5	116.8
Grey alder	103.8	111.3	119.5
Oak	32.4	33.6	34.8
Ash	49.3	50.8	52.6
Others	11.5	12.2	15.2
Total growing stock volume, mill. m^3	334.0	347.6	378.1
Average growing stock volume, m^3/ha	180	184	195
Current annual increment, m^3/ha	6.3	6.2	6.1
Average age of forest stands, years	49	51	53



6.24 pav. Species composition of Lithuanian forests.

26% of the total forests of the country, were registered at the beginning of 2002. It is stipulated that after the land (forest) reform has been finished, the area of private forests will amount to 40-45%. The course of the process of forest restitution in 1992-2001 is presented in Figure 6.25.

Protected areas in Lithuania cover over 750 thousand hectares, which accounts for 11.9% of the entire territory of the country (Chapter 5.6). Over half of the protected areas is located on the land of forests, which accounts for 18.8% of the total forest area. It should be noted that a great attention is also devoted to protective functions of forests in farming forests (Group IV). Since 2001 the inventory of wood key habitats has been started. The chief aim of this work is to take inventory of the most valuable forest habitats from the point of view of biological diversity containing rare species of plants and animals, for the preservation of which a specific forest environment and farming regime are necessary.

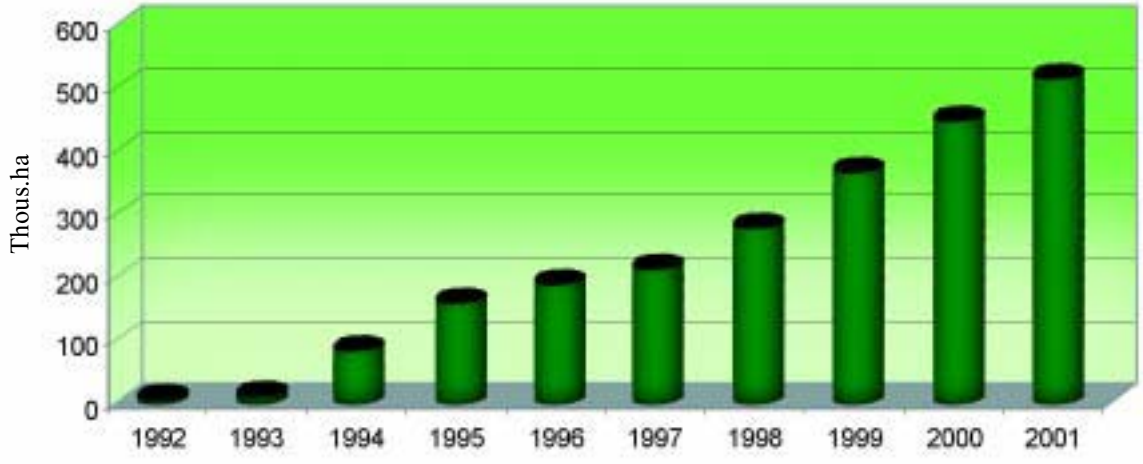
Seeking to better harmonise the functions of preserving natural diversity and increasing the productivity of forests as well as their use, since 1995 Lithuanian forests have been classified into four groups by a management regime and the basic functional purpose.

Group I is forest reserves. They are forest in state strict nature reserves, in strict nature reserves of national parks and in nature reserve boundaries. The purpose of management is to allow forests to grow naturally. Forests of this group occupy 1.1% of the forest land territory. They are distinguished as state forests only.

Group II is special purpose forests. The following forests are distinguished within this group:

A - forests for the protection of ecosystems. These are forests of the state landscape, telmological, pedological, botanical reserves as well as forests of genetic, zoological, botanical-zoological nature state reserves, areas of protected natural resources, anti-erosion and other forests. The aim of management is either to preserve or restore forest ecosystems or their separate components. These forests cover 8.2% of the forest land territory.

B - recreational forests. These are forest parks, city forests, forests of recreational zones of national parks, compartments of recreational forests and other forests intended for recreation. The aim of management is to form and preserve the recreational environment of a forest. Recreational forests account for 3.8% of the total forest land territory.

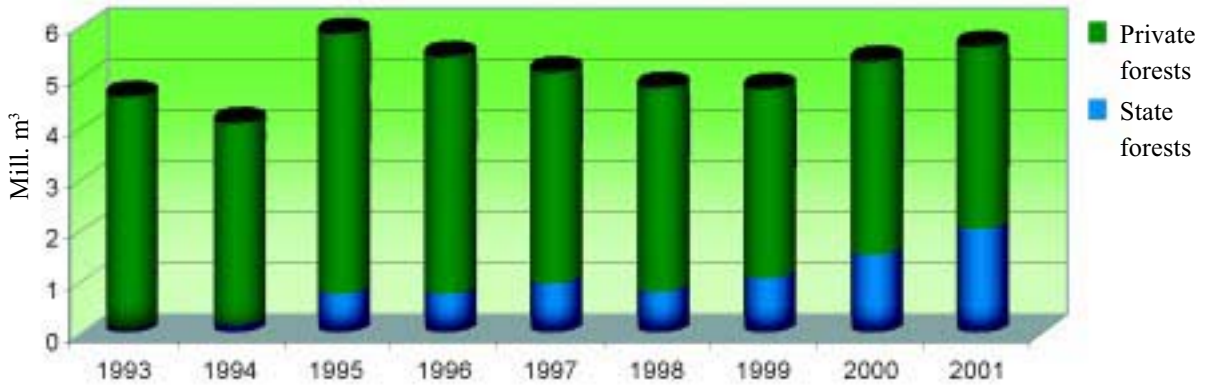


6.25 Changes of private forests area

Group III is protective forests. These are forests of geological, geomorphological, hydro-graphic, cultural nature state reserves and protection zones. The aim of management is to form productive forest stands capable of performing the function of protecting soil, air, water and man's environment. They cover 15.2% of the total forest land territory.

Group IV is commercial forests. This group covers all other types of forests that were not covered by Groups I-III. The aim of management is to form productive forest stands, to continuously provide timber in compliance with the environmental requirements. Commercial forests occupy 71.7% of the total forest land territory.

Lithuanian forests constitute an important potential for satisfying the country's needs for wood, carrying out very important functions of nature protection as well as social functions and those of preserving the biological diversity, extraction of many other valuable products. Up to 11.9 million m^3 of wood increase annually in Lithuanian forests as current annual increment. This amount will increase in the future with the increase of forest areas. What part of wood is available to use without violating the functions of nature protection as well as social functions and the preservation of the biological diversity and other important functions performed by forests is a question of strategic significance.



6.26 Changes in forest felling of merchantable wood volumes

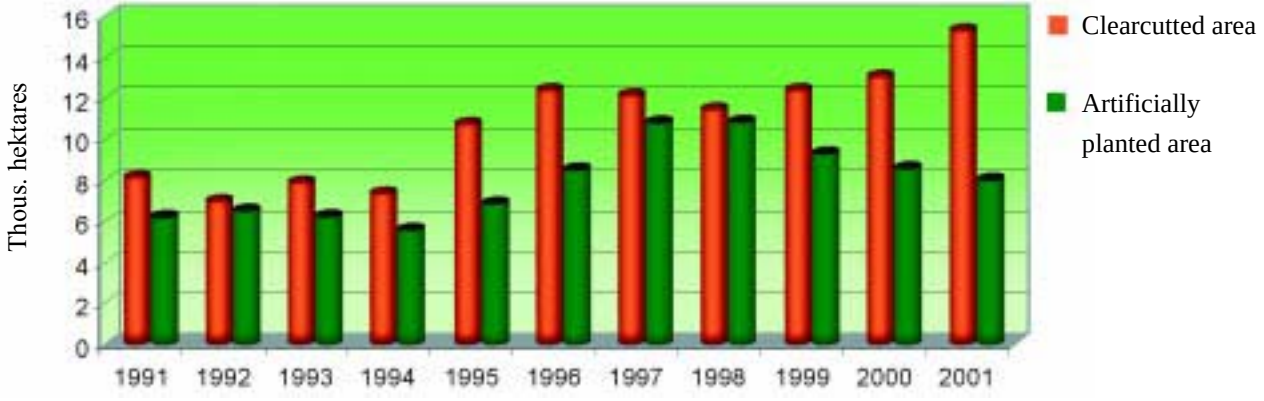
Changes in the volumes of forest felling during the period under study are presented in Figure 6.26. The total amount of merchantable wood being felled within a year increased from 3.35 million to 5.7 million cubic meters in the course of ten years. With the increase in the areas of private forests (Figure 6.25), felling volumes in these forests also increase.

Successful organisation and planning of forest economic activity according to the principles of sustainable development is not possible without making long-term forecasts providing for peculiarities of the forest growth within a period that is not shorter than that of the rotation. To forecast the dynamics and use of the Lithuanian forest resources, in imitating the process of regeneration, growing and making use of forest. The carried-out calculations show that taking into account the present species composition, the age structure, the annual wood increment, the regeneration rate of Lithuanian forests, without harm to ecological properties of the forest, the annual consumption of wood in 2010 can be increased up to 6.8 million cubic meters, that is, by more than one fourth, as compared with 2000. The main objective that is sought to be achieved in practice is the increase in accumulation of the wood increment and resistance and sustainability of mature forest stands. To implement this objective it is necessary to orient oneself towards rather intensive thinnings in the young age in the commercial forests and the regulation of density of forest stands capable of ensuring the formation of mature forest stands resistant to natural factors as well as the increase in the volume of wood.

Since annual clearcut felling areas increased during the past ten years and in 2001 they reached 15.3 thousand hectares, the area of planted forests increased during that period as well (Figure 6.27). The spruce (63%), the pine (20%) prevail and other species make up 17% in the planted areas. Mixed forest plantations account for about 60% of the total area of the forests planted in clearcutted area.

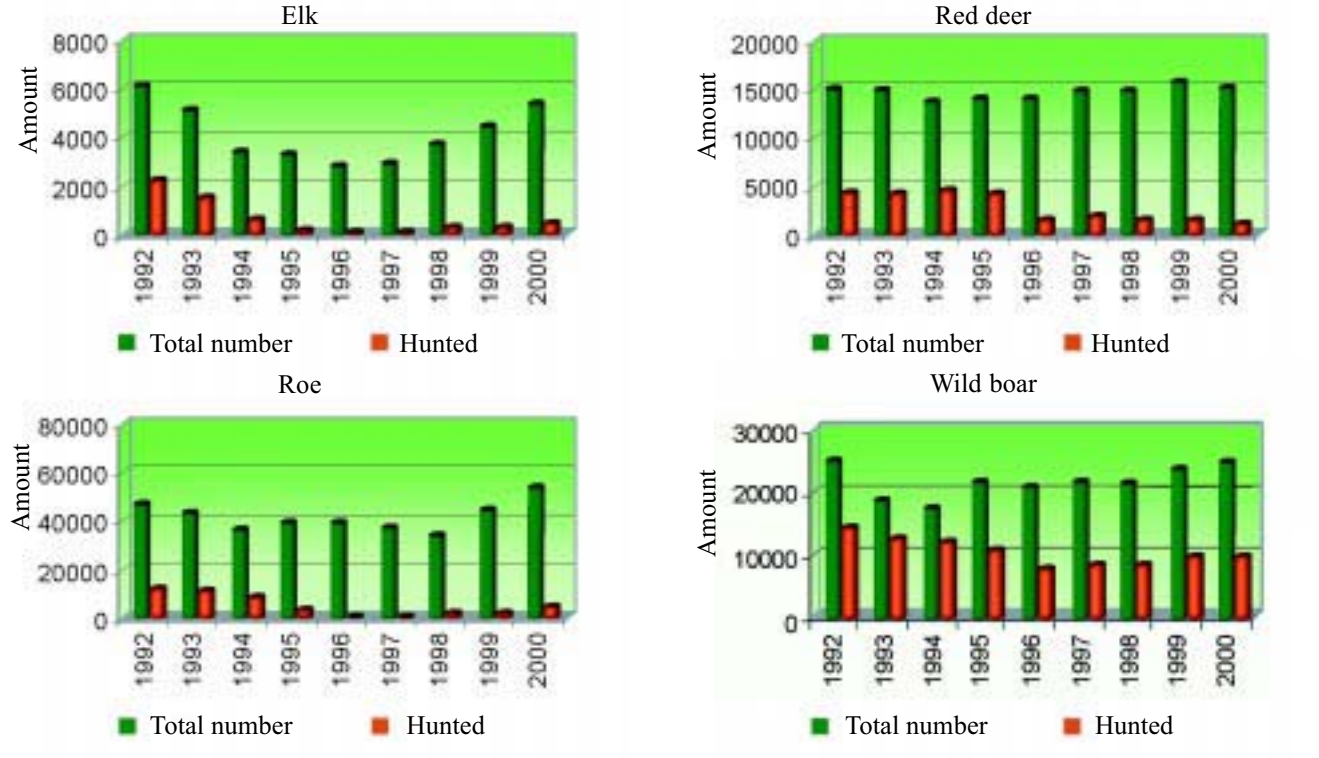
Recently the area of clearcutted territories that are artificially planted has somewhat decreased because a large part of clearcutted areas (about 30%) is left for natural regeneration. That increases the species diversity of the forests being regenerated. It is forecasted that about 30-40% of the clearcut areas will be left for natural regeneration in the future.

Apart from wood, forest is a source of other natural resources - mushrooms, berries, fruits, medicinal herbs. Game fauna plays a very important role in the use of



6.27 Changes of annually clearcutted and artificially planted forest areas

forest resources as well. As the data in Figure 6.28 show, at the beginning of the transition period due to intensive hunting, the amount of the animals of the majority of big mammalian species in Lithuanian forests decreased and in 1994-1996 reached the minimum. The herds of elks and wild boars decreased the most during this period. However, when the protection became stricter and hunting was reduced, the amount of game fauna in Lithuanian forests was reestablished quite rapidly, and the quantity of roes and red deer even exceeds the amount that was at the beginning of the period.



6.28. Changes in the total and hunted amount of main game species

The state of Lithuanian forests has been assessed according to the European Forest Monitoring Programme since 1987. One of he main assessment indicators of forest state is crown defoliation. As the data in Table 6.10 show, the defoliation of all tree species in Lithuania was increasing steadily up to 1994-1995. Since 1996 the decrease in average defoliation has been noted. For the last years defoliation has not been changing significantly (19.9-21.1%).

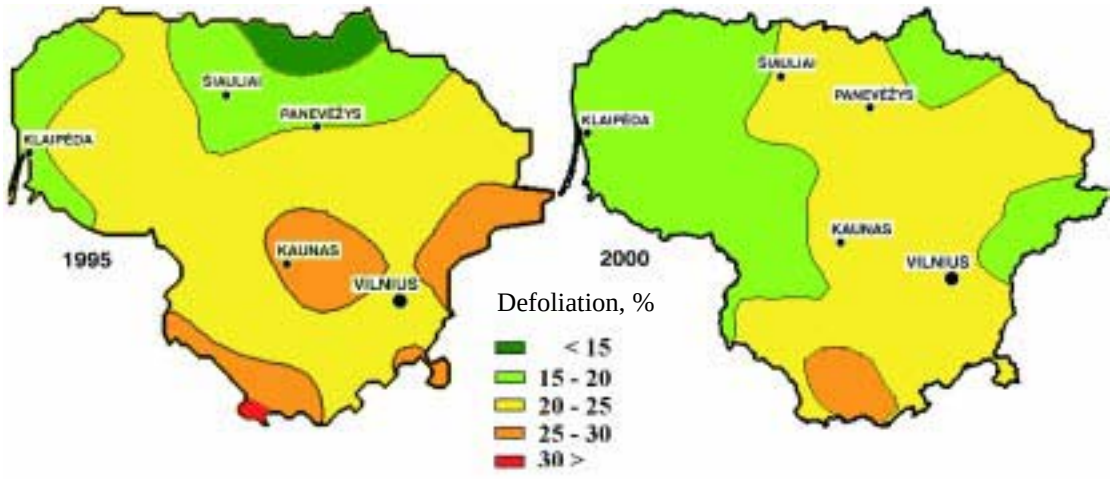
Uneven territorial distribution of defoliation is predetermined by meteorological conditions, air pollution,

Table 6.10 Changes of average defoliation of the main tree species in Lithuania

Tree species	Average defoliation, %									
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Pine	23.6	25.2	24.4	24.0	19.3	21.1	19.5	20.0	20.9	19.7
Spruce	17.5	23.1	21.7	28.6	21.2	21.3	20.5	18.8	19.3	17.9
Birch	18.8	21.5	21.9	20.5	16.6	19.5	20.0	19.4	20.2	20.3
All species	21.0	23.4	23.0	24.2	19.1	21.1	20.6	19.9	20.8	19.9

species composition of forests, age structure, site types, local invasions of forest pests and diseases and other factors. The spatial distribution of average defoliation of all tree species in Lithuania in 1995, when the state of forests was the worst, and in 2000, when the state of forests was quite stable, is presented in Fig. 6.29. In 2000 higher average defoliation remained in the central and southern parts of Lithuania, and lower remained in northern and western Lithuania.

beettle (Yps typographus) favoured the spreading of pests. Since 1996 the improvement of the state of Lithuanian forests has been caused by quite favourable hydrothermal conditions for the past years, the decrease in background air pollution (Chapter 5.10) and in the number of biotic and abiotic tree damages. The invasion of pests in the pine-stands of south-eastern Lithuania and other unfavourable factors determined the state of forests locally during the last years.



6.29 Average defoliation of the main tree species in Lithuania in 1995 and 2000

The analysis of the reasons for forest state change shows that the changes in average defoliation were caused by many factors. Until 1995 the worsening of forest state was caused not only by quite great background air pollution, the impact of which has great (4-6 years) inertia, but also by the unfavourable hydrothermal conditions of vegetation periods at that time (the droughts of 1992 and 1994). At present the state of spruce stands was predetermined by the invasion of a bark-beettle Yps typographus, for the arising of which hurricane winds in the winter of 1993 and the aforementioned droughts formed favourable conditions. Besides, the sanitary felling of trees that was done too late when eliminating windfallen trees and the trees damaged by a bark-

Seeking to ensure the sustainable development of the forest sector, to satisfy the needs of multistakeholders and to ensure forest preservation for the future generations, it is necessary to form long-term forest sector policy. To this end, a draft document of Lithuanian forest sector strategy has been prepared, which establishes the main principles of forestry policy, long-term forest sector policy trends and strategic objectives. The following principal strategic objectives of forest sector development should be noted:

- Planting of new forests, increase of forest coverage in Lithuania by 3 per cent in the nearest 20 years, seeking to improve ecological stability of the country and to ensure the role of forests in general development of the country-side.

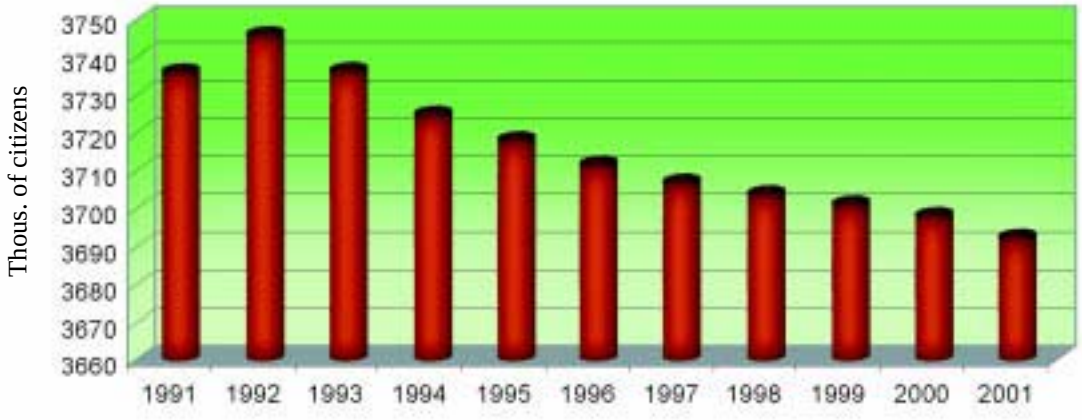
- Development of the training, consulting and education system of private forest owners.
- Formation of legal and economic preconditions, encouraging joining of small forest estates, association and co-operation of forest owners.
- Preparation of a uniform supply system of forest sector, joining the data bases existing in separate institutions to a uniform system and creating the missing dta bases, providing for exchange of information within the forest sector and with external users of information.
- Making the curricula of universities, high non-university and vocational training institutions, paying more attention to education in market economy fundamentals, in stable and sustainable forest sector principles, in application of modern technologies and equipment and to other important forest science fields.
- Increase in the effectiveness of the enterprises that carry out their economic activities in the forests, preparing and implementing the optimal models of economic activity organisation in the forests.
- Enlargement and modernisation of forest nurseries, seeking to ensure the quality of forest seedlings, to minimise their cultivation cost price and to apply modern technique and advanced technologies of forest seedling cultivation more effectively.
- Increase in rational use of fine raw-material timber and felling waste in the domestic market, increasing the volumes of wood-processing industry and the use of this wood for energy purposes.
- Inventory of natural and close to natural forests (in accordance to FAO classification), specification of their protection regime and establishment of new protected areas, first of all in the habitats of the most valuable natural objects.
- Regeneration and cultivation of forests on the ecological-genetic basis, focusing on the cultivation of mixed plantations, hard wood species trees, combining forest planting with natural regeneration, paying special attention to forming stable forest edges.
- Improvement of the unite systems of forest fire prevention and sanitary forest protection at national level, taking into consideration the abundance of small private forest estates.
- Creation of new working places in forest sector, developing different types of forest business, economic encouragement of the development of these types of business (granting of subsidies, soft credits, tax privileges, etc.) in the context of country-side development.

7. Social development

7.1. DEMOGRAPHICAL INDICATORS

Drastic changes of Lithuania's population took place over the last few decades. Before World War II in the present territory of Lithuania three million people lived. Lithuania suffered severe population losses during World War II and the post-war years of active resistance, when about 300 thousand people were killed, more than 400 thousand were deported to Siberia and many others emigrated. Subsequent censuses showed that the pre-war population size had not been regained before 1967. From the beginning of 1960's Lithuania's population size was growing quite steadily for three decades and in 1992 it reached 3.74 million. Immigration from the eastern republics of the contemporary Soviet Union contributed to the growth of Lithuania' population rather essentially.

Since 1993 Lithuania's population size has started to decrease again. This trend has been continuing so far. As the official statistical data presented in Figure 7.1 show, from 1992 till 2001 Lithuania's population size decreased from 3.74 to 3.69 million. However, the data of the general population census carried out in 2001 showed that, in fact, in 2001 Lithuania's population size was only 3.49 million, that is 200 thousand fewer than the official statistics showed. This inadequacy was likely caused mostly by short-term and long-term unofficial emigration.

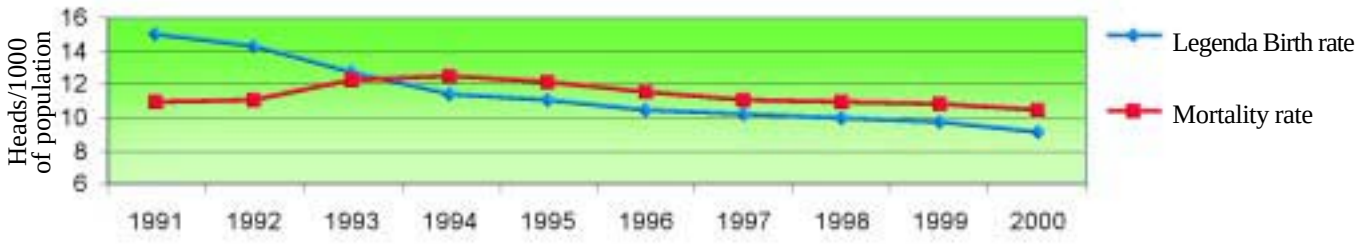


7.1 Changes of population in Lithuania

Birth and mortality rate data during the same period is presented in Figure 7.2. It shows that birth rate was decreasing during the whole period, whereas mortality rate was increasing in 1993-1994 and from 1994 population mortality rate started to exceed the birth rate, that is natural growth of the population became negative. Since 1995 mortality rate has begun to decrease a little, however, since 1994, as birth rate has been decreasing, negative natural growth of population of approximately 0.1% has been registered so far.

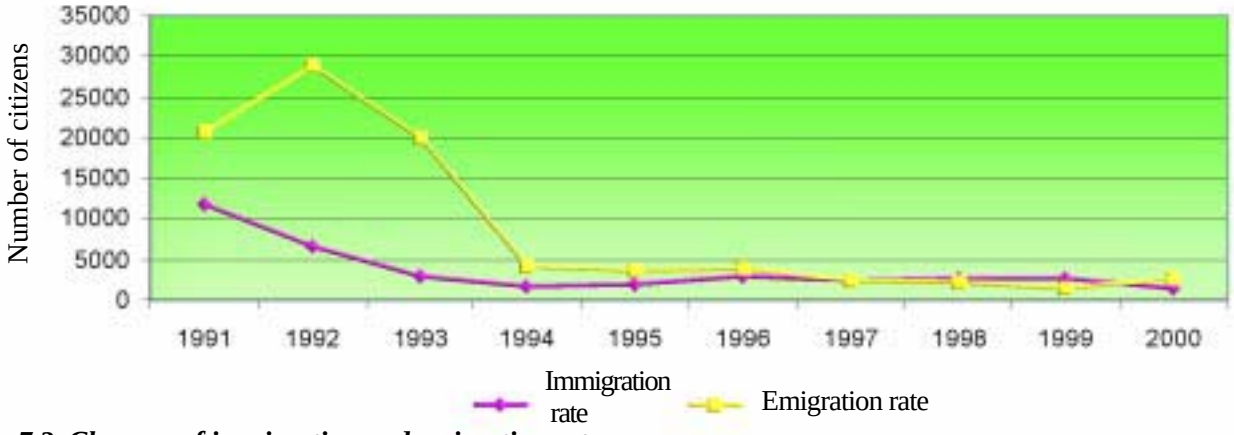
Beside the changed natural growth of population, for the recent decade the fluctuations of the number of Lithuanian population have been greatly influenced by intensified migration (Fig. 7.3). At the beginning of the transition period, migration was very active and especially emigration rate was very high inside the Russian-speaking population of Lithuania. At that time the emigration to the CIS countries accounted for 85% of the total number of emigrants. However, since 1994 the emigration has slackened highly, and quite a great part of former emigrants from Lithuania has came back. In 2000 immigrants from the CIS countries made up over 75% of the total number of immigrants. Since 1996, as both the emigration rate and immigration rate have reduced, the quantities of emigrants and immigrants, in fact, have become the same. These processes have been only slightly influencing the present changes of the Lithuanian population.

The distribution of the Lithuanian population by nationality didn't change significantly during this decade. There were 79,6 percent in 1990 and 81,8 percent in 1999 of Lithuanians living in the country. The number of Russians from 1989 to 1999 decreased by 1,3 percent. The percentage of other nationalities, in fact, didn't change.



7.2 Changes of Birth and Mortality rate

The ratio of rural and urban population didn't change significantly during the decade under consideration. Urban population accounts for 68.1 percent of the total, while rural population makes up 31.9 percent of the total. The migration pattern "from rural to urban areas" changed: land restitution and privatisation, a downfall in the manufacturing sector, and increase in unemployment and housing related difficulties contributed to the decrease in the migration of rural residents to the towns and cities. However, urban inhabitants migration to rural areas increased especially at the beginning of the transition period.



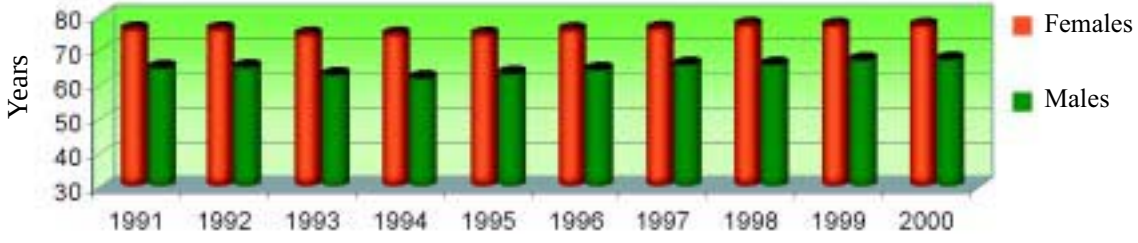
7.3 Changes of immigration and emigration rates

Average life expectancy at birth is an important indicator of a society's wellbeing and its state of health. During this decade this index was changing quite significantly (Fig. 7.4). According to the data presented, the average life expectancy at birth of females is considerably greater than males. This is a characteristic feature of all the countries, but in the EU countries this difference accounts for about 7 years on average. In 1994 in Lithuania it increased to 12 years and at present it makes up about 10 years. Since 1991 the average life expectancy at birth of males has been reducing quite significantly. In 1994 it reached the minimum of 62.7 years, that is nearly four years less than at the beginning of the transition period and almost 10 years less than in the European Union. The average life expectancy at birth of females did not reduce so significantly and in 1994 this index was only 4 years less than in the European Union.

Since 1995 a quite obvious increase in average life expectancy at birth has been registered in Lithuania. In 2000 the average life expectancy of males and females was approximately by 2 years higher compared to that at the end of the Soviet period. At present the average life expectancy of females is less by 1.5 years and the average life expectancy males is less by 5 years than it is on average in the European Union. There are great differences in average life expectancy at birth of rural and urban population: it was 74,0 years for urban population and 70,0 for rural population in 2000.

After the restoration of the state independence and the rapid transformation of social and economic structures, significant changes occurred in family relationships and family models. Divorce rate per 100 marriages increased from 44 to 65 during the decade. About 40 percent of women aged 30 and older are single, widowed or divorced. During the last decade, changes in family behaviour and family attitudes were

particularly evident among young families (couples younger than 30). They play an important role in demography and in forming future family models. In 1990, 125 men and 117 women were married per 1,000 men and women aged 20-24, whereas in 2000 the figures were 48 for men and 56,7 for women, respectively. The decrease in the rate of marriage of young people differed in urban and rural areas. In 1990, 116,4 per 1,000 urban men aged 20-24 were married, whereas in 2000 the figure was only 45,5. Respectively, for women the figures stood at 108,3 and 53,3. In rural areas in 1990, 148,6 men aged 20-24 were married per 1,000 men of this age group. In 2000 the number was 54,4. Respectively, the numbers for women were 89,8 and 62,1.



7.4 Changes in the average life expectancy at birth of Lithuanian population

Changes in the family model have led to a decrease in the birth rate in absolute numbers and relative to mortality rate. This has resulted in negative population growth as well as in the accelerated ageing of the population.

7.2. PUBLIC HEALTH

The health care system was fundamentally reorganised during the last decade. In 1997 the health care system financing was changed, making a transition from budgetary allocations to statutory health insurance. In 1993-1996 wholesale and retail trade in medicines and part of dentistry services were privatised. The majority of health care institutions were reorganised into non-profit institutions in 1997.

The Ministry of Health Care of Lithuania controls the general health care system. At present the health care system is divided into three levels:

- primary health care services;
- secondary-level services;
- tertiary-level services.

The main institution responsible for public health care administration is State Public Health Service. It manages public health network, including ten Public Health Centres in the counties and specialised regional ones. The organisations subordinate to State Public Health Service - specialised public centres - take care of infectious disease prevention, the prophylactics of chronic non-infectious diseases, the promotion of healthy lifestyles, healthy environment, nourishment, dissemination of information and do other public health care work.

Among the most important indicators on availability of health care in a country are the number of doctors and available hospital beds per 10,000 population. From 1990 to 2000 the number of physicians and dentists did not change significantly (Table 7.1), but the number of hospital beds decreased from 123 per 10,000 population to 92. This could be explained by more rational use of the resources and by implementation of reforms in the sector.

Free medical services for all Lithuanian citizens in state medical treatment institutions are regulated by Article 53 of the Constitution of the Republic of Lithuania, by the Law on the Health Care System and the Law on Health Insurance.

Overall infant (less than 1 year of age) mortality rate improved over the past 10 years from 10.3 deaths per 1,000 live births in 1990 to 8.5 deaths in 2000. The peak of infant mortality rate came in 1992 with 16.5 deaths per 1,000 live births. So, infant mortality was almost halved during the past 8 years. Infant mortality rates are higher in rural than in urban areas (Fig. 7.5). In 2000 in urban areas, infant mortality rate was 8.0 deaths per 1,000 live births, and in rural areas 9.2 deaths per 1,000 live births.

In 1992 a multiple-leveled system was created for the health care of expectant mothers and new-borns. In this system, mothers delivering with different risk levels as well as sick new-borns were guaranteed an appropriate level of health care. On the basis of this system, different-level hospitals were supplied with the necessary diagnostic and medical equipment ensuring timely and qualified medical care in complicated situations.

The number of children having various health disorders increased from 1991 to 1998. According to yearly preventive health examinations, out of all children under 16 years of age 58,6 percent were completely healthy in 1991, while only 48,5 percent were completely healthy in 1998. Out of total number of preventively examined children of 7-15 years of age 12.4 percent had some sight disorders, 8.5 percent - carriage disorders, 2.4 percent - scoliosis and 2.6 percent had speech disorders.

Over the past decade three main causes of mortality that caused over 85 per cent of total deaths were cardiovascular diseases, cancer, and external causes (suicides, transport accidents, accidental drowning, accidental alcohol poisoning, and homicide, etc.) (Fig. 7.6). The data presented below show that in 1993-1995 mortality rate increased significantly. However, since 1996 it has started to decrease, and, except for the deaths from malignant tumours, at present it is less than at the beginning of last decade.

Table 7.1 Number of physicians, dentists and pharmacists per 10,000 of population

Medical personnel	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Physicians	40.4	38.9	39.1	39.3	40.2	39.7	39.8	39.8	39.5	39.4	38.0
Dentists	6.0	5.7	5.5	5.2	5.0	4.7	4.6	5.8	6.1	6.2	6.6
Pharmacists	5.4	5.3	5.3	5.3	5.5	5.5	5.9	5.8	5.8	5.8	5.7

Table 7.2 Health of children (results of preventive health examinations)

Indicator	1991	1992	1993	1994	1995	1996	1997	1998
Total of examined children of 0-15 years of age, thousand	888.1	883.6	872.5	865.1	849.9	840.5	799.7	793.6
Out of that completely healthy, %	58.6	59.2	57.4	53.9	51.9	51.2	50.0	48.5

Mortality rates from cardiovascular diseases decreased from 615 deaths per 100,000 population in 1990 to 566 deaths in 2000 after peaking in 1993 with a rate of 672 deaths. The 2000 mortality rate for cardiovascular diseases in rural areas was 83 percent greater than in urban areas.

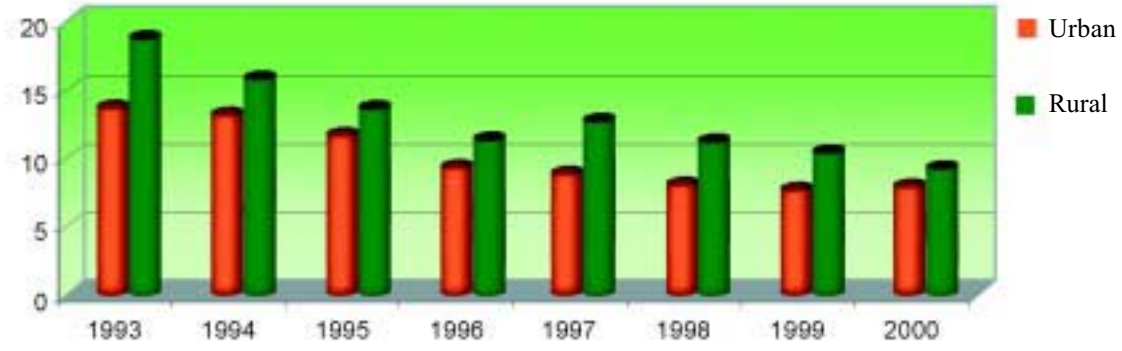
The number of people suffering from malignant tumours was gradually rising from 278 per 100,000 population (1990) to 379 (2000). When speaking about cancer in men, malignant lung, prostate and stomach tumours prevail. In women malignant tumours of breast, stomach and uterus prevail. Mortality rates from cancer increased steadily from the rate of 188.0 deaths in 1990 to the rate of 209,0 deaths in 2000. The 2000 cancer mortality rate in rural areas was 35 percent greater than in urban areas.

Mortality rates due to various external causes increased from the rate of 119 deaths in 1990 to a peak of 186 deaths in 1994 and then decreased, as it was mentioned, to the rate of 138 deaths per 100,000 population in 2000. The 2000 mortality rate due to external causes in rural areas was 61 percent greater than in urban areas. Lithuania has one of the highest suicide rates in the world. During the past decade the peak for suicides came in 1996 with an overall rate of 46 per 100,000 population. From then it declined to 42 in 1999, but it rose again to 44 in 2000. Transport accidents are the second major external cause of death for Lithuanians. The rate of 52 deaths per 100,000 of all the population for rural males is very high.

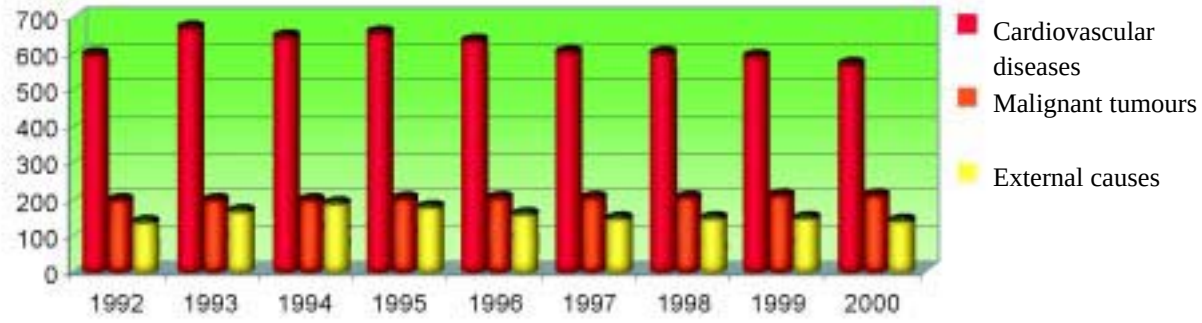
The number of people suffering from tuberculosis in Lithuania is falling from 1998, when it reached the peak of 81 new cases per 100,000 population. In 2000 it constituted 72 per 100,000 population. The incidence of tuberculosis is considerably higher in rural areas than in urban areas.

HIV infection remains low compared to many European countries, but the number of HIV carriers is growing. The patterns of transmission are similar to those in the neighbouring countries. 65 percent of the HIV transmission in Lithuania occurs via sharing of injecting equipment among injecting drug users. According to the Lithuanian AIDS Centre, 266 cases of HIV infection were registered in Lithuania in 2000, and in 2001 the figure increased to 573 cases. The majority of HIV positive persons are younger than 30 and the major share of new infections occurs mostly among young people under 25. Therefore, the youth as the most sexually active group are seen as a whole in need of special consideration, resolutely strengthening education in imprisonment institutions.

Health care in Lithuania is regulated by the laws adopted by the Parliament. The Law on Health Care System (1994) created a legal basis for the development of health care policy and defined the roles of state and local authorities in managing health care system. The Laws on Health Care adopted in 1996



7.5 Infant mortality rate (per 1,000 live births)



7.6 Population mortality by the main causes

created preconditions for the introduction of health insurance and the accreditation of health care institutions.

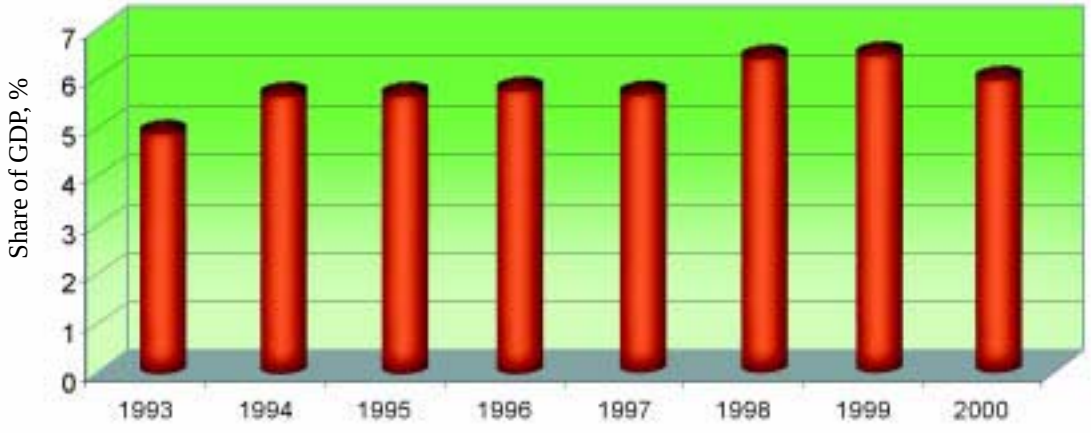
The National Health Programme was adopted by the Parliament in 1998, and the National Public Health Care Strategy was adopted by the Government of the Republic of Lithuania in 2001. The main objectives of the health care system are as follows:

- To carry out the health policy focused primarily on disease prevention, promotion of healthy lifestyles, health preservation and improvement;
- To optimize the network of health care institutions giving priority to primary health care;
- To improve the management and funding of health care aiming to achieve the general health reform objectives;
- To encourage investments in high-quality medical services;
- To make use of the potential of private medical and voluntary health insurance in improving the quality of services and offering patients greater choice;
- To improve accessibility of health care services, their quality and effectiveness;
- To reduce population morbidity and disability rates and to achieve further rise of average life expectancy at birth;
- To bring the health care system in line with the European Union standards;
- To ensure sustainable development of the health care system across all the areas of health care and in all the country's regions through a gradual investment process.

7.3. EDUCATION AND SCIENCE

During the recent decade important reforms were being carried out in the education system, including a structural reform, introduction of new types of schools and a curriculum reform. The three priorities of the reform are education accessibility, quality and compatibility. Over the period 1993-1999 the share of funding allocated for education increased from 4,8 percent to 6,5 percent of GDP. In 2000 the percentage of GDP allocated for education decreased to 6 percent (Figure 7.7).

One of the most important indicators characterising the state of education is its accessibility. Educational opportunities are unevenly distributed territorially depending on the size of the population, the economic structure, the demand for labour and other regional economic factors. The problem of an uneven distribution of educational institutions is solved ensuring the mobility of pupils and students. Transportation is made available for pupils from rural areas where primary or basic schools are too small to function.



7.7 Changes in the share of GDP allocated for education

Along with the economic difficulties caused by the recession, advocacy for the stronger role of a family has contributed to a decreasing number of nurseries and kindergartens in the country. In 1990 there were 813 pre-school establishments in urban areas and 868 in rural areas. The number of pre-school institutions decreased significantly during the last decade, especially in rural areas. In 2000 there were 501 pre-school institutions in urban areas and 213 in rural areas. Thus the number of pre-school establishments in rural areas decreased by 75,5 percent and by 38,4 percent in urban areas during the decade. Alongside with the decreased number of pre-school establishments, the number of seats in those establishments was reduced in urban areas from 169.020 in 1990 to 71.890 in 2000, while in rural areas from 40.500 to 10.470 respectively. The number of children in pre-school institutions decreased from 163.170 in 1990 to 90.080 in 2000. However, in recent years the increase in the number of children attending pre-school has been observed. The total number of children attending pre-school institutions during the past five years grew by 11 percent (in urban areas grew by 16,3 percent and in rural areas - only by 3,2 percent).

In 1993 about 6.5 percent of 7-10 years old and 10,9 percent of 11-15 years old children were not attending schools. Since 1994 the situation concerning enrolment is changing for the better. There was 97,7 percent enrolment ratio of 7-10-year olds in schools and 94,4 percent - for 11-15-year olds in 1998 (Table 7.4).

The total number of pupils and students per 10.000 population decreased from 1830 to 1790 at the beginning of the transitional period in Lithuania. However, it has been increasing since 1995, and in 1997 it exceeded the level of 1990. At present it accounts for more than 2090 (Figure 7.8).

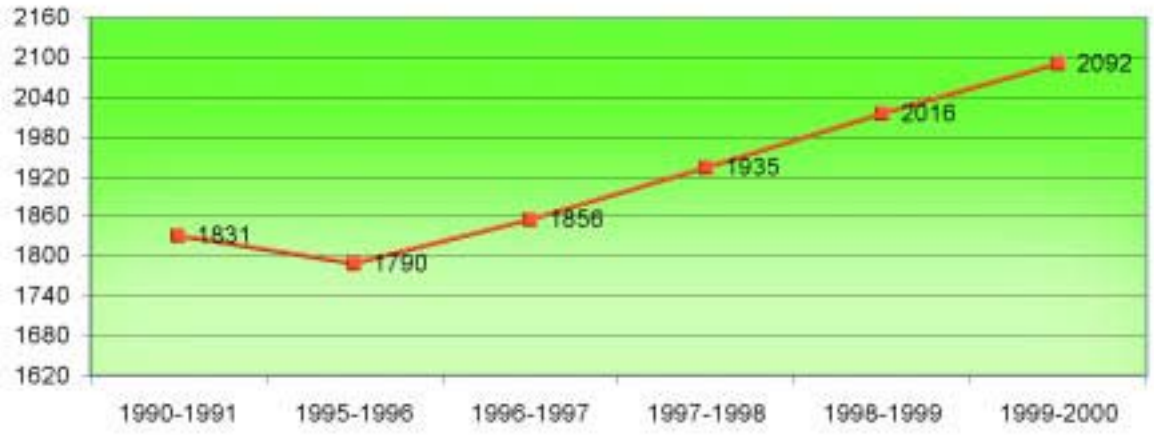
Particular attention in Lithuania is paid to children under 16 years of age who do not attend basic school. According to the Constitution and laws, education is compulsory for children until they turn 16. In the past

Table 7.4 School enrolment by age, %

Levels of education	Primary	Lower secondary	Upper secondary
Age groups of population, years	7–10	11–15	16–18
1993	93.5	89.1	72
1994	94.1	89.1	73.7
1995	94.9	90.8	76.2
1996	96.7	90.9	81.2
1997	96.8	93.4	82.8
1998	97.7	94.4	87.4

decade the number of drop-outs from elementary school decreased from 10.000 pupils in 1991/1992 school year to 4.800 schoolchildren, that is more than twice.

At the beginning of the transition period the number of students in universities decreased from 67 thousand in the academic year 1990/91 to 51.5 thousand in the academic year 1994/95. From 1995/96 the number of students at Lithuanian universities started to increase rapidly, and in the academic year 2000/2001 it exceeded 95 thousand, that is it exceeded the level that was at the beginning of the decade by more than 40% and the level of 1994/95 by 85 percent.



7.8 Number of pupils and students per 10.000 of population

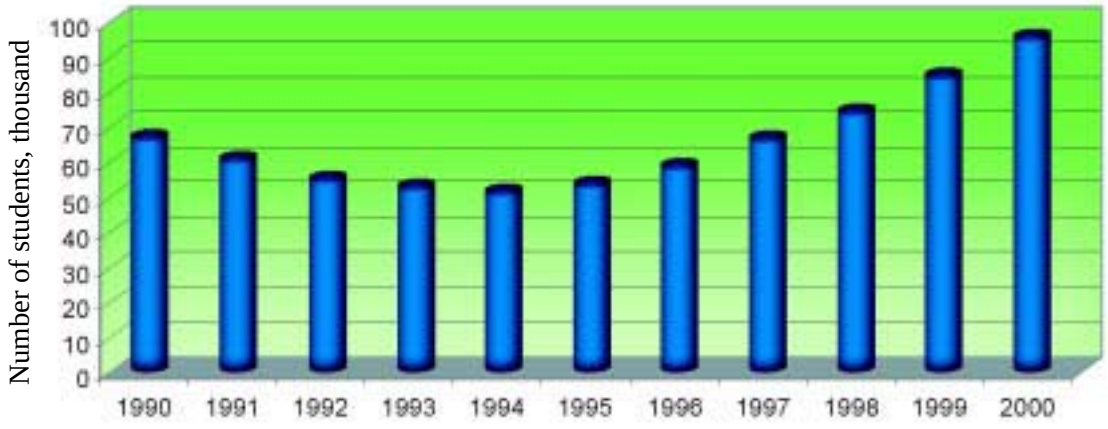
At present the Lithuanian higher education and research system includes19 university-type higher education institutions (including 15 state universities and academies, two church seminaries and two private higher education institutions); 16 colleges (including nine private), 26 state science and research institutes and 25 research establishments (nine of them were founded by and are subordinate to state universities). The system also includes science and technology development centres as well as business entities engaged in scientific and applied research.

The total number of research and development (R&D) institutions in Lithuania increased from 86 in 1995 to 121 in 1996 and then decreased to 104 in 1999. The main part of Lithuanian R&D capacities is concentrated at universities and state institutions.

The reform of Higher Education and Research is aimed to increasing the efficiency of the system and expanding co-operation between research and industrial sectors. In addition, efforts are being made to make more efficient use of the country's academic potential in order to meet the needs of the national economy, culture, education and social sector as well as streamlining the use of state budget funds allocated for higher education and research.

In implementing the country's higher education and research reform the following initiatives are underway: the improvement of the legal basis of the system; introduction of new funding methodology tied to goals and achievements; and implementation of a structural reform of the system.

Research and development area financing sources come from state budget funds (57.9 percent in 2000), customers' funds (12.1 percent) and other sources (30.0 percent). Total expenditure on research and development increased from 114,9 m LTL in 1995 to 269.9 m LTL in 2000. Correspondingly, the expenditure on R&D as a



7.9. Number of students at Lithuanian universities

percentage of GDP increased from 0.48 percent in 1995 to 0.60 percent in 2000.

As for computer training in schools, there is a big shortage of computer classes in the majority of the institutions. Scarcity of financing and lack of qualified teachers are main reasons for inadequate computer literacy. Insufficient investment in education as far as computer instalment in schools is concerned does not allow young generation to fully benefit from the advances in world technology and impedes the creation of information society. The reform of the IT sector is carried out by taking into account the four priorities outlined in the national information society development strategy: general computer literacy; public administration; electronic business; culture and language.

The importance of environmental education and public awareness is emphasised in the Lithuanian Environmental Protection Strategy (1996) approved by the Government. Since 1996 the Commission of Education and Information Co-ordination for sustainable development issues has been functioning at the Ministry of Environment. It includes representatives of the ministries, scientific institutions, business organisations and NGOs. The main task of the Commission is to co-ordinate information and present guidelines to state, municipal, scientific and study institutions as well as to NGOs concerning the implementation of main legal acts of the Republic of Lithuania and international agreements on the issues of public awareness and education on sustainable development.

In 1998 the Government approved the Lithuanian Strategy and Action Plan for Environmental Education for 1998-2002 based on Chapter 36 of the UN "Agenda 21". The main goal of the Strategy is defined as dissemination of information on sustainable development. The Lithuanian Strategy and Action Plan for Environmental Education involves various actors: kindergartens, secondary schools, vocational schools, colleges, and universities (formal education system) ministries and subordinate institutions, local authorities, scientific institutions, business entities, mass media, NGOs, etc (non-formal education system). Specific objectives and tasks are formulated for the institutions (groups) to disseminate information both in formal and in non-formal way.

By the initiative of the Ministry of Education and Science together with the Bureau of Regional Environmental Centre, the project to reorient education towards sustainable development "Education for Sustainable Development" financed by the United Nations Development Programme started to be implemented in Lithuania in 2000. Education for sustainable development takes an interdisciplinary approach incorporating social, economic and environmental issues. It is thus a broader concept than traditional environmental education focusing on the protection of and care for the environment. Project activities cover wide spectrum of educational institutions: pre-school to upper secondary education and formal adult education; universities and other institutions of higher education; non-formal education. Implementing this project Strategy and Action Programme for the Education Sector of the Baltic Sea Region Agenda 21 - was devised. It was approved on 24 January 2002 by the ministers of Education of the states of the Region (Lithuania and Sweden were appointed as the leading states in drafting the aforementioned strategy and action programme). On the basis of the provisions of the Education Sector Strategy and Action Programme of the Baltic Sea Region Agenda 21, the Ministry of Education and Science started to draft an Action Programme for the country's Education sector of Agenda 21 that will renew a part (devoted to formal education) of the finishing Action Programme of Lithuanian Environmental Education Strategy.

Country Office of the Regional Environmental Centre for Central and Eastern Europe has initiated national project "School Agenda 21". The aim of the Project is to encourage schoolchild and teachers to take interest in and solve the issues of their community and initiate sustainable development programme of the school. In implementing the project, teachers acquired knowledge about sustainable development and integration of its principles into their curricular, extra-curriculum activities and school management, got acquainted with active learning methods and activity examples at school as well as encouraged schoolchildren to take interest in community problems and participate in their solving.

events to commemorate the World Earth Day and the World Environmental Protection Day as well as actions of tree-planting, festivals of birds receiving and seeing them are organised.

In implementing the general educational reform in Lithuania it is intended to speed up the formation of free, independently-thinking and acting individuals and an open democratic society, to build an education system guaranteeing a right to science and possibilities to continue it for everyone. The following basic activities have been planned for several coming years: to ensure compulsory education for everyone; to optimise general education financing and

Non-formal environmental education institutions such as the Ministry of Environment, other ministries, local governments, scientific and study institutions as well as NGOs play a very important role in implementing the objectives and tasks of environmental education. In the Law on Environmental Protection of the Republic of Lithuania, the Ministry of Environment is committed to co-ordinate environmental education and inform the society on the state of environment. The Ministry of Environment and institutions under it permanently inform the public on the most important environment events by national and local media, annually organise, publish and distribute a survey on the state of environment in Lithuania called "Aplinka" ("Environment"), yearbooks of the quality of Lithuanian river water and air as well as other publications. Every year all over Lithuania

school network; to renovate and construct schools; and to foster self-expression of schoolchildren and extra-curriculum activities for them.

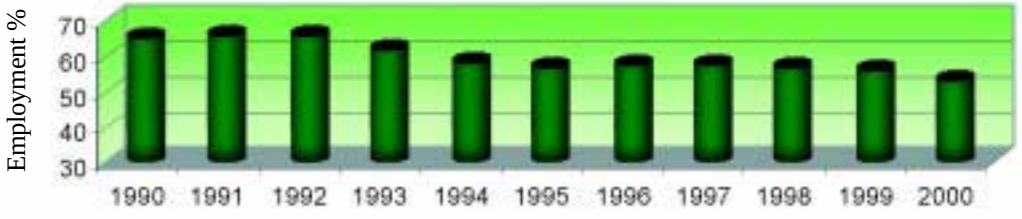
One of the strategic goals of vocational education is to establish a system ensuring that workforce qualifications comply with not only Lithuanian, but also with foreign labour market needs and helping them to adjust to the rapid structural and technological changes.

Basic efforts to guarantee education quality are directed towards satisfying the needs of the information society with particular emphasis on the supply of schools with computer hardware and software. The establishment of a Lithuanian education information system and an education quality management system will be continued.

7.4. EMPLOYMENT

During the last decade very broad and intensive economic transformations in Lithuania resulted in radical changes in employment. Employment trends over the previous decade are characterised by the emergence of unemployment, structural unemployment in particular, unofficial employment and a decrease in total employment. The data presented in Fig. 7.10 show that at the beginning of the transitional period, employment was decreasing quite rapidly. In 1995 it came to the minimum of it - 57.5%. In the second half of the decade, employment fluctuations were insignificant. From 1996 when the economy was slowly recovering, employment started to grow. However, due to the repeated economy depression in 1999, employment decreased again. During the whole period, female employment was 5% less than that of males.

During this decade, employment changes according to the types of economic activity and professions occurred. That caused a decrease in employment in the industrial sector and an increase in the share of total employment in the services sectors. An increase in employment in the private sector coincided with a reduction in the role of the state in regulating employment and labour relations.



7.10 Changes of Employment

Employment by the main economic sectors is presented in Fig. 7.11. It shows that in 2000, 20.1 percent of the labour force worked in industry and 6.1 percent in construction. The services sector is developing fast, 54.2 percent of the labour force was employed in it in 2000. 19.6 percent of the labour force was employed in agriculture, though the share of GDP produced in the sector is two times smaller (Chapter 6.1). That shows low labour productivity in the agricultural sector.

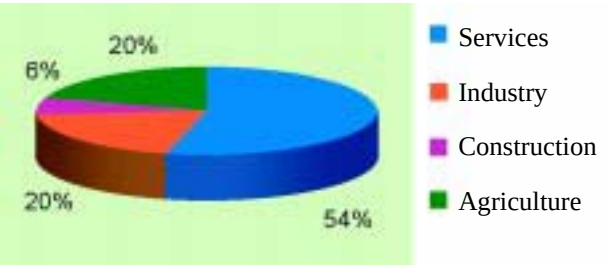
During the period of economic transformation there were obvious changes in territorial employment differentiation, especially in urban and rural employment. Regarding territorial employment differentiation, Lithuania can be divided into three regions:

- Predominantly agricultural regions are in the worst employment situation.
- Regions dominated by industry. Many enterprises have succeeded in re-orienting their production and function relatively effectively under market conditions; therefore employment is the highest in these regions.
- Large cities with the best employment situation and the highest investment activity.

The main problems of territorial employment differentiation in Lithuania are discrepancies in job opportunities and earnings between the regions as well as impeded territorial and occupational labour force mobility.

The enhancement of labour market flexibility is one of the necessary conditions when creating market economy that is competitive and easily adaptable to external changes, reducing labour market disproportion in the regions. It can be accomplished by creating more flexible forms of employment and earnings, removing unnecessary limits to labour market, encouraging labour force mobility and creating new jobs. In the Labour Code adopted in June 2002 it is stipulated that the Government of the Republic of Lithuania by the proposal of the Trilateral Council may establish different size of minimal earnings for individual economic branches, regions or worker groups.

The restructuring of economy, privatisation, development of market relations, other internal and external factors have determined the growth of unemployment. According to the number of the unemployed registered at the Labour Exchange, the unemployment rate rose from 4,4 percent in 1993 to 11,5 in 2000. However, special surveys carried out by the Department of Statistics indicate a much higher level of unemployment. A maximum unemployment rate of over 17 per cent was reached in 1994 -

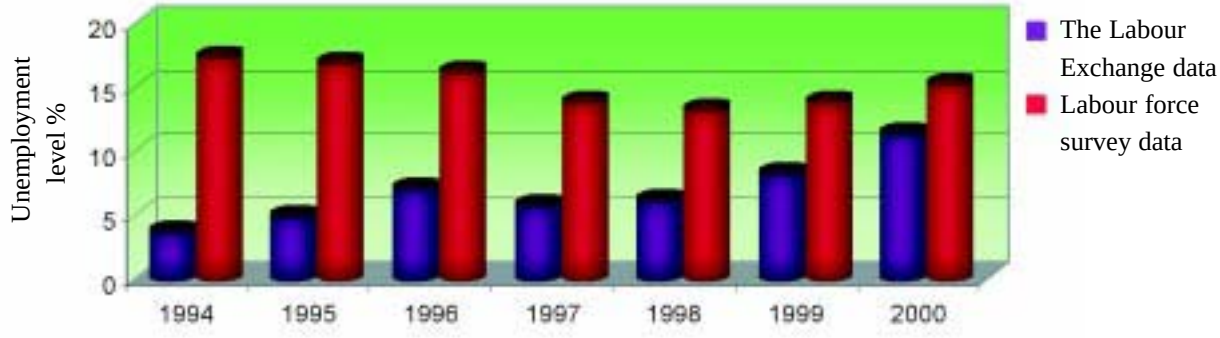


7.11 Employment according to the economic sectors

1995 (Fig. 7.12). Since 1996 the real unemployment rate had been decreasing, but since 1999 it has been increasing because of the reasons mentioned above. At present it makes up approximately 15 per cent.

Unemployment, first of all, affects young people lacking work experience and persons without relevant skills and qualifications. Young people - even those with good education or who are trained in a profession - have difficulties 'entering' the labour market. Young people with no qualifications and little education have an extremely difficult time finding work. According to the Labour Exchange data, the unemployment rate of the young amounts to nearly 30%. Approximately half of the young people out of work have no qualifications (just primary or basic education).

There are quite significant regional unemployment differences. The difference between the highest territorial unemployment level and the lowest territorial level was 3.5 times in 2000. According to the Labour Exchange data, the highest level of unemployment was 27 percent in Druskininkai, while the lowest was in Trakai and Kretinga - 8.1 percent. Unemployment, particularly long-term, is spreading among rural residents. A recent new negative phenomenon in Lithuania is formation of so-called 'problematic regions', i.e. densely populated territories with marginalized people with high unemployment rate.



7.12 Changes of unemployment rate

The relatively high level of unemployment becomes one of the burning social issues blocking the way for people from all social strata to make use of the benefits of market economy and the results of economic reforms and also preventing from poverty reduction and elimination.

The deficiencies characteristic of the present system of the benefits for the unemployed are as follows:

- Financing of active and passive political measures of labour market is not separated (at present the measures mentioned is funded from one source - by the State Social Insurance Fund);
- The amount of unemployment benefit is not related to the previous earnings;

The main reorganisation objectives of unemployment insurance are as follows:

- To ensure the payment of unemployment benefits in accordance with insurance principles;
- To reorganise the financing system of unemployment insurance;
- To ensure minimal social security in the case of unemployment in accordance with the amended European Social Charter;

In order to implement the aforementioned objectives, it is provided for:

- Defining the provisions of laws giving a right to receive an unemployment benefit;
- Shortening the compulsory insurance period giving a right to receive an unemployment benefit;
- Relating the amount of unemployment benefit to the previous earnings;
- Making use of funds of unemployment social insurance only for paying unemployment benefits to the insured;
- Funding active political measures of labour market by the state budget.

The Employment Increase Programme for 2001-2004 approved by the Government in May 2001 defines the strategic policy objectives of employment and labour market. They stipulate to surmount the negative outcomes of the structural economic reform and the external impact on employment and labour market, to decrease unemployment and to balance labour market. Implementing the Employment Increase Programme, it is expected to stop unemployment increase and to consistently decrease registered unemployment to 7-8 per cent. The same objective to decrease the level of unemployment to approximately 7 per cent was specified in the Long-term Economic Development Strategy of Lithuania for 2001-2015.

In the period of the Employment Increase Programme favourable conditions for business development and investments should be created. It is expected that it will help to create 110,000 -120,000 new jobs. It would allow to further increase employment till it reaches the average level of the EU member states - the employment of 70 per cent.

In Lithuania among the actions to combat the negative consequences of the structural economic reform and external impact on employment and the labour market, the priority is given to active unemployment reduction measures. Five guidelines for implementation of the unemployment reduction policy are envisaged:

- Development of a job creation system (development of the system of jobs, promotion of local employment initiatives);
- Development of the support for employment (activation of the labour market policy, growth of employment capacities, development of vocational training, strengthening of employment and social policy cohesion);
- Improvement of adaptability to changes (development of flexible forms of work organisation and remuneration, in-service training of employees, diminishing of the consequences of the structural changes);
- Enhancement of equal opportunities in the labour market (labour market open to everyone, equal opportunities for men and women in the labour market, support of employment for the disabled);
- Enhancement of integrity of the employment policy (development of employment and labour market management system, strengthening and reorganisation of the institutional system of the labour market, development of an open labour market, development of the system of private employment agencies).

The improvement of the situation on the labour market will finally be determined by uniform economic development, favourable business and investment environment, and flexibility of the labour market. In this respect, the Government of the Republic of Lithuania treats the employment policy as an integral part of overall economic and structural reforms.

7.5. HOUSING

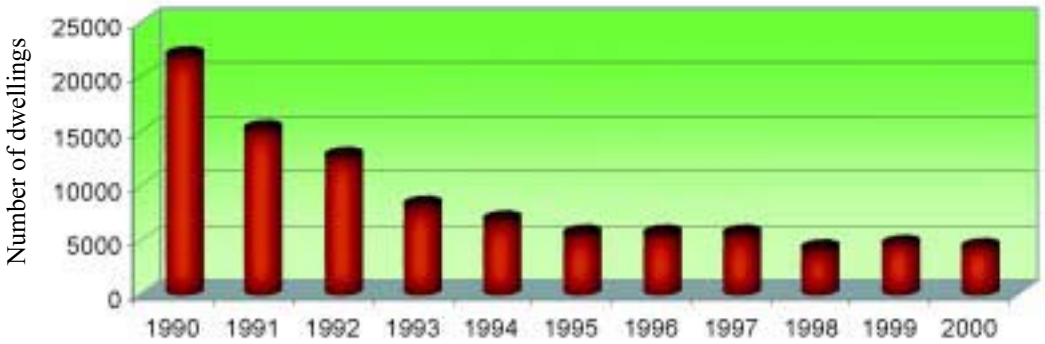
After the restoration of independence of Lithuania, the housing policy and construction process changed in essence. Formulating a housing provision policy, Lithuania rejected the monopolised state system of dwelling construction and distribution. It was changed to housing purchase. Residents acquired a right to choice, and the state reserved for itself a responsibility for the housing provision for socially supportable and the most vulnerable groups of society. Legal and economic conditions were created for state housing sector privatisation as well as favourable conditions for long-term financing of housing loans. State and private sector funds as well as the funds of housing communities were raised.

However, dwelling construction reduced nearly 5 times because of general economic recession from 1990 to 2000 (Fig. 7.13). The major part of newly built dwelling places is in towns and cities (79%). At the same time average total floor space per new dwelling increased from 66 sq. metres to 113.5 sq. metres during this period, mostly due to the leap in construction of individual houses. The share of individual houses increased from 10% in 1990 to 39% in 1999.

Almost three quarters of dwellings in Lithuania were constructed in 1961-1996. Approximately 80% of these dwellings are in multi-storeyed buildings made of blocks are subject to ineffective energy consumption, to improper maintenance and repairs, poor technical quality and technical infrastructure of the buildings. The renovation of those dwellings, wall warming and the change of windows and maintenance improvement are the most important tasks to improve housing conditions.

For the past decade the dwelling ownership has been changing rapidly. Carrying out the first stage of privatisation in 1991-1995 the majority of dwellings were privatised for investment cheques and cash. In 1990 less than 40% of Lithuanian citizens lived in private dwellings while in 2000 - 96.9 % of them. Only 2.5 percent of rural dwellers and 3.6 percent of urban dwellers lived in state-owned or municipal flats in 2000.

The number of rooms per household provides important characteristics of a dwelling. According to the data of the Lithuanian Living Conditions Survey, the majority of Lithuanian households live in a 2-3-room flat or house. Among households having only one room, the majority



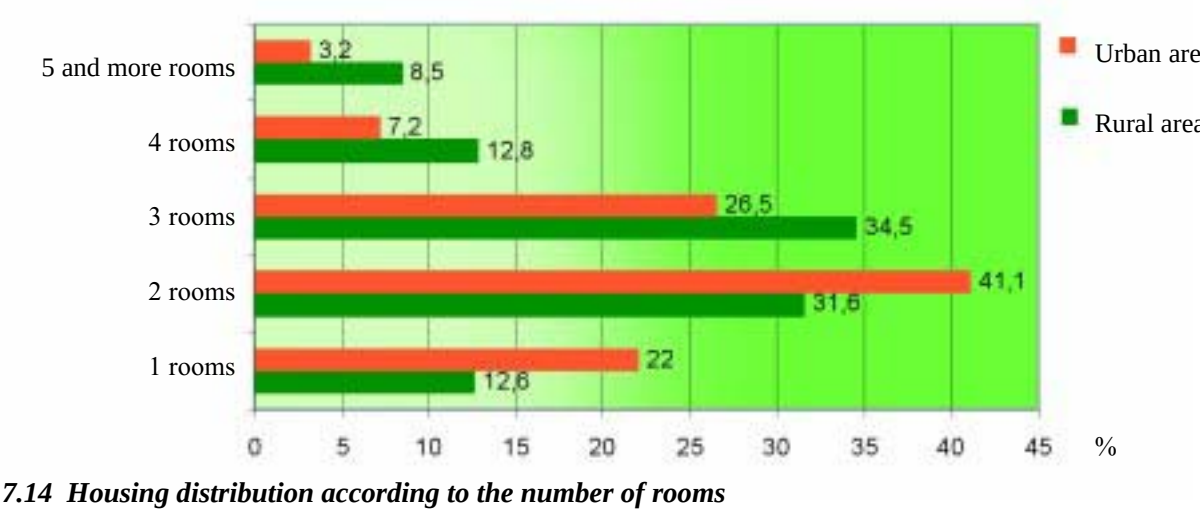
7.13. Number of annually completed dwellings

Average useful floor space per dwelling makes up 59.2 m^2. Dwellings in urban areas are smaller (55 m^2) than in rural areas (69.4 m^2). Quite a clear difference in housing provision between urban and rural areas has remained: total useful floor space per capita of urban population is 20,9 square metres, whereas in rural areas - 24.6 m^2. During the decade the number of dwellings increased by 31%, and useful floor space per new dwelling increased by 73%. Total useful floor space per capita increased by 14%.

are urban-dwellers, while rural dwellers more frequently live in large dwellings - 4 or 5 and more rooms (Fig. 7.14).

The qualitative indices of housing are better in urban areas. About 90% of dwellings in urban areas are equipped with central heating, water supply system and sewerage, whereas in rural areas - only 40-45%.

Public technical infrastructure should be improved in rural dwellings. In urban areas the problem of housing shortage should be solved and the spatial and thermal parameters of a dwelling should be improved. Technical



7.14 Housing distribution according to the number of rooms

standards of newly constructed dwellings are much higher - up to 96% of new dwellings are equipped with municipal conveniences.

According to the data of the Living Conditions Survey in Lithuania, the majority of Lithuania's population - 52.8% - lives in multi-storeyed houses. The share of residents living in private houses is quite large as well - 43.6% and is constantly increasing. The majority of rural population - 81.8% and only 20.8% of urban dwellers live in individual houses. The latter percentage has grown only on account of smaller towns, and only 5% of total population lives in individual houses in the capital city Vilnius.

In Lithuania there are more than 30 thousand blocks of flats. The majority of them are privatised. The demand for investments in the repairs and restoration of the present housing resources is not investigated. Only the demands for warming of houses have been generally evaluated that amount to 5.5 billion USD. Taking that into consideration, Regulations of Thermo Technical Requirements of Buildings has been prepared and long-term loans for the programme of energy saving are foreseen.

From the beginning of the last decade with the prices for heating and hot water rising one of the main tasks of housing policy was to encourage residents, communities of dwelling owners and state enterprises to save energy by renovation and warming dwellings. Since 1997 flat owners have been able to obtain technical assistance and loans for the preparation and implementation of energy projects. Besides, if expenses for heating and hot water exceed 2.5% and 5% of a family's incomes respectively, they are indemnified.

Promoting renovation, modernisation of blocks of flats and seeking to increase their energy effectiveness, the Housing Financing Fund was established in 1994 (in 1999 it was reorganised into a public institution called Housing and Urban Development Fund). Its objective is to concentrate financing resources, including loans on behalf of the state, and direct them to the financing of the projects to renovate blocks and to increase their energy effectiveness. Through this fund the agreement with the World Bank was signed in 1996 concerning 10m USD loan to finance the projects to increase housing energy effectiveness. The project helped create a relevant financing mechanism, promoted the initiative of the communities of multi-flat house owners to manage the household and invest their capital. The demand for the resources of this fund was especially stimulated with the Resolution of the Government establishing that the communities of flat owners could cover up to 30 per cent of the estimated value of the investment project using the resources of this fund.

The increase in prices for heating and hot water is a very important issue of the housing sector because expenses for housing heating and hot water make up a great share of a family's expenditures - around 14%. If there are no possibilities found to modernise the heating system and to lower the prices for heating supply, the started process of residents' disconnection from the centralised heating supply network can make a lot of problems and increase air pollution in the future.

Though during this decade 95 thousand dwellings were constructed having the total area of 7840 thousand m^2, the shortage of housing remains the main issue. In 2000 104.4 thousand families were waiting for the state support in acquisition of residential space (Table 7.5). As there is a very small housing fund of municipalities, it is possible to satisfy only minimal social housing needs.

Lithuania managed a great job preparing the legal system of the housing sector substantiated by the market prin-

ciples. The basis was formed when the Government approved the Housing Programme in 1992. Together with the aforementioned principles of the programme, the target to build 12-14 thousand flats annually was put forward in the Housing Programme. However, due to the decrease in construction capacities, it has not been carried out.

The adopted Law on Procedure, Terms and Conditions of Restoration of the Ownership Rights of the Citizens to the Existing Immovable Property has formed a legal basis for compensation or restoration of the existing immovable property for the former owners. The Law on Privatisation of Flats adopted in 1991 allowed the citizens living in the flats belonging to the municipality or the state to purchase them. In this case, residents could pay in cash, defray 80% paying by investment cheques or pay in instalments, having paid the first 10% contribution of the total price.

The Law on Residents' Acquisition of Residential Space stipulates that every citizen has a right to a dwelling by means of constructing it or purchasing it on the market or renting it from the municipality and other legal entities. The size and quantity of dwellings belonging to one citizen are not limited. The law has annulled the limits to the ownership rights, allowed residents to have their own dwellings in accordance with the ownership right, to rent and to mortgage them. The law also provides for the state support to acquire residential space.

The Law on Communities of Multi-Flat House Owners stipulates that the owners of flats are under an obligation to maintain and manage the objects of common ownership by establishing communities or concluding a joined-activity agreement. Flat owners in accordance with the share in common property should defray the administration expenses pro rata.

In 2000 a new Civil Code was adopted corresponding to the standards of civil law of the European Union member states. Standards of multi-flat house common ownership management and use, and conditions and procedure of flat rent were established in it.

In 1996 the Law on Construction was adopted. It established essential requirements for designing, building, reconstruction, repair of constructions and other requirements related to construction. The legal fundamentals of technical standardisation of construction are established in the law. The system of fundamentals comprises about 20 documents related to all the aspects of construction process. The system was prepared in accordance with the EU Directive 89/106/EEC.

In 2001 a new Amendment Law of the Law on Construction was adopted. It is basically a new Law on Construction from a qualitative point of view. There is an article in the law defining the protection of environment, landscape, immovable cultural values and the interests of the third parties. This new article establishes the relation between the Law on Construction and other laws and legal acts regulating environmental protection, environmental impact assessment of proposed economic activity, preservation of protected areas, landscape, immovable values of cultural heritage, fire and labour security as well as public health care, nuclear and other energy safety, and supervision of potentially dangerous equipment. This article also includes the requirement that a new construction or reconstruction has to be made fit for the needs of the disabled.

One of the main objectives is to reduce energy consumption due to a great need to save it. In the National Energy Saving Programme there is a target set to save about 50% of energy consumption applying the following measures: warming the present dwellings, implementing economic incentives for heating measurement instruments and rational consumption of heating, restoring heating supply systems, and optimising energy distribution systems.

The Lithuanian Government is ready to further support the project to restore a dwelling and increase its energy effectiveness. It proceeds with the co-operation with

Table 7.5 Number of families waiting for the state support in dwelling acquisition or rent

Year	Families waiting for the state support to get a soft loan	Families waiting for the state support to rent public dwellings from municipalities
1995	78.727	14.608
1996	80.849	14.110
1997	82.146	14.005
1998	90.001	14.259
1999	89.813	15.159
2000	88.180	16.274

the World Bank concerning the signing of a new loan agreement. The drafting work of a new agreement has already been started. The technical assistance of the Japanese PHRB Foundation is provided on the initiative of the World Bank for the project and for the preparation of the Housing Strategy of Lithuania.

The transposition and implementation of the European Union Directives on noise emission in Lithuania create conditions for guaranteeing a right to favourable healthy environment to the residents by limiting the harmful impact of a noise on health. It is stipulated to reduce noise in the living environment and in public premises, to provide guarantees to the residents by legal regulation means for noise fighting, to create better conditions for public access to information, to implement the measures to evaluate the indices of noise level and public health and to provide actions for improvement of territories and public health in the territorial plans. For these purposes it is stipulated to harmonise the legal acts regulating public health care in Lithuania for fighting noise impact on health, to draw up urban noise maps for determining urban noise level, to install noise-muffling screens and other architectural noise protection means along the streets and roads in noisy residential regions, to establish limiting parameters for mechanisms that make noise, to legalise the programme supervision of transportation noise in local authorities, to organise declaration of the noise generated by the equipment imported and produced in Lithuania, to prepare guidelines for the public on the preventive measures of noise impact on health, their control measures, hygienic care, etc.

It is provided for ensuring residents' right to a healthy and safe dwelling, reducing air pollution in residential space, improving the microclimate of residential space and public access to information on environmental pollution, residents' morbidity rate and the impact of a dwelling on health. It is intended to evaluate the indices of territorial pollution, residents' health and the means of the territorial healthiness and improvement of residents' health in the territorial plans. For these purposes the monitoring programme of housing and its impact on health will be prepared, the list of the construction products to be certified will be expanded and compulsory evaluation of health indices in territorial planning will be legalised. Guidelines for local authorities and residents on the impact of dwellings on the residents' health, on preventive measures and housing hygienic care are under preparation.

The implementation measures of the revised and renewed National Programme for Increase of Energy Consumption Effectiveness are approved. They provide for the preparation of the law on construction work maintenance and the regulation on construction work maintenance, the preparation of legal acts and financing of the implementation of energy saving measures, the use of indigenous renewable energy resources as well as auditing and certification programme for energy consumption effectiveness in construction works.

7.6. POVERTY

The increase in income inequality during the years of economic recession in Lithuania, small GDP per capita and comparatively small part of GDP devoted to social security - all these contributed to increase in poverty. Social security expenditure totals around 12-14 per cent of GDP in Lithuania.

In Lithuania with the economic recovery average disposable income per capita has been quite rapidly rising since 1996 (Table 7.6). However, because of a repeated economic recession, the decreased incomes did not rise in 2001. Although the disposable incomes decreased during the past two years, since 1996 the share of foodstuffs in all the consumers' expenditure has been decreasing all the time.

Table 7.6 Average monthly disposable incomes per capita and foodstuffs expenditure share

Indicator	1996	1997	1998	1999	2000	2001
Incomes, LTL	326.7	368.9	422.5	428	415.4	409.5
Foodstuffs expenditure share, %	55.2	52.2	48.1	45.7	44.4	42.4

The difference in consumers' expenditure between deciles I and X decreased from 1996 to 2001. The consumers' expenditure per capita of the wealthiest decile was 8.7 times higher than that of the poorest in 1996. In 2000 the ratio was 7.9 times, in 2001 - 8.2. In spite of the slight decrease in consumers' expenditure disparity between the wealthiest and the poorest population, it still remains significant (Table 7.7). The expenditure on food of decile X is almost four times as large as that of decile I, although the poorest households allocate 63 percent of their total expenditure on food, and the wealthiest - 29 percent.

Table 7.7 Monthly consumers' expenditure of wealthiest and poorest deciles, per capita, LTL

Decile	1996	1997	1998	1999	2000	2001
All households	348.1	382.6	426.8	425.4	404.4	411.4
Decile I	105.6	118.3	135.3	133.5	128.4	127.4
Decile II	160.7	176.9	199.5	202.8	189.6	189.5
Decile IX	530.6	546.1	642.2	631.2	608.1	620.1
Decile X	920.7	1004.6	1080.3	1077.7	1008.7	1047.0

The relative poverty line is estimated at 50 percent of the average consumers' expenditure and is used as the main indicator of poverty. The living standard of 16.4 percent of the population (27 percent of population in rural areas, 15 percent of town population and 8 percent of city population) was below relative poverty line in 2001 (In 2001 the poverty line was 265 LTL). Average consumers' expenditure in households below poverty line as calculated per equivalent consumer was smaller than the poverty line by almost a quarter in 2001.

The poverty level (the share of population living below poverty line) has declined since 1996 in Lithuania (Table 7.8). However, it was not the case in rural areas - it increased from 26 percent in 1996 to 27,3 percent in 2001. The poverty level in urban areas decreased from 14,7 percent in 1996 to 11.3 percent in 2001. (Fig.7.15).

A place of residence, education, occupation, and household size and structure are the factors most related to poverty. Households in rural areas are poorer than households in urban areas. Trends in disposable

Table 7.8 Poverty line and poverty level

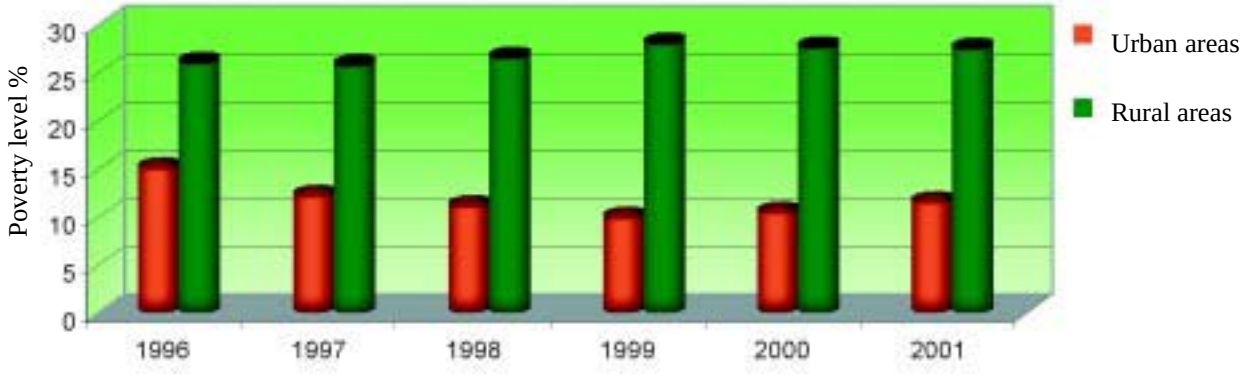
Indicator	1996	1997	1998	1999	2000	2001
Relative poverty line, LTL	226.2	248.6	276.7	274.6	260.0	264.75
Poverty level, %	18.0	16.6	16.0	15.8	16.0	16.4

income in rural and urban households indicate that this gap was growing up to 2000 (In 1996 average disposable income per capita in urban areas was 31 percent higher than in rural areas, while in 2000 - 49,5 percent.). However, in 2001 this difference decreased by 3 per cent and made up 46.5 per cent (Fig. 7.16).

More than a quarter of rural residents and every twelfth citizen in urban areas were living below the relative poverty line in 2000. More than a half (2001 - 53%) of persons classified as poor lived in rural areas, while only 32 percent of the Lithuanian population is rural.

Human capital mainly determined by education is a very important factor in lowering the probability of poverty. The demand for unskilled labour is diminishing, while demand for highly educated professionals is increasing. The statistical data show that among people with university education only 2.7 % lived below poverty line in 2001. In a group of households with head having primary or basic education poor people accounted for more than 26% in 1999. Thus older generations of unskilled workers and young people with primary or basic education are more vulnerable to become poor.

The data indicate that economic activity is a very important determinant of poverty in the society. Only 8.2 percent of self-employed population engaged in business activities and 11.6 percent of employed population were poor in 2001. Poor people among the farmers accounted for 34,9 percent. Among retired people 21,2 percent were considered to be poor. The unemployed or people of working age with no work due to other reasons (classified as "others") are among the poorest in the country.

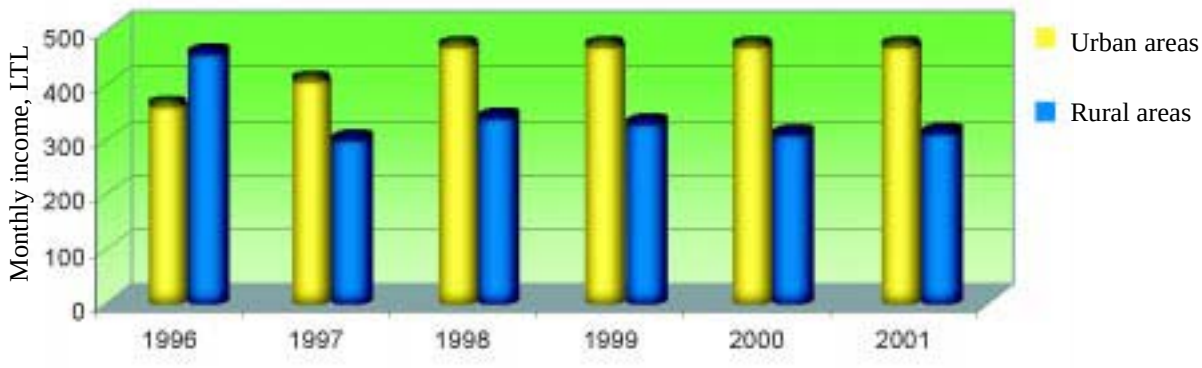


7.15 Changes of poverty level in rural and urban areas

Household composition and size, including the number of children under 18 years of age, are important predictors of the risk of poverty. Large families are mostly affected by poverty. Table 7.9 shows that the probability of being poor increases with the number of children in a household. The biggest difference occurs between households with three or more children (32,5 percent in 2001) and all other households

Table 7.9 Poverty level by the number of children in a household in 1997-2001 (%)

Year	Without children	With one child	With two children	With three and more children
1997	13.0	14.9	16.0	37.2
1998	12.4	14.1	17.0	34.5
1999	12.2	12.4	18.7	35.4
2000	12.8	12.9	17.7	37.6
2001	13.3	15.2	17.2	32.5



7.16 Changes of monthly incomes per capita in urban and rural areas

(13,3 percent to 17,2 in 2001). Approximately 8 percent of all households has three or more children, but they account for 20 percent of poor households.

Gender itself is not a strong factor determining poverty with one exception - average disposable income is lower in households headed by women. In 2001 average monthly income per capita in households headed by men amounted to 421 LTL and headed by women - 396 LTL, i.e. 6 percent less.

The way a person assesses his or her life is an important indicator of poverty alongside adverse standards of living evaluated by income or consumption indicators. According to the Lithuanian Human Social Development Report of 2001, almost 64 percent of respondents attributed themselves to the middle-class and slightly more than one-third - to the poor in 2000. 43 percent of respondents from single-parent households with children indicated that they were poor, but, according to the statistical data, less than 13 percent really were poor. While assessing the general standard of living in the country, over 80 percent of population indicated that their situation had worsen for the recent decade.

In 1995 at the United Nations Summit in Copenhagen the Lithuanian Government committed itself to eradicate absolute poverty, to satisfy the basic needs of the country's citizens, to make efforts to include marginalized groups of society into the country's social and economic development, to ensure that people living in poverty have access to resources and income enabling them to reach an acceptable standard of living. Following the Summit commitments the President of Lithuania established the National Social Committee for the implementation of the Copenhagen Declaration to develop the National Poverty Reduction Strategy in 1999. The National Poverty Reduction Strategy was presented to the President and the public in 2000. Another significant event in dealing with poverty eradication was the establishment of the Poverty Monitoring Commission. It prepared and presented the first "Report on Poverty in Lithuania in 2001" to the public in accordance with the Presidential Decree of 2001 at the beginning of 2002. A poverty Reduction Action Plan is to be prepared during 2002.

7.7. GENDER EQUALITY

The number of women's organizations grew up significantly during the last decade. They became stronger and more influential. More than 70 NGOs are active in the field of women or gender equality. However, at the same time, gender equality has to be improved in certain areas.

Participation of women in a decision-making process is still insufficient. As in many countries of the world, women in Lithuania are minority in governing structures and decision-making institutions. During the last decade, women's representation in the Parliament increased from 7 percent (after the elections in 1992) to 18 percent (after the elections in 1996) and then dropped to 10,6 percent (after the elections in 2000) (Table 7.10).

Table 7.10 Structure of the Parliament by gender

Parliament	Women	%	Men	%
Parliament VII (1992)	10	7.1	131	92.9
Parliament VIII (1996)	25	18	114	82.0
Parliament IX (2000)	15	10.6	126	89.4

After the last parliamentary elections for the first time during the last decade three of the 13 cabinet ministers are women. Before that it used to be just one woman in the previous cabinets, only in Cabinet VIII there were two women out of the 18 ministers.

A little better situation concerning women's representation is at local level. There were 19.4 percent of women in municipality councils' after the elections in 1995, and 22 percent – after the elections in 1997. After the municipality elections in 2000 among the members of the municipal councils' there are 17.6 percent of women. Comparatively low women political representation and participation in decision-making processes indicate that stronger co-operation, mutual support among women and specific programmes to address the issue are needed.

In Lithuania women enter the labour market with a higher level of education than men do (Table 7.11). It is obvious that during the last decade the relative part of women having secondary education increased significantly. At the beginning of this period the number of males and the number of females at secondary schools were nearly the same, whereas at present females comprise almost two-thirds. The relative part of females studying at universities increased from 52 percent in 1991 to 58 percent in 2001. However, that does not determine the position of women in labour market.

As it is the case in many countries, both a horizontal and a vertical segmentation of the labour market by gender is characteristic of Lithuania. This implies that most women hold jobs in less prestigious (and less paid) sectors or occupy lower positions (or perform work that is less paid) in the same activity branches. A vertical segmentation of the labour market according to gender can be demonstrated by a comparison between men's and women's average monthly earnings (Table 7.12).

According to the statistical data, in no economic sector in Lithuania women earn more than men. In 2001 women earned on average 81.7 per cent of the amount earned by men. The difference between earnings among blue-collar workers was about 25 percent, while among white-collar employees, earnings difference was even greater – about 30 percent.

It is evident that although women attain higher education, men progress in their careers more rapidly, occupy higher-standing positions, and their earnings are greater. Thus special programmes for changing the position

Table 7.11 Enrolment, %, at the beginning of academic year

Academic year	Specialised secondary education		Higher education	
	Females	Males	Females	Males
1990/91	50.8	49.2	51.9	48.1
1995/96	64.3	35.7	56.2	43.8
1999/00	64.6	35.4	57.9	42.1
2000/01	64.0	36.0	58.1	41.9

Table 7.12 Average gross monthly earnings, LTL

Date	All employed		Workers		Employees	
	Women	Men	Women	Men	Women	Men
April 1996	534	709	339	560	628	915
April 1997	685	920	546	765	782	1197
April 1998	886	1152	643	902	1044	1587
April 1999	968	1182	660	909	1152	1615
Quarter I 2000	930	1143	654	861	1092	1551
Quarter I 2001	964.3	1180.8	671.7	891.4	1135.7	1617.5

of women in the labour market are necessary, not only because from the human rights standpoint, income earning opportunities should be equal for all people irrespective of gender, but also because women, more often than men, are the only breadwinners for their children. (Births by single mothers comprised 22.6 percent out of all births in 2000. In 2000, 10.7 percent of families registered in the country did not have a father and 0.9 percent had no mother). Poverty studies show that incomplete families are among the most impoverished.

A very important issue that still has to be dealt with in Lithuania is violence against women, and domestic violence in particular. According to the 1997 National Survey "Violence Against Women", personal security is "very important" to 61 percent of women and "important" to 32 percent. Only 46 percent of women said they felt secure in their own home at any time of the day.

According to the survey, most women (63,3 percent) admit to having experienced male violence at some point in their lives after the age of 16. Eleven percent were victimised by strangers, while 8,2 percent of women were victimised by friends and 14,4 by relatives or acquaintances. Most women fall victims to violence in their home: 42,2 percent of women who were married or were living with their partner at the time of the survey had at one time or another experienced violence from their husband or partner. Out of divorced or separated women 53,5 percent had been victimised by their ex-husband or partner. The results of the survey show that the place of women are least secure is in their families.

Only first steps toward solving violence against women problems have been made. An institutional mechanism for dealing with problems of domestic violence is being formed only very slowly. The most progress in this area has been made by non-governmental women's organisations. They have initiated scientific research, distributed educational literature, organised conferences and training, and founded crisis centres and shelters. International organisations often provide significant support for such activities as well. Municipal police departments are also taking initiative and are establishing shelters for victims of domestic violence. Nevertheless, many of these initiatives are still in the very first stages of their development, therefore it is difficult to judge about their effectiveness in helping women who have suffered violence.

In order to solve the problem of violence against women it is necessary to analyse and, if needed, change laws, to continue to educate society and foster intolerance to violence, to create special training programmes for law and order officers as well as for health care specialists and social workers and to support the expanding network of institutions helping the victims of violence.

In spite of the significant achievements in promoting and ensuring gender equality in Lithuania, some problematic issues still remain to be solved. Not all rights of Lithuanian population are equally assured in terms of their nature (political, social, economic) or in terms of the possibility for everybody to exercise them. Political and civil rights are far ahead of socio-economic rights. Women's position on the labour market and poverty among single parent families (who most often are single mother families) are among very important socio-economic issues of women that still need to be dealt with.

One of the most significant changes in ensuring gender equality is the Action Plan approved by the Government to implement the Programme of Women Advancement in Lithuania in 1996. The Action Plan is being implemented in collaboration with the state institutions and women's NGOs. The successful implementation process took place with regard to legislative and educational activities.

Another significant change in this area is the gradual extension of the national level measures for dealing with women's issues. In 1999 the Law on Equal Opportunities came into force. In 1999 the Office of the Ombudsman for Equal Opportunities was established and started monitoring the enforcement of the provisions of the Law on Equal Opportunities making Lithuania among the pioneers in this area in the region.

8. SUSTAINABLE DEVELOPMENT AT LOCAL LEVEL

Chapter 28 "Local authorities' initiatives in support of Agenda 21" of "Agenda 21" states that the participation of local authorities is a determining factor in achieving the objectives set out in "Agenda 21", because so many problems being addressed in the document have their roots in local activities. Each local authority is encouraged to prepare a Local Agenda 21 in co-operation with its citizens and institutions in order to ensure a sustainable development. A great attention in this Chapter is paid to the inclusion of the society in the preparation of "Local Agenda 21", co-operation between municipalities, and international co-operation.

The results of the conference held in Rio de Janeiro were implemented in Lithuanian municipalities quite slowly. A non-governmental organisation called "Environmental Centre for Administration and Technology" (ECAT-Lithuania) was established in 1997 seeking to strengthen environmental management at local level. It developed the strategy of Agenda 21 for local governments in Lithuania. The process of Local Agenda 21 was substantiated by the experience of Scandinavian countries in this field.

The process of Local Agenda 21 was initiated presenting the Concept of Sustainable Development to local authorities during the national events, discussions, in publications as well as organising trainings and implementing projects. In total four national events were organised, twelve publications were issued aiming at encouraging and supporting the initiative of Local Agenda 21.

So far no special studies on the implementation of the process of Local Agenda 21 have been carried out in Lithuania. However, empirical data of 2002 show that about 27 per cent of the Lithuanian municipalities has started the process of Local Agenda 21 in co-operation with the local community.

The first processes of Local Agenda 21 were started to implement in the biggest cities of Lithuania (Kaunas, Klaipėda, Panevėžys) in 1997 following the first national conference on Local Agenda 21 held in Birštonas. The main goal of the conference was to discuss the needs and perspectives of Lithuanian municipalities, to initiate the projects of sustainable development and encourage co-operation. This conference can be considered the beginning of the national campaign aimed at initiating the process of Local Agenda 21.

In July 1998 the local government of Kaunas started carrying out a large-scale project of Local Agenda 21. Its first stage continued for a year. The main goal of the project was "order in your home", that is the preparation of structures and procedures of municipalities favourable for the sustainable development. Kaunas local government carried out the project in co-operation with the local government of Tampere city (Finland). It was financed by the European Union PHARE programme. The result of the first year work was the preparation of "Environmental Protection Policy of Kaunas City".

In November 1998 the municipality of Klaipėda City started carrying out the project of Local Agenda 21. PHARE programme supported it financially as well. The goal of the project was to prepare the plan of Local Agenda 21. Public participation and environmental education were the main topics of the project. The municipalities of Kristianstad (Sweden), Espoo (Finland), Koege (Denmark) and Waterford (Ireland) cities helped to solve the issues.

In 1999 in Kaunas the municipalities of Klaipėda, Kaunas, Šiauliai and Panevėžys shared their experience in the national discussions on "Local Agenda 21 in Lithuania: Experience and Perspectives". Factors and obstacles to success, specific features working in the Lithuanian conditions were discussed.

In 2000 in Kaunas the meeting of mayors for discussing the issues of Local Agenda 21 was the first high-level meeting of local authority officials concerning sustainable development in Lithuania. A workshop-discussion "Sustainable Development: the Role of Local Authorities" held at the end of 2000 was the continuation of the national campaign that started in Birštonas in 1997.

Before 1999 the projects encouraging sustainable development had been carried out only in bigger Lithuanian cities. Small municipalities having not so many foreign relations, less resources for strategic planning and

the preparation of sustainable development plans did not receive such support. The Environmental Centre for Administration and Technology (ECAT – Lithuania) initiated and undertook the co-ordination of the project "Local Agenda 21 for Small and Medium-Sized Lithuanian Municipalities". The municipalities of Alytus, Marijampolė, Šiauliai cities and the districts of Ignalina, Kaišiadorys, Kaunas, Radviliškis, Raseiniai, Rokiškis, Šiauliai, Trakai and Varėna took part in this project.

The main goal of the project was to encourage small and medium-sized Lithuanian municipalities to start the process of "Local Agenda 21" and help them to develop the strategies of "Local Agenda 21". The aim of the municipalities taking part in the project was to develop strategies together with local community, non-governmental organizations, industry and business representatives.

The main obstacles for municipalities to implement "Local Agenda 21" faster are as follows:

- lack of knowledge and understanding of sustainable development and "Local Agenda 21";
- lack of experience in strategic planning;
- absence of co-operation traditions with the society and passive attitudes of the society;
- lack of financial and human resources.

One of the main aspects of "Local Agenda 21" is the development of partnership among different sectors (that is, coordination of economic, social and environmental aspects, their integration). Working groups comprising representatives of administration and different divisions of municipalities were formed in the municipalities where the process of "Local Agenda 21" started. This influenced not only the improvement of the environmental activities in municipalities but also the efficiency of their work, because the co-operation that had not existed so far and the communication between the divisions of municipalities was initiated.

Planning of regional development is a complicated process. Moreover, the concepts of sustainable development and "Local Agenda 21" are quite newly coined definitions in Lithuania. Therefore, during the implementation of the project mentioned above big part of time had to be devoted to strengthening administrative capacities in this field. Following the proposal of local authorities, national workshops on the topics important for municipalities have been organized: "Local Agenda 21", "Strategic Planning", "Public Participation", "Instruments of Environmental Management", "Project Deve-

lopment". In order to provide possibilities for a greater number of administration employees to take part in workshops and discuss the urgent issues, workshops have been organized in the premises of municipalities. The topics of the workshops varied: "Sustainable Development and Local Agenda 21"; "Project Management", "Cooperation of Local Authorities and Non-governmental Organizations", "Organization of Meetings and Improvement of Work During the Meetings".

In 1998-2001 a number of publications for municipalities were prepared or translated into the Lithuanian language. The main ones are as follows: "Charter of Sustainable Development of European Cities", "Agenda 21 (Chapter 28)", "Local Agenda 21", "Public Participation in "Local Agenda 21", "Initial Guide of "Local Agenda 21. Hanover Call", "Implementation of Sustainable Development in Municipalities: Experience of Poland and Lithuania", "Sustainable Development".

A positive result of "Local Agenda 21" campaign is the fact that over this period as many as 15 municipalities started their "Local Agenda 21" processes. This process is not only supported by foreign funds but also it is being carried out on the initiative of municipalities by using their own financial and human resources. Informal network of organizations carrying out "Local Agenda 21" has been formed and will be able to exert influence on the Lithuanian "Agenda 21" in the future. Local non-governmental organizations and educational institutions (schools, universities) have become important assistants in implementing "Local Agenda 21". In many cases local media also shows interest in this process.

During whole national campaign Lithuanian local authorities were urged to undersign Aalborg Charter showing that the city or the district seeks to implement the principles of sustainable development. In 2001 the following four Lithuanian municipalities signed Aalborg Charter: Alytus city, Rokiškis district, Trakai district and Visaginas city.

The process of sustainable development implementation at local level continues. The goals of development of municipalities, the ways of action and aims are presented in different strategic documents. Recently in Lithuania much attention has been devoted to the preparation of development plans. Without these documents a rational distribution and use of resources would be impossible. Strategic plans for different sectors of the country's economy and regional plans are being prepared. External foreigners or employees of the municipality very often prepare strategic documents of municipalities. However, local community is still not involved in the process of the preparation of development plans. Moreover, there is a lack of complex attitude towards the involvment of municipalities in preparation of strategic plans.

At the end of 2001 a new project "Assessment and Development of Local Sustainable Development Strategies in Polish and Lithuanian Municipalities" was started to carry out. This project is the continuation of the project "Local Agenda for Small and Medium-Sized Lithuanian Municipalities" carried out in 1999-2001. The United Nations Development Programme, the European Union financing programmes, municipalities support the project.

The model created during the implementation of "Umbrella" project of the Polish United Nations Development Programme and successfully has been used in Poland for six years is used for the preparation of municipal strategic plans in Lithuania. This model is an exceptional way of devising the strategy. It is special because a working group including leaders of the local communities representing different groups of a community (representatives of local government, non-governmental, business, science and other organizations and groups) rather than the hired external experts prepare development strategies of municipalities. During the preparation of a strategic plan, spheres of economy, environment, social affairs and spatial planning are assessed in a complex way. In this case during seminars external consultants play the role of moderators and, when necessary, consult working groups on the urgent issues of certain spheres. Thus a strategic sustainable development plan will be prepared in accordance with the recommendations of Agenda 21, i.e. with active participation of local community.

In order to ensure a successful continuation of the implementation of sustainable development principles at local level local authorities need recognition and support at national level. The approval of the National Sustainable Development Strategy, improvement of information exchange between the national and local levels, more active involvement of local authorities in the decision-making process at national level would greatly stimulate the sustainable development at local level. Also more attention to the implementation of the sustainable development principles should be paid in the central mass media.

9. INTERACTION BETWEEN SECTORS

An appropriate balance between environmental, economic and social development can be achieved only by creating interaction between sectors ensuring and regulating the legal basis and special institutions functioning on its basis and by developing special skills of officials and by ensuring active public support. It will enable to solve integrally development issues of national, regional and local significance.

Public attitudes for closer interaction between sectors have been already formed in Lithuania. The society does not express the conflict of interests in the development of different sectors and the stakeholders expressing these interests are not influential in the society. Public influence on the harmonisation of interests in the sectors development grows because of the increasing need for education and science and their influence. Quite a wide network of non governmental organisations fostering sustainable development exists in Lithuania.

Favourable political preconditions for the harmonisation of interests in the sectors development are forming. Political concepts, programmes and political powers declaring them do not suppress the need for the harmonisation in their mutual fights. Despite a frequent change in the political governing powers (especially at the executive level), the idea of interaction between different sectors and their sustainable development is not revised.

One of the most effective legal acts of the Republic of Lithuania defining the obligation to integrate the sectors activity is the Law on Territorial Planning valid since 1995 (with amendments). Article 3 of the Law specifies that the objectives of territorial planning are as follows: to achieve sustainable territorial development of the Republic of Lithuania, to form full-fledged, healthy and harmonious living environment, working and recreation by trying to create better and equal living conditions in the whole territory of Lithuania, to preserve, rationally consume and restore natural resources, natural and cultural heritage values, to maintain ecological balance and to restore it, to encourage investments in social and economic development, etc.

The Law on Environmental Impact Assessment of Proposed Economic Activity plays an important role in ensuring relevant interaction between different sectors and their sustainable development. This law has established the necessity to evaluate a possible impact of a proposed economic activity not only on natural, but also on social environment. It should certainly be indicated that there is a great disproportion between the amount of attention paid to natural and social environment in this law and other secondary legislation, and too little attention is paid to social aspects of the development.

The Governmental Programme of the Republic of Lithuania and the plan of its implementation measures should be mentioned as one of the most important documents encouraging more close interaction between the sectors. In accordance with the programme for 2001-2004 approved by the Government of the Republic of Lithuania, it is pointed out that "preconditions for the integration of sustainable development and environmental protection into the policies of other sectors should be ensured in order to implement the principles by making relevant improvement to legal mechanisms and the ones of economic environmental management. Economic development should be advanced in such a way that it does not have negative impact on the general quality of the environment and preserves healthy and clean environment for the society."

There are a lot more legal acts regulating activity of sectors with the aspects of interaction between sectors provided. The sphere of environmental and economic interaction is the most elaborated. Most of these legal acts originate because of the necessity to implement the EU directives on the environment as well as because of the fact that some activity spheres (consumption of natural resources, waste management, water supply) closely connect environmental and economic interests. Among the most important legal acts regulating the interaction between the economic and environmental sectors, first of all the Law on Taxes on State Natural Resources, the Law on the Tax on Environmental Pollution, the Law on Waste Management, the Law on Packaging and Packaging Waste Management, the Law on Bio-Fuel and other laws should be mentioned. There are a lot fewer and far insufficient legal acts regulating the interaction between the environment and social sphere.

Despite the aforementioned general (constitutional and legislative) provisions, in Lithuania there is no suf-

ficiently developed legal basis ensuring the inevitability of interaction between sectors, its consistency and control of its effectiveness. Besides Lithuanian general international commitments in relation to sustainable development and the legal acts proving them, in the country several documents have been recently approved declaring directly the necessity of interaction between sectors and regulating it.

The institutions of national importance responsible for sustainable development form the institutional basis for ensuring the interaction between the sectors. The National Commission on Sustainable Development is the most important body among them functioning since 2000. The activity of the Commission on Sustainable Development and on Protection of Immovable Cultural Values of the Parliament of the Republic of Lithuania started in 2001 should also be significant.

The Strategic Planning Committee formed in accordance with the Resolution of the Government of the Republic of Lithuania in 1999 should play an especially important role in ensuring long-term determined interaction of the main activity sectors. Unfortunately, the Committee represents only the sectors of economy and social security. Environmental sector, despite its integrity, still has not become of relevant importance in this Committee.

New institutions of national significance able to encourage closer interaction between sectors and sustainable development are established. One of the examples could be mentioned. That is the National Regional Development Agency established on 28 September 1999 by the Ministry of Environment, the Ministry of Economy, the Ministry of Agriculture, the Ministry of Governance Reforms and Municipal Affairs, the European Committee under the Government of the Republic of Lithuania and the Lithuanian Association of Commerce, Industry and Craft Chamber being the owner of the Agency. This agency aims at being the main institution of regional development policy implementation, consulting and technical assistance in Lithuania. Its main objective is to implement the Lithuanian and EU programmes for regional development seeking to encourage local and regional social economic development and to prepare to make use of the EU Structural Foundations and the initiatives of the European Community in Lithuania. One of the aims of the Agency is "to form infrastructure complying with social-economic and environmental requirements, to reduce differences in living, economic, cultural, educational conditions between the regions".

In the structure of the main state governance institutions (ministries, services) there are not many units active in the field of co-ordination of interaction between sectors and its development. Most of the integral divisions function in the Ministry of Environment (Environmental Strategy Department, Environmental Quality Department, Construction and Housing Department, Territorial Planning, Urban Development and Architecture Department and other departments). There are some units oriented towards interaction between sectors in the Ministry of Agriculture (Rural Development and Information Department), in the Ministry of Health Protection (Health Economy Division). In other ministries there are no special units oriented towards interaction between sectors, although the motives for interaction between sectors in the activity of these ministries are very evident (for instance, the Ministry of Economy). It should be noted that the Ministry of Communications coordinating one of the activity spheres making the greatest impact on the environment has very few institutional possibilities to ensure interaction between sectors.

The municipal administration structure is very different. As a rule, there are divisions of economy and social security, ecologists and advisors in these structures. In some local authorities there are special institutions capable of ensuring closer interaction between sectors at local level (for example, in the administration of Anyksciai District Municipality there is Regional Management Division, in Ignalina District Municipality there is Territorial Planning and Architecture Division, in Varėna District Municipality there is Architecture and Regional Management Division). It should be mentioned that the enterprises of some urban municipalities preparing urban master plans ("Vilnius Plan", "Šiauliai Plan", etc.) exert a great influence on the development of interaction between sectors.

The basic documents legalising closer interaction between sectors are general strategies and strategies for individual sectors, programmes and projects implemented according to them. Up to now the strategies and programmes regulating the implementation of bilateral interaction (the sectors of environment and economy, the economic sector and social sector, etc.) evidently dominate in Lithuania. "Inclusion" of some environmental aspects in the strategies and programmes of economy branches prevails most frequently.

The Ministry of Economy has drafted the Strategy for General Economic Development for 2002-2004. In this document strategic objectives and priorities of all the Lithuanian economic sectors are formulated. It is important to note that in the chapter "Environmental Protection" the main objective of environmental protection in Lithuania is clearly defined - to create preconditions for sustainable development of the country maintaining clean and healthy environment, preserving biological and landscape diversity, rationally consuming natural resources as well as co-ordinating the actions of central governance and self-government institutions and of economic entities taking into account the national objectives and requirements for accession to the EU.

Medium-term Industrial Development Policy and its implementation strategy for the period of 2001-2003 was approved by the Government and came into force on 13 July 2000. A great attention in this strategy is paid to sustainable industrial development. To sustain industrial development will be sought to achieve through regional development and the appropriate use of its potential, through the development of small- and medium-sized enterprises and encouragement of ecological production. On the basis of this document "environmental problems will be solved taking economic and legal measures. That will ensure safe management of chemical substances and preparations, safe and sustainable consumption, as well as utilisation of hazardous substances. It will encourage recycling of production waste and secondary raw materials, will help to implement energy saving measures, will encourage the reduction of water consumption and pollution, air pollution, extention of ecological industry and industry saving energy resources". However, this strategy lacks a broader approach to industrial development as the harmonisation of interests of environmental, economic and social spheres.

In 1999 the Parliament of the Republic of Lithuania approved the National Energy Strategy. Among the Lithuanian strategic energy sector objectives there are following:

- secure, safe energy supply with the least expenses;
- increase in energy consumption effectiveness;
- reduction of negative impact on the environment, ensuring nuclear safety requirements.

In the plan of the National Energy Strategy implementation (approved by the Government of the Republic of Lithuania on 25 May 2001), preconditions for the co-operation not only between different ministries of Lithuania, but also between national and local levels are created. For example, the Ministry of Economy, the Ministry of Finance, the Ministry of Education and Science and the institutions of Lithuanian municipalities are responsible for the carrying-out of different measures increasing energy consumption effectiveness. The Ministry of Economy, the Ministry of Agriculture, the Ministry of Environment, the Ministry of Education and Science and municipal institutions are responsible for consumption increase in renewable, indigenous and waste energy resources.

It should be indicated that the National Energy Strategy and the plan of its implementation measures lack social orientation aspects of this strategic economy branch, and the social consequences of strategy implementation are not well enough revealed.

In the Programme for Hazardous Waste Management and the Programme for the Use of Secondary Raw Materials and Waste implemented by the Ministry of Economy a lot of attention is paid to environmental and economic consequences of the implementation of the programmes. However, there is a lack of social motives for the implementation of these programmes and a lack of the assessment of the social consequences.

Transport is one of the main economic sectors making a great impact on the environment. It has acquired specific social meaning in economic and social transformation conditions. In the Strategic Action Plan of the Ministry of Communications a serious attention is paid to the reduction of negative impact on the environment made by transport. However, the implementation measures are not systemically organised. It should be noted that intersectorial approach in the sphere of communications is not so much characteristic of the central department of the Ministry of Communications, but it is transferred to the institutions in its regulation sphere. The examples of co-operation between sectors are the projects implemented by the Klaipėda State Sea Port and other projects elaborated by the Institute of Transport and Roads Research. The co-operation between sectors there is almost exceptionally oriented towards the interaction between transport development and environmental protection.

The Strategy for Environmental Protection of the National Defence System approved in 2001 could be attributed to the examples of bilateral interaction between sectors. In this strategy it is noted that the military activities always affects the environment: the air, water,

soil, marine environment, landscape, flora and fauna. Therefore, it must systematically and concertedly carry out and improve environmental protection. The object of environmental protection of the National Defence System is Lithuanian military territories, military equipment directly or indirectly affecting the environment and natural resources that are in the military territories. The environmental protection objectives set in the strategy as follows: to encourage the employees of the National Defence System to search for the ways and measures to avoid and reduce the negative impact on the environment; to implement environmental management in the National Defence System and in this way to improve the quality of the environment; to limit the consumption of polluting fuel and to encourage the consumption of ecologically clean fuel; to reduce the amount of generated waste; to sort the generated waste; to encourage effective energy consumption and saving; to ensure the protection of soil and surface and underground waters; to reduce noise near shooting-ranges, polygons, aviation bases and the noise made by vehicles; to strengthen nature protection in the areas belonging to the National Defence System and to create the most favourable conditions for flora and fauna; taking into account the possibilities and financial resources, to take the necessary measures to clean the available territories and to restore the natural resources.

In the plans of science and studies development the motives of interaction between sectors are also getting stronger attempting to regulate the variety of researches carried out and specialists trained in accordance with the economic, ecological and social needs of the country. To this end, the institutions of science management are reformed by involving the representatives of the economic and social sectors in their activity and by coordinating the programmes with environmental institutions.

The Strategy for Poverty Reduction in Lithuania drafted by the Ministry of Social Security and Labour in 2000 could be an example of the interaction between the social and economic sectors. In this strategy, interaction between sectors is illustrated by the fact that in reducing poverty it is intended to take not only passive social support measures, but also active economic development and regional policy measures. Clear examples of the aspects of co-operation between sectors and successful project implementation could be found in the Strategy for the Development of Local Employment Initiatives Projects implemented by the Ministry of Social Security and Labour. In this it is stipulated that solving social problems "economic and social objectives should be harmonised, greater possibilities for local people to participate in economic activity under market conditions should be created, vulnerability of structural transformation in economy of certain territories should be reduced, the possibilities for their development should be increased". The EU Directive on Minimal Health and Safety Requirements Applied for a Workplace implemented by the aforementioned ministry is attributed to the field of interaction between sectors.

In 1998 the Lithuanian Health Programme approved by the Parliament of the Republic of Lithuania is the most integral because it is substantiated by economic, social and environmental motives and their interaction. In the Programme long-term objectives helping to improve the quality of the environment are formulated. Until 2010 it is intended to achieve that the quality of the water consumed complies with the standards, ambient air quality and the quality of air in the premises do not threaten public health, the microbiological and chemical composition of foodstuffs complies with the normative acts established in Europe, physical and social environment favourable to public health is created in urban and rural areas, an effective supervision system of labour environment and of health of the employes is implemented, the elimination of very harmful labour conditions is ensured, the state supervision and control system of people radiation protection is supported. To this end, the National Environmental Wellness Programme is being drafted.

In one of the programmes of strategic action plan of the Ministry of Health Protection called "Strengthening of Public Health Supervision in Integrating into the EU Health System" an objective to reduce the impact of harmful environmental factors on the residents' health is formulated. Implementing this objective it is intended to reduce morbidity, disablement and mortality of Lithuanian residents for the causes negatively affecting the working and living environment of the residents, that is to create safe physical, biological, social and psychological living and working environment by reducing the impact of harmful environmental factors on residents' health.

The National Programme for Agricultural and Rural Development for 2000-2006 devised by the Ministry of Agriculture is distinguished by the greatest integrity

among the sectorial strategies and programmes. In this programme the main attention is paid to integrated rural development by closely harmonising social, economic and ecological challenges. As the most common objective of agricultural and rural development "to contribute to the solution of economic, nature preservation, social and cultural issues related to rural prosperity and that of the whole country, to co-operate with private sector and local communities" is specified as a challenge. It should be noted that this programme is one of the few ones where a relation with other programmes is considered. The assessment criteria of rural development projects are formulated as a system in this programme - that is, in all the cases the complexity of consequences, and multiplication effect are assessed.

For the implementation of the strategic objectives concerning agricultural and rural development there are 17 programmes devised. In the majority of them, besides the different economic and social aspects, quite a lot of attention is paid to effective development of organic farming, to the determination of change in environmental parameters in organic farms, to utilisation of livestock waste, to solution of other environmental issues.

Long-term Lithuanian Economy Development Strategy approved in 2002 should be noted for a distinguishing and great integration between sectors. It comprises 15 branch strategies. The main principles of sustainable development are consistently taken into consideration in them. Some of these branch strategies are directly aimed at interaction between sectors (the factors of social development and economic factors of employment, economic factors of environmental protection, tourism development, etc.). Despite a great integrity of the certain strategies, there is a lack of clear relations between the aforementioned 15 strategies their interaction and interdependence are not revealed. In order to solve this problem an additional attention should be paid to it.

The possibilities of interaction between sectors are qualitatively renewed and expanded and they are reflected in the Master Plan of the country. Although in this document a great attention is paid to the aspects of sustainable development of individual sectors, some of the aspects of implementation of interaction between sectors should be expanded. For instance, assessing the living quality for the purposes of the Master Plan, among the criteria for assessing it no environmental quality criterion is used. Analogous approach is reflected in the comparative research into the living conditions carried out by order of the Ministry of Social Security and Labour.

From the material presented in this chapter it is evident that the legal basis and institutions ensuring interaction between the sectors are being gradually created in Lithuania. Interdepartmental tolerance and competence of officials implementing the measures of interaction between sectors is evidently growing, interdepartmental barriers are little by little diminishing. Different institutions co-operate not only in preparation of strategic documents, but also in implementing the set tasks. This co-operation will be encouraged by the work of the National Commission on Sustainable Development because it comprises the representatives of not only different ministries of Lithuania, but also of scientific institutions and local authorities. The work of this Commission will help to solve the issues of the development of the country in a complex manner.

On the other hand, it should be indicated that simplex and quite and episodic attention to the interests of the other sectors still dominates in the strategies and programmes for the development of the sectors. While there is a lack of effectively functioning institutions (permanent interdepartmental commissions, work groups, etc.) co-ordinating the interaction of development of the individual sectors, in many strategies and programmes the assessment and monitoring of interaction and its effectiveness are not developed.

Seeking to encourage the co-operation between different sectors it is very important to ensure that the representatives of different Lithuanian institutions are acquainted with the principles and basic attitudes of sustainable development and understand the importance of their implementation and co-operation between different sectors. The increasing public and political stability creates possibilities for consistent and long-term assurance of interaction of sectors development and - at last - their integration and implementation of sustainable development. International co-operation, international commitments of the country and accession processes also encourage closer interaction between sectors. The National Sustainable Development Strategy that is under preparation should give an additional impulse to these positive processes.

10. SUMING UP: FROM TRANSITION TO SUSTAINABILITY

In analysing the development of Lithuania and other countries in transition, essential changes to be taken into consideration took place at the beginning of the past decade when the political and economic systems of these countries were changed. With the transformational economic decline beginning, not only the production volumes decreased several times, but the consumption of the natural resources and environmental pollution as well. Such a great decrease in the consumption of natural resources and environmental pollution is, no doubt, a very positive phenomenon from the point of sustainable development. However, taking into consideration the fact that these favourable to the environment changes took place mostly not because of the implementation of special environmental protection measures, but because of transformational economic decline, these changes cannot be regarded so unambiguously. As it was mentioned in Chapter 3 of this report, wishing to evaluate the changes of transition period in relation to sustainable development, first of all the following basic questions should be answered:

- Has the consumption of natural resources decreased only because of the economic recession?
- Has the environmental pollution decreased only because of the decreased consumption of resources?

If the answers to both of these questions were positive, that would mean that changes that took place in the countries in transition are not very positive in relation to sustainable development and with the recovery in economy, a simultaneous increase in the consumption of natural resources and environmental pollution would start.

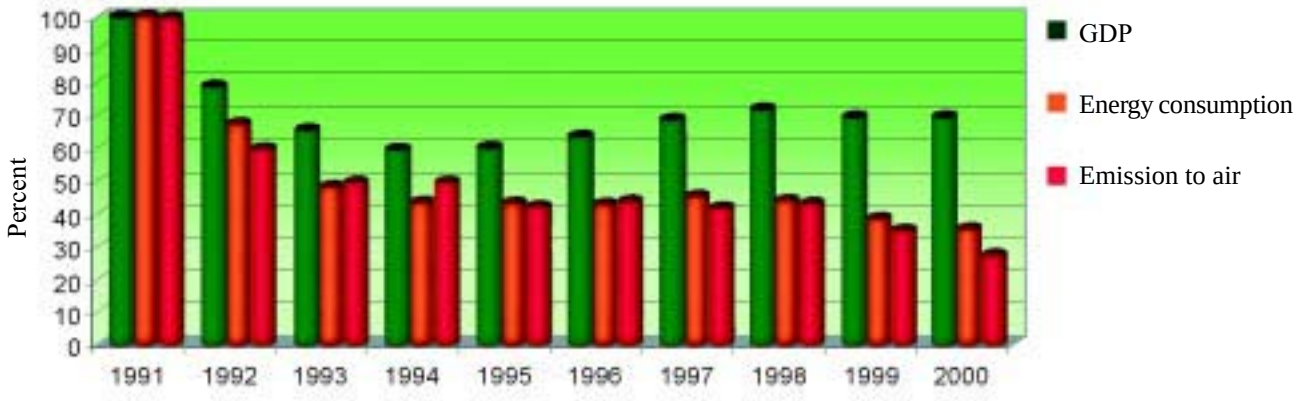
On the other hand, it is necessary to understand that the economic growth of Lithuania and other countries in transition will inevitably cause a certain growth in consumption of natural resources and environmental pollution. However, these, at first glance unfavourable, trends would not have to be automatically considered as a transgression of the principles of sustainable development. If the decoupling of economic growth in these countries from the growth of the consumption of resources and environmental pollution is a success, that is if the consumption of natural resources increases more slowly than the economy does, and environmental pollution increases more slowly than the consumption of natural resources does, such development should have to be evaluated as positive in relation to sustainable development.

In this chapter, on the basis of the information presented in previous chapters of the Report, at first the questions presented above will be attempted to answer. Data on the changes in Gross Domestic Product, in energy consumed in the production and service sectors and in emission into the air are presented in Figure 10.1. For more evident comparison the data of all the three mentioned indicators in 1991 are equal to 100 percent.

The data presented in Figure 10.1 show that even in the first part of the transition period when a very intensive economic depression took place, the consumption of energy resources and air pollution decreased much more rapidly than the production and services (GDP) did. Up to the middle of last decade (1995) GDP in Lithuania decreased by as much as 40% and the consumption of energy resources and environmental pollution decreased by almost 60%.

In the second part of the transition period with the recovery in the county's economy, the amount of the energy consumed and environmental pollution began to slightly increase. From 1995 to 1998 GDP in Lithuania increased by 18%. However, the final consumption of energy and air pollution increased only by 1-2%. Due to the Russian economy crisis, in 1999 a temporary repeated economic depression was also registered in Lithuania. However, since 2000 Lithuanian economy has started growing again, but energy consumption and environmental pollution have been on the further decrease.

Despite the possible inaccuracies of the statistical data, summarising the data presented in Figure 10.1, the first question presented above could be clearly answered - no, the consumption of resources decreased not only because of economic decline. Transition to the market economy and restructuring of the Lithuanian economy as well as increased



10.1 Comparison of the changes in Gross Domestic Product, final energy consumption (production and service sectors) and total emission to air (1991 = 100%)

prices of energy determined favourable changes in Lithuania's development in relation to sustainable development from the beginning of the transition period when the trajectories of economic development and consumption of resources as well as environmental pollution were decoupled. At the beginning of the transition period the consumption of resources and environmental pollution has decreased a lot more rapidly than production and services, and with the increase in economy, the disjunction between economic development and resource consumption as well as environmental pollution has been still increasing.

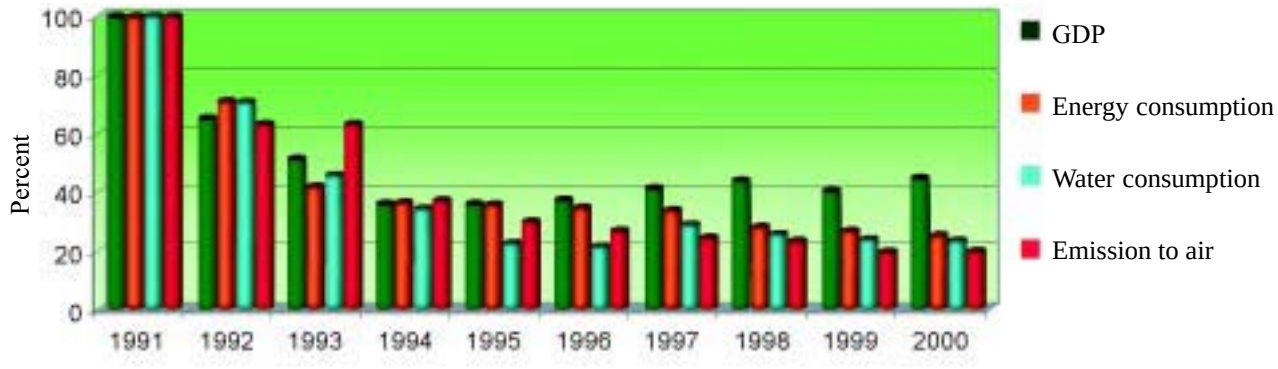
The data in Fig. 10.1 show that since 1999 the trajectories of resource consumption and of environmental pollution have started decoupling. Having implemented more advanced fuel combustion technologies in some energy and industrial enterprises and having started to consume more natural and in the transport sector - more liquid gas, emission of pollutants for the same amount of combusted fuel started to decrease. So the answer to the second question presented earlier can be now answered - no, the emission of pollutants decreases not only because of the decreased consumption of the resources (in this case - energy).

During the last decade the consumption of energy per GDP unit decreased approximately twice as a result of these changes (Chapter 5.3) and emission of pollutants into the air - over 2.5 times. However, comparing with the European Union member states, the efficiency of energy consumption in Lithuania is still quite low and 1.5 times more energy is consumed in order to produce one GDP. On the other hand, comparing the emission from stationary sources into the air per unit of area in Lithuania with the European Union member states, it is clear that the amount of pollutants emitted into the air per one square kilometre in Lithuania is several times less than in the most EU countries.

The data on changes in production, resource consumption and environmental pollution in the main economic branches (industry, transport, agriculture) are presented below.

During the recent decade the changes in production and consumption of energy and water resources in the industrial sector are presented in Figure 10.2. As it was mentioned in Chapter 6.2, during the transition period the industrial sector suffered the deepest depression and from 1991 to 1995 the industrial production decreased almost threefold. In the first half of the transition period no favourable changes in relation to sustainable development in the industrial sector were registered. The consumption of energy and water resources decreased in proportion to the decrease in production, and at the very beginning (in 1992) the production decreased even more than the consumption of resources.

In the second half of the transitional period industry started to slightly recover. Although in 1999 the industrial sector and other economic branches suffered a repeated depression, it was short-term and already in 2000 almost the increase of 11% was registered by the GDP created in industry. In 2001 according to the preliminary data, the industrial production increased by almost 20%. Having started to consume the resources more economically and to implement cleaner production methods, in the second half of the transition period the effectiveness of the consumption of resources started to grow, and decoupling of the trajectories of changes in industrial production and resource consumption has started (Fig. 10.2). During the decade under study, energy consumption per one GDP unit produced in the industrial sector decreased by 1.7 times and water consumption - by almost twice as a result of these changes.



10.2 Comparison of changes in the GDP created, consumption of energy and water and emission into the air in the industrial sector (1991 = 100%)

Analysing the changes in industrial emission into the air, the data on the general emission of the enterprises under inventory were used. The data presented in Figure 10.2 show that in the first half of the transition period not only production and the consumption of resources, but also environmental pollution (emission of pollutants into the air) decreased almost equally. However, in the second half of the period under study emission into the air started to decrease more rapidly than the consumption of energy resources, and during the decade under study the emission into the air per one GDP unit decreased by 2.2 times.

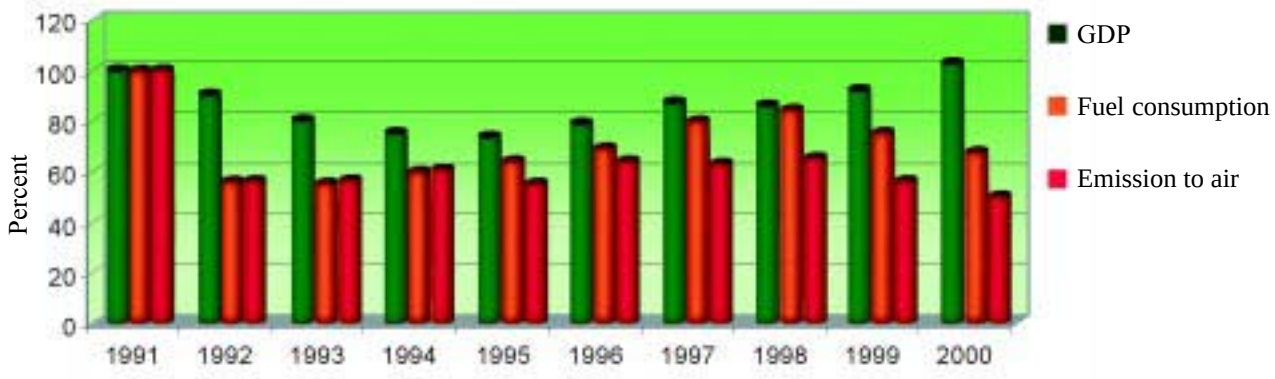
At the beginning of the transition period the transport sector, contrary to the industrial sector, suffered the smallest transformational decline and recovered the most rapidly. Therefore, during the decade under study the share of the GDP created in this sector increased from 8 percent in 1991 to 11 percent in 2000. The contribution of transport to air pollution increased as well. In 2000 the emission of transport pollutants accounted for almost three-fourths of the total emission compared to 55% at the beginning of the decade. Thus the transport sector has become one of the most problematic from the pint of sustainable development.

During the recent decade the changes in GDP created, energy consumption and emission of pollutants in the transport sector are compared in Figure 10.3. Presented data shows that at the beginning of the transition period from 1991 to 1995 the GDP created in the transport sector decreased, however, incomparably slower than in the industrial sector. In 1995 it accounted for about three-fourths of that in 1991. Since 1996 the GDP created in the transport sector has been increasing quite rapidly, and this is the only sector that exceeded the level of 1991.

Such a rapid, as compared to other economy sectors, development of transport sector is not acceptable from the view of sustainability. However, in 1996-1998 the trend towards a more rapid increase in energy consumption than in the GDP created in the transport sector (Fig. 10.3.) that is, the trend towards the decrease in transport energy effectiveness is even more unacceptable. It is very important that since 1999 this trend has changed. Despite of the fast further growth in the GDP created in the transport sector, the consumption of fuel and emission into the air have started to decrease quite rapidly because of the changes in the structure of car park (Chapter 6.4) and this trend should be considered as very positive.

During the past decade in the Lithuanian agricultural sector very cardinal changes occurred. With the collective farm system collapsing and private farms forming rapidly, not only agricultural production, but also the life of rural people has changed in essence. Agricultural production by the GDP created achieved the lowest level in 1994 when the GDP created in this sector decreased up to 42% compared to that of 1991. Since 1995 agricultural production has been on a slight increase, and at present the GDP created in agricultural sector amounts to about a half of that in 1991.

It should be noted that during this decade energy consumption in agriculture decreased eight times. About four times less energy is consumed in order to create one GDP unit at present than at the beginning of the decade. This fact could be assessed in two ways - on the one hand, it shows low effectiveness of the former collective production and very irrational energy consumption. On the other hand, it is obvious that the existing low-productivity and poorly-mechanised agriculture will have to be modernised in the nearest future, so that it could adjust to the growing competition as a result of the Eurointegration and globalisation processes.



10.3 Comparison of changes in GDP created, consumption of fuel and emission into the air in the transport sector (1991=100%)

At the beginning of the transition period plant production was on the decrease by about one-third, but quite soon it started to grow and at present total grain harvest accounts for about 85, sugar beet - about 95, vegetables - about 110 and potatoes - about 115 percent of that in 1991 (Chapter 6.6). From the point of sustainability it is very important that during this decade the amount of mineral fertilisers and pesticides used in the agricultural sector decreased substantially.

In Figure 10.4 the changes in the annual grain harvest and the amount of pesticides used per one hectare of arable land are compared. In 1991 the harvests and the use of pesticides are equalled to 100 percent. It is obvious that during this decade the use of pesticides in order to get the same harvest decreased by about three times and comparing with 1990 - nearly six times. At present in Lithuania about 0.5 pesticides (by the amount of the preparation) are used per hectare of arable land per year.

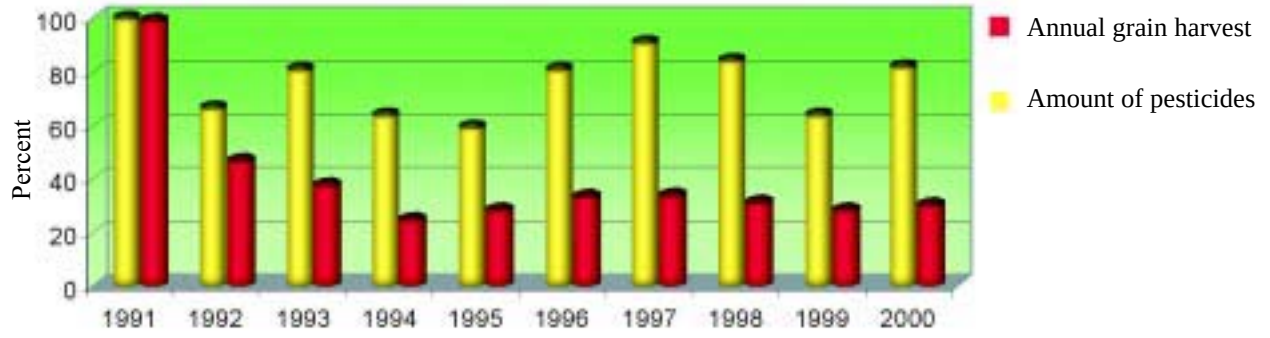
The amounts of mineral fertilisers consumed also decreased substantially. At present in Lithuania 55 kg of the active substance of SPP (sodium-phosphorus-potassium) fertilisers falls per hectare of land use per year and that is over twice as little than it is on average in the EU countries. With the consumption of mineral and especially nitrogen fertilisers being on the decrease, the leaching of nitrogen compounds into ground and surface waters decreased to a great degree. At the beginning of the decade under study on average 15-20 kg of nitrogen was leached from one hectare of agricultural land per year. At present this negative process is practically almost stopped.

The household sector is quite problematic, mostly because of irrational energy and, first of all, heat energy consumption. Although during the last decade, energy consumption in the household sector decreased by about 30%, that occurred mostly because of insufficient heating of premises and not because of more effective heat consumption. The thermal properties of the constructions built in the Soviet times are very poor, and their renovation (wall warming, change of windows) is the most acute tasks of the housing sector. Old and poorly-insulated networks of heating supply and the whole heating supply infrastructure that is physically and morally out-of-date determine comparably high prices for heating supply (on average about 15% of a family's budget). If these problems are not solved in time, the already started process of disconnection from the centralised heating systems can reach the extents that are hard to forecast and substantially increase the air pollution.

In analysing the social changes of the transition period it is necessary to take into account the fact that the countries of the former Soviet block with the behindhand economy consuming resources very irrationally and having quite heavy polluted environment inherited quite a lot of positive things. First of all, the level of education of the people is quite high, the system of health protection is quite well-developed although not very effective. During the decade under study all the spheres of social life experienced great changes (Chapter 7).

The Figure 10.5 shows some social development indicators in the background of economic changes (GDP) that occurred during the last decade. It could be seen that as a result of transformational decline in economy, in the first half of the transition period all the social indicators were worsening as well. However, since 1995 with the slight recovery in economy, positive changes in most of the social spheres have started.

For example, the number of students in higher educational institutions of Lithuania in 1994 compared to the beginning of the decade decreased by about 15 percent, how-

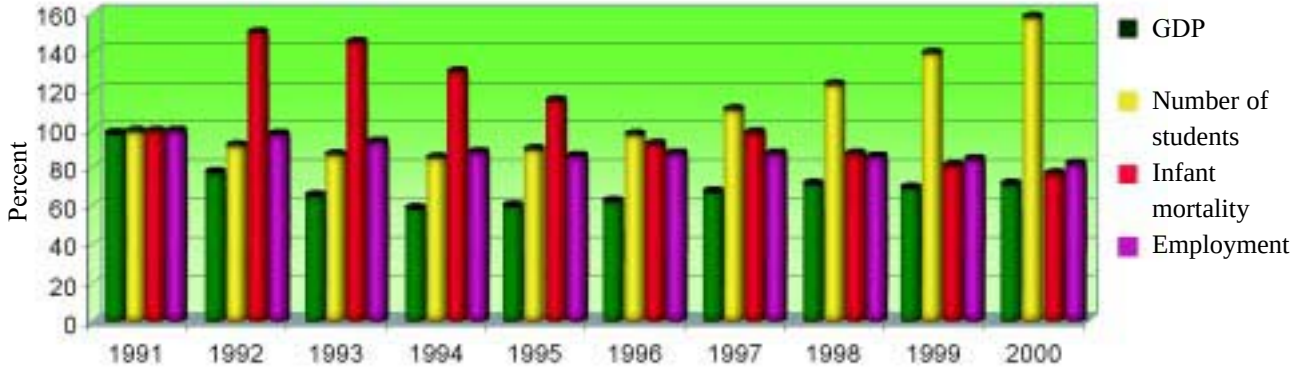


10.4 Changes in grain harvest and the amount of pesticides consumed (1991 = 100%)

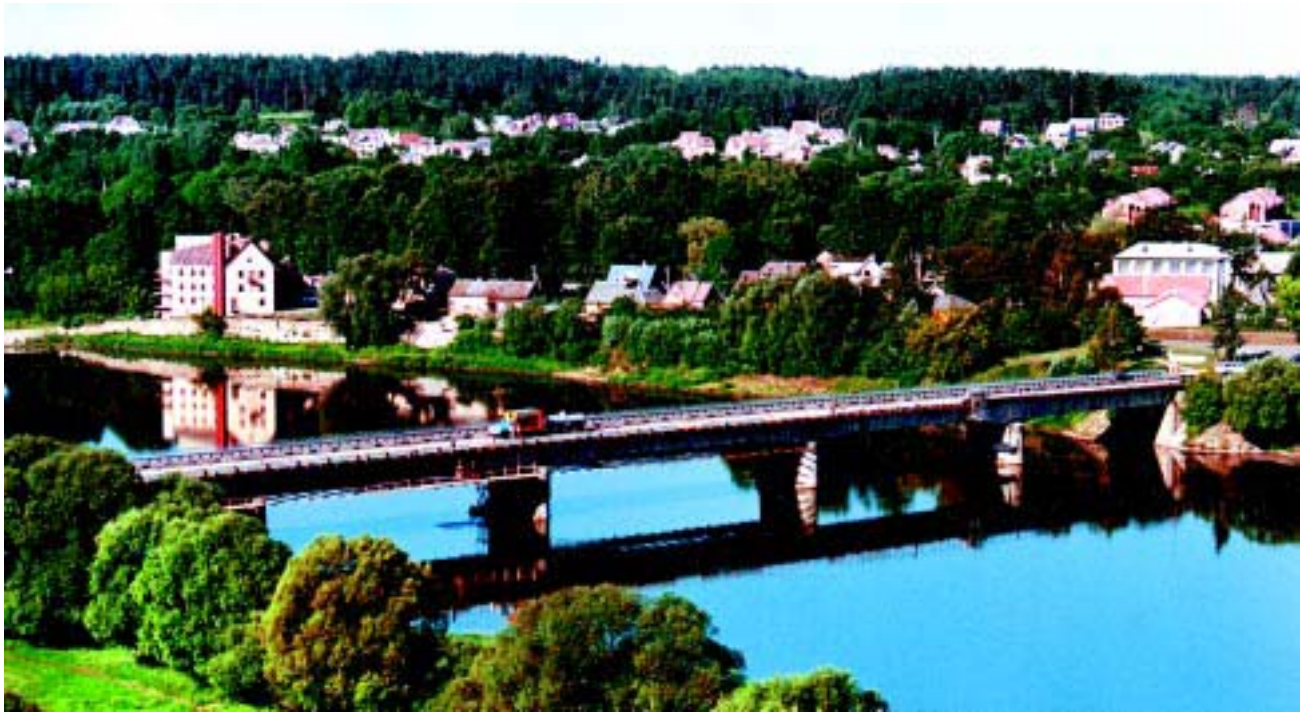
ever, in 1995 with the extention of the network of Lithuanian universities, the number of students started to increase rapidly. In 1996 it reached the level of 1991 and at the end of the decade the number exceeded the level of 1991 by one and a half times. Since 1995 the number of schoolchildren has been increasing at secondary schools. Total number of students and schoolchildren per 10.000 of population in 1999/2000 academic year accounted for almost 2100.

In the sphere of public health similar changes occurred, and main indicators public health worsened substantially at the beginning of the transition period. For instance, infant mortality per 1.000 live births from 11 cases in 1991 increased by nearly one and a half times. In 1992-1993 it accounted for 15-16 cases per 1.000 live births. However, from 1994 infant mortality started to decrease. In 2000 it amounted to 8.5 cases per 1.000 live births, that is it decreased almost twice compared to 1994 and by 22 percent compared to the beginning of the decade (Fig. 10.5). Average life expectancy as an important indicator of public well-being and its health also changed rapidly at the beginning of the transition period, especially male life expectancy. From 1991 to 1994 it decreased almost by four years and accounted for 62.7 years, that is became by almost ten years shorter than on average in the European Union countries. The decrease in female average life expectancy was not so substantial and in 1994 it was only by 4 years shorter than in the EU countries. Since 1995 quite an obvious increase in life expectancy has been observed in Lithuania. In 2000 average male and female life expectancy was already approximately by two years longer than at the beginning of the decade. At present female average life expectancy is 1.5 and that of males - 5 years shorter that it is on average in the EU countries.

In fact, the only social life sphere with no serious improvement registered so far is the population employment. The data presented in Figure 10.5 show that despite some economic growth, the population employment was on the decrease during the whole past decade. It increased very insignificantly in 1996-1997, and in 2000 it was by almost 20 percent less than at the beginning of the decade. According to the data of the researches carried out, the maximum level of unemployment in Lithuania was reached in 1994-1995 when it exceeded 17 percent. Some decrease in unemployment was registered in 1996-1998.



10.5 Comparison of economic (GDP) and social (number of students, infant mortality, employment) changes (1991 = 100%)



However, because of the repeated economic depression, since 1999 the increase in unemployment has been registered again. In 2000 it amounted to about 15 percent.

In the National Sustainable Development Strategy of Lithuania under preparation it is foreseen that a stable economic development will allow to increase the Lithuanian GDP by 2.5-3 times up to 2020. Then the GDP per capita will reach the present average of the EU countries. By substantiating economic development to the modern and environment-friendly technologies it is foreseen that a significant increase in the effectiveness of the consumption of raw materials, water and energy has to be achieved. Energy consumption per GDP unit should decrease not less than two times and should not exceed the present EU average. In the agricultural sector it is anticipated that organic farming will be developed essentially and it is intended to achieve that in 2020 organic farming production should take about 15% of agricultural land use. By modernising traditional agriculture mineral fertilisers and pesticides should be used more rationally than in many EU countries, and healthy foodstuffs that are able to compete in the market should be produced.

In the sphere of environmental protection it is provided for that by taking legal, economic, technological and organisational measures the trajectories of economic growth and the increase in environmental impact should be more disjoined, and the impact on environment, especially environmental pollution, should grow far more slowly than production. Lithuania should carry out all the requirements of the international conventions and the European Union directives in relation to environmental protection. In the sphere of conservation of natural resources and their consumption it is stipulated that effective protection of natural resources and the conditions necessary to renew biological resources should be ensured. The effectiveness of resource consumption should be increased seeking that renewable resources would constitute an ever-increasing part of the natural resources consumed. Up to 2020 the share of indigenous renewable resources in the balance of energy consumption should increase up to 15 percent mostly because of increased use of renewable biological resources.

In the sphere of social development it is foreseen that till 2020 social guarantees and the level of public education should reach the level of the European Union countries. In carrying out the expedient policy encouraging the development of behindhand regions of Lithuania it is provided for substantially reducing the differences between regions and ensuring the level of employment and living and health protection complying with the EU standards for all the regions. The modern educational system should help to form an active and responsible society: conditions will be created for the society to actively participate in decision-making process at local and national levels and in implementation of the principles of sustainable development.