The State Committee of Russian Federation
for Environment Protection
Project GEF «Biodiversity conservation>>

The First National Report of Russian Federation

Biodiversity conservation in Russia

Moscow 1997

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Measures undertaken by Russia to fulfill the obligations under the Convention on Biological Diversity

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The First National Report (1997) «Biodiversity conservation in Russsia» on measures undertaken by Russia to futfill the obligations under the Convention on biological diversity are prepared and published by the State Committee of Russian Federation for Environment Protection with participation of experts from different departments, using grant funds, allocated by the Global Environment Facility.

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Foreword

Russia ratified the Convention on Biological Diversity in 1995 thus having taken responsibility for the conservation of living nature on the 1/7th of the planet's land. This happened at the turning point of the development of this country and its economy.

Despite the critical political, economic and social situation, Russia does its best to fulfill the Convention 's obligations - it develops a system of zapovedniks and national parks, prepares a new edition of the Red Data Book and implements national programs for the salvage of rare animals. On the federal level, to advance the implementation of the Convention on Biological Diversity, Gosudarstvennaya Duma of the Russian Federation Federalnoye Sobranie (Gosduma) only for the last two years has adopted a series of fundamental laws, such as On protected areas(1995), On fauna (1995), On ecological expertise (1995), On the continental shelf of the Russian Federation (1995), etc. The efforts have been initiated to generate an integral monitoring system that primarily focuses on the status of biological diversity.

Russia has actively joined international activities in the field of the living nature conservation. Offices of about all international environmental organizations were open in this country. Some of them (IUCN, GEF, WWF, etc.) are involved in the realization of large projects in Russia. For instance, the Global Environment Facility has allocated over 20 million US dollars for the project Biodiversity Conservation that will facilitate the generation of the Russian National Strategy and Action Plan, render considerable assistance to Russian zapovedniks and the conservation of nature on the Baikal.

Yet, the main front of nature rescue efforts is gradually shifting from the Center to regions where the activities of executive authorities are in many aspects crucial for the fate of Russian biodiversity. By their initiative there have been set up new zapovedniks and regional ecological funds to finance biodiversity conservation actions.

Only 5 years have passed after the UN Conference in Rio de Janeiro though a lot has been achieved to put its documents into practice. Among the most important outputs of the Rio meeting are cooperative efforts of the countries under the Convention on Biological Diversity, including those in Europe, where it is being implemented on the basis of the Pan-European Landscape and Biological Diversity Conservation Strategy. Russia has rich experience in nature protection as well as high-class specialists - scientists, practical ecologists, and managers.

In spite of the country's tremendous size, ecosystems, floras and faunas of its regions are well investigated. So, this country joining the international biodiversity conservation system will prove useful for all its Parties.

It is evident that this report cannot be considered independently from other materials, especially from the annual State Report On the status of the Russian Federation environment. Its targeted purpose however dictated a necessity to repeat statutes, even if

obvious for Russian specialists, on the structure and functions of executive power bodies, baseline environmental legislation and other information.

Of course, being a pioneering work in this field done for a comparatively short period of time, the report is marked with certain shortcomings. That is why we anticipate that the constructive criticism of the proposed report would lead to its future improvement for it to become a full-value analytical base for the development of the National Strategy and Action Plan for the biological diversity conservation and sustainable use.

The first 1997 National Report on the fulfillment of obligations under the Convention on Biological Diversity by Russia reviews the current status and use of living nature as the most important strategic resource. It is the output of a joint effort of numerous specialists and organizations involved in the process of the Russian biodiversity conservation.

I would like to express gratitude to everybody directly engaged in the preparation of the National Report and to all those who gave assistance to this work, primarily, the Global Environment Facility and project Biodiversity Conservation. I hope that the first steps will pave the way to a new, more fruitful phase in the conservation of nature both in Russia and on the Earth.

The Chairman of the Russian Federation State Committee
for Environmental Protection

V. I. Danilov-Danilyan

Preface

Introduction. Russia is the largest state on the Earth with the ancient history, multinational culture and rich natural and intellectual resources. Irregular economic development of the territory conditioned by the relatively severe climate contributed to the conservation of flora, fauna and ecosystems in a close-to-the-wild state on the most part of Russia. This country has rich traditions in the biodiversity conservation. A system of protected areas has been functioning for about 100 years. Forestry, rational use of hunting and sea biological resources have been established through centuries. There are significant achievements in the ecological efficiency of agriculture. Russian basic and sectoral (forestry, agrarian, hunting, fishery) sciences have created conditions for organizing the conservation and sustainable use of biodiversity, its identification, evaluation and monitoring of its status. Russia possesses a great potential of high-class specialists in the field of biology, ecology, forest science, and geography, i.e. in those areas of expertise which are necessary for the generation and implementation of the biodiversity conservation strategy. At the same time, the country's economy developed under the conditions of strong centralization, lack of the normal market and isolation from the most of the global system. A lot of innovations, including those in nature protection, remained unused. The above features determine specifics of today's Russia. This country features many prerequisites for its future ranking among the most advanced states with a mature biodiversity conservation system.

Currently Russia is undergoing very hard changes in economic and social relations. The country is standing on the threshold of radical restructuring and updating of its economy in line with world scientific and technological advances. Unfortunately, restoration processes are of a long-term nature and the transformation of nature is extremely high in Russia. Urgent actions are needed to conserve and, in many instants, to rescue certain plant and animal species, unique ecosystems, and natural monuments. Therefore, within the report on Russia's fulfillment of the CBD obligations, it is important to evaluate the potential and current status of Russian biodiversity, identify perspective and priority areas of its conservation and sustainable use.

Synopsis: The Russian Federation incorporates 89 Federation subjects (Fig. 1) and has the status of a country with transitional economy. Its area is 17,000 thou sq km (11,4 % of the global land). It is washed by 14 seas. The sea border lasts for 38 807,5 km. The country's land border is equal to 14 509,3 km.

The territory of Russia features over 120,000 rivers and about 2,000 thousand lakes. The area of wetlands reaches 2 000 sq km and permafrost grounds are spread over almost 65 % of the country's territory. Within Russia there are large plains and mountain massifs (the Khibins, Caucasus, Urals, Altai, Sayans, Verkhoyansk Ridge, Kamchatka and Transbaikalia mountains). Its plains display ecosystems of 8 natural zones (biomes): polar deserts, arctic and subarctic `, forest tundra, taiga, broad-leaved forests, steppes, semiarid and arid zones (Annex 5.2.2.). The basis for the Russian biodiversity is formed by more than 11 000 species of vascular plants, 320 - mammals, about 730 - birds, 75 - reptiles,

about 30 amphibian species, almost 400 species of coastal sea fish, and 270 fresh water fish species (data of the Institute of Botany and Institute on Ecology and Evolution Problems RAS).

Biodiversity and biological resources of the country constitute, to a great extent, the basis for its economics and human environment. The forest fund occupies about 69 % of the total Russian lands. Almost 78 % of all dense forests are located in Asian Russia and only 22 % - in its European part. In 1997, since the introduction of the Russian Federation Forest Code, the structure of ownership for the forest fund has radically changed. The Code made for a transfer of a part of the forest fund to the ownership of Federation subjects and enacted other forms of its possession, disposal and use. Forests, their biodiversity and biological resources determine the life of population and economic structure on almost a half of the country's territory. In addition to the supply of timber that is harvested annually on about 10 000 sq km (100,8 million m3 in 1996), forests have notable environmental, resource and recreation functions.

Another significant unit of biological resources and biodiversity under conservation is formed by natural feedstock lands - hay fields and pastures of all Russian natural zones. Natural feedstock lands (excluding reindeer grazings) constitute 0.8 million km2: 0.2 million km2 - hay fields and 0,6 million sq km - grazings. The area of reindeer and horse grazings is 3,27 million sq km. There is noted a tendency to reducing their areas and productivity due to the degradation of the vegetation cover, aridization, erosion, etc. Productivity of hay harvesting is equal to from 1 (in dry steppes and semiarid zones) to 3 - 4 kg per 1 sq m (reaching 4 - 5 kg of green mass per 1 sq m in Nechernozemie (Poor-in-Black-Soil Lands) and floodplains of the Central Chemozem (Black Soil) region).

The calculation of cattle loads on natural forage lands shows that Russia can be potentially looked at as one of the world leaders-producers of livestock breeding products for both domestic consumption and export. Strategic reserves of natural feedstock lands tend to growing in the context of the decline in arable lands during recent years.

An important biological resource and biodiversity element of the country are water (sea and fresh water) organisms - algae, invertebrates, fish, birds, and mammals. Fishery and commercial use of sea biological resources rank among the key sectors of Russian economy, particularly in the export volume. A total rate of the fish catch was about 5.5 million tons in 1996.

Despite the National Report template suggested by UNEP (having been reflected in the structure and headings of the report) being rigidly fixed, the Russian Party to the CBD formulated the goal of the report as the analysis of the current status of biodiversity, measures for its conservation and sustainable use, and discussion of strategic areas in the Russia's fulfillment of CBD obligations. In concord with the above, 2 parts are singled out in the report: I - Measures taken by Russia to fulfill the CBD requirements and II - The status of Russian biodiversity. Part I, basing on the evaluation of nation-wide significance of biodiversity, degree of its understanding and character of its present-day use, identifies priority areas of activities in this pool and discusses issues of the to-be-developed biodiversity conservation and sustainable use national

strategy and action plan. This part of the National Report is crowned with the discussion of potential stakeholders of the future biodiversity conservation strategy, efforts under the Global Environment Facility project Biodiversity Conservation in Russia and institutional issues in relation to the fulfillment of the CBD obligations.

Part II of the National Report, in compliance with the UNEP requirements (Guiding Principles for the Preparation of Research Efforts... in Biodiversity and UNEP\CBD\SBSTTA\1\6 Science and Technology Information to be Contained in National Reports) gives data on the status of Russian biodiversity, relevant socio-economic factors, forms of biological resource use, in-situ and ex-situ conservation efforts, local forms of nature protection, economic and financial mechanisms of the biodiversity conservation and its monitoring system. A special section of the National Report deals with potentialities of Russia in the biodiversity conservation and sustainable use: country's scientific, informational, legislative and institutional potentials are analyzed in the light of CBD obligations.

The authors of the National Report, in full understanding of a challengeable character of overviewing the biodiversity status and its determining factors in such a large country as Russia, focused their attention on the selection of reference data for the Annex. Its first unit contains 30 color maps to present the data on biodiversity geography and integral evaluations of the role of socio-economic factors. The second unit includes reference data in the form of lists and tables on current legislation in the filed of nature protection, on rare and endangered plant and animal species, etc. The National Report ends with the list of information sources which served as the basis for the preparation of individual sections of Part II.

To prepare the National Report, multiple published and unpublished statistical and analytical materials were utilized. In some cases, they, naturally, reflect author's or sectoral opinions on situations, issues and prospects. Yet, while preparing the report the authors avoided using unofficial information. To guarantee this, specialists and materials of ministries and sectoral agencies responsible for individual aspects of the matter at the national level were drawn to the work over key biodiversity conservation issues. Among the others, Ministry of Agriculture, SCEP, Rosleskhoz (Russian Forestry Management), Russian Academy of Sciences, State Committee on Land, Ministry of Science, etc. were engaged.

The authors of the report realize that the analysis on the status of Russian biodiversity and its determining factors is not comprehensive enough. Hence, the present National Report should be looked at as the first step on the way to the generation of the national biodiversity conservation strategy and to the involvement of Russian andforeign specialists into this process.

Part 1.
Measures undertaken by Russia to fulfill the obligations under the Convention on Biological Diversity

1. Introduction. The Role of the Convention on Biological Diversity in the Conservation and Sustainable Use of Biological Diversity in Russia

Russia ratified the Convention on Biological Diversity (CBD) in December, 1995. The 3rd meeting of the CBD Parties' Conference in Argentina, November 1996, for the first time defined specific actions for the implementation of the Convention's objectives, particularly in such important for Russia areas as the biodiversity conservation in forestry and agriculture. Within the CBD and with the participation of Russian experts, the Protocol on Safety in Biotechnology is being developed to be completed in 1998. In 1996, the Global Environment Facility Project Biodiversity Conservation was launched in Russia. It comprises 3 components: Biodiversity Conservation Strategy, Protected Areas and Baikal Region. The preparation of the national strategy and action plan in the nature protection has started within its framework.

From among the positive outputs of biodiversity conservation national actions in the context of the CBD ratification, the following should be singled out:

- active generation of the legislative base (Annex 5.2.1);

- high rates in the expansion of the federal system of protected areas; creation of regional networks of protected areas (Annex 5.1.11, 5.2.9-5.2.11);

- completion of works on the preparation of a new edition of the list of animals for the Red Data Book of Russia; Red Data Books have been already published in 20 Federation subjects and in most of the regions lists of plant and animal species under conservation are attached to relevant legal acts;

- expansion of the network of organizations involved in the ex-situ conservation of rare animal and plant species; - establishment of 2 cross-sectoral commissions - on biodiversity issues and on gene-engineering activities;

- Russia's successful entering international activities in the biodiversity conservation pool, including its participation in the efforts under the CBD, CITES, and other conventions and agreements;

- putting of advanced informational support methods in the biodiversity conservation into practice of certain scientific research and sectoral institutions (creation of mass databases, use of GIS technologies, etc.);

- development and implementation of federal and sectoral programs on the protection and sustainable use of individual biodiversity elements (on forest biodiversity, on keeping a register of domestic cattle breeds and cultural plant sorts, on reforestation, on support to zapovedniks, on the Amur Tiger conservation, etc.);

- financing of certain federal and regional scientific biodiversity programs and projects;

- beginning of the implementation of the GEF project Biodiversity Conservation in Russia, including Nizhni Novgorod oblast and Baikal Region and on the territory of 74 Russian zapovedniks and national parks;

- extension of activities of regional state environmental organizations and funds in the biodiversity conservation (especially in central areas of European Russia, in Siberia and Far East);

-intensive functioning of Russian (Socio-Ecological Union, Center of Wild Nature Protection, Russian Union of Bird Conservation, Green Cross, etc.) and international non-governmental ecological organizations (WWF, IUCN, Wetlands International, Greenpeace, etc.).

Simultaneously, sound problems associated with the necessity to fulfill the CBD obligations by Russia can be identified. In a contracted form, they may be formulated as follows:

- insufficient financing of biodiversity inventory, status evaluation, conservation and monitoring;

- low performance of economic mechanisms of the biodiversity conservation and sustainable use;

- ignoring of environmental regulations by many sectors characteristic of transitional economy conditions; criminalization of some areas in the use of biological resources;

- underdeveloped international biodiversity conservation legal base in CIS countries.

The CBD ratification proved to be an incentive for more active performance and initiation of coordinated efforts on the nature protection in Russia. On the background of a general decline in public and authorities' interest to environmental problems, it is nevertheless possible to bring attention of many potential participants in the strategic process to biodiversity conservation issues.

2. References

2.1. Current Status and Problems of the Biodiversity Conservation

Biodiversity conservation through protected areas. For November 1, 1997, protected areas of Russia have occupied about 2 % of the country's total area. They are represented by 95 zapovedniks (3 10,265.5 km2) and 32 national parks (66,45 1.4 km2). In addition, there are almost 1,600 state zakazniks (up to 600,000 km2) and over 8,000 natural monuments. Flora abundance of individual protected areas deviates from 300 to 1,500 vascular plant species. This constitutes 30 - 80 % of the flora composition of a region. From among the Red Data Book plants, only 40 - 50 % of vascular plants, 36 % of mosses, and 86 % of lichens are currently conserved in zapovedniks. Russian zapovedniks conserve 87 % of land mammal fauna (218 species), including 37 species listed in the Red Data Book, 92 % - amphibians (24 species, including 3 from the Red Data Book), 73 % - reptiles (49 species, including 6 from the Red Data Book), and 83 % - birds (5 15 species, including 60 % of the Red Data Book species). A representative range of landscape diversity on protected areas varies within 60 - 70 % and 10 out of 58 Russian biogeographic regions are still lacking zapovedniks and national parks. Botanic-geographic regions do not all possess protected areas. In terms of the insufficient representative range of biota and landscapes on protected areas, the development of their system and regional networks remains urgent.

Conservation of rare and endangered species. The SCEP Department for Biodiversity Conservation has prepared a list of rare and endangered animals of Russia for a new edition of the Red Data Book. It includes 65 mammal species, 123 species of birds, 20 - reptiles, 8 - amphibians, 44 - fish, 13 - worms, 44 - mollusks, 94 - insects, etc. (Annex 5.2.8). Their conservation and reproduction are carried out in-situ (in zapovedniks, national parks, zakazniks) and ex-situ (in zoos, botanic gardens, breeding farms, arboreta). Yet, a lot of species fall out of various forms of protection and that is why it is still actual to expand a network of protected areas and set up special breeding centers for rare species breeding focused on their introduction into the wild.

Biodiversity conservation in forestry. According to the Rosleskhoz data, the territory of Russia comprises the following number of forest-dependent plant and animal species: trees and shrubs - 847, grass and small shrubbery - 1,438, fungi - 212, mammals - 127, birds - 158 (the data to be specified further on). Forest habitats are characterstic of 80 Red Data Book fauna and 257 flora representatives. Most of Russian protected areas are located in the forest zone, hence biodiversity conservation prospects thereof are satisfactory. For the Russian Federation National Report on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests (Montreal Process, July, 1997) the Russian Party prepared statistical and analytical materials which incorporate data on the criterion Biological Diversity Conservation. It pinpoints an insufficient degree of the study on forest landscape and biological diversity and a need for making its full inventory. This should be facilitated by regular development of forest areas (once in 10 - 15 years) and State Registration of forest fund, i.e. national inventory

of forests (once in 5 years). New data on the status of Russian forests according to the State Registration are planned to be available by January 1, 1998.

Hunting management and game animal protection. Russian hunting lands occupy 1.5 billion hectares. About 60 mammal and 70 bird species being regular objects of commercial and non-professional hunting are encountered on the territory of the Russian Federation. Since 1994, the state control over the status of game resources and hunting management has been placed by the Russian Federation Government on the Department of Hunting Resources Protection and Rational Use under the RF Ministry of Agriculture. The State Service for Hunting Resource Registration of the Department performs the annual estimation of the number of key game species in individual regions and across Russia.

Data of the RF State Service for Hunting Resource Registration witness that a drop in number of certain valuable game animals observed in 1992 - 1995 is mostly characteristic of the center and south of European Russia. Totally throughout Russia the number of game animals did not reduce so dramatically for the same period. The reduction of game animals did not exceed the frameworks of natural deviations in their abundance and was caused by unfavorable weather and climate conditions observed on the most part of Eurasia in 1992 - 1995.

The situation has changed for the last two years. Total livestock of fur and wild ungulate animals has been growing throughout Russia. The improvement of weather-climatic conditions for the recent years and a better game animal feed base have produced their positive effect. In addition, anti-poaching efforts have been intensified in Russia. A certain positive role in stabilizing the livestock of wild ungulates and creating prerequisites for its growth was played by the strategy of rigid restriction in hunting quotas for these species in the period of exposure to negative natural factors pursued by the Hunting Department of the RF Ministry of Agriculture.

Anyhow, there are specific problems in the game animal biodiversity conservation of Russia. They are primarily associated with a shortage in game animal protection financing, particularly insufficient funding of the RF Ministry of Agriculture Hunting Department system.

Conservation of sea and inland waters biodiversity. A level of understanding of Russian sea biodiversity has been still relatively low. Better than others are studied the Black, Azov, Baltic, White and Barents Seas and individual parts of the Sea of Japan. There -is no single entity that would perform management of sea biological resources and biodiversity conservation. In addition to a high fishing load, through the last years marine ecosystems have been experiencing significant impacts from companies that carry out oil/gas prospecting and extraction (the Barents, Kara, Caspian, and Okhotsk Seas). In southern and northern seas remains a threat of losing unique maritime ecosystems as a result of oil pipeline building and tanker transportation. The invertebrates and fish intended introduction is proceeding absolutely uncontrolled. This situation dictates setting

priority in the biodiversity conservation on the setup of a network of sea zapovedniks and expansion of protected sea areas in existing reserves along with efforts on taking inventory of sea biodiversity.

Fresh water basins of Russia are undergoing drastic antropogenic impacts - pollution, transformation and flow withdrawal, and the like (Annex 5.1.8). Their ecosystems, flora and fauna are dramatically altering and a number of species is becoming extinct (especially fish - sturgeon, salmon, etc.).

Biodiversity conservation in agriculture. In terms of the reduction of agricultural areas under the economic decline, some regions demonstrate restoration of wild vegetation in sites where plowed fields used to be. Reduction of cattle stock, lowering of loads on natural grazings and recovery of their biodiversity are also occurring in a lot of regions. Positive environmental results have been brought by a recent cut in the use of pesticides and toxic chemicals on fields. However, a decreasing state support to agriculture poses a threat of destruction for the system of agricultural plant and animal genofund protection. Currently there are 30 119 sorts of cultural plants, including 11 117 Russian breeds, available in Russia. 375 sorts out of them are under conservation (242 - of Russian origin). The total number of domestic animal breeds known in Russia is 454 with 124 among them being conserved. Principal areas in the agricultural biodiversity conservation strategy are: the implementation of ecologically efficient production technologies, optimization of agrarian landscape and conservation of domestic animal and cultural plant breeds (breakthroughs of the past in breeding).

2.2. **The Global Environment Facility Project Conservation of Biodiversity in Russia**

In 1993 - 1996, the preparation of the biodiversity conservation Project based on the Global Environment Facility grant was carried out in Russia. On April 11 - 12, 1996, negotiations with the World Bank of Reconstruction and Development (WBRD) were held in Moscow where the parties discussed the agreement on the grant. On May 30, 1996, in Washington, the WBRD Council of Directors approved the Project to be implemented in Russia and on September 23, 1996, the Prime Minister VS. Chernomyrdin signed the Russian Federation Government Edict No 1130 On ratification of the agreement between the Russian Federation and World Bank of Reconstruction and Development. On September 29, 1996, the Ambassador of the Russian Federation in the USA Yu.M. Vorontsov, on behalf of the RF Government, signed the Agreement on the grant.

The total Project cost is 26.0 million US dollars out of which 20.1 million US dollars are allocated directly through the Global Environment Facility grant. Russia is to finance the Project implementation with the sum equivalent to 4.8 million US dollars. In addition, the Government of Switzerland granted 1.1 million US dollars to support non-governmental and educational programs in the biodiversity conservation.

The Project will be being implemented through the years of 1997 - 200 1. It consists of three Components:

A. Biodiversity Conservation Strategy (2.7 million US dollars from the GEF grant). The Component envisages to develop the National Strategy and Action Plan, a model of the Regional Biodiversity Conservation Strategy, economic and financial mechanisms and information support to nature protection measures.

B. Protected Areas (9.3 million US dollars from the GEF grant). The Component was designed to consolidate a system of Russian protected areas under new socio-economic conditions. In addition to GEF-funded efforts, the Component will carry out training of protected area top managers and local population. The training will be financed by the Swiss Government via the WWF Russian Program Office.

C. Regional Baikal Component (6.3 million US dollars from the GEF grant). The Component was designed to support cross-regional relations in the conservation of the Lake Baikal and its watershed biodiversity within the Buryat Republic, Irkutsk and Chita oblasts.

Management of the Project was placed on the Russian Federation State Committee on Environmental Protection (SCEP). To ensure feasible management of the Project, the Chairman of SCEP appointed the SCEP Deputy Chairman as the Project Director and Chairman of the Project Supervisory Committee. Similar to that, top managers of the SCEP (Head of the Biodiversity Conservation Department, Head of the Natural Reserves Management and responsible secretary of the Baikal Commission) were appointed, respectively, as Directors to Components A, B, and C. Routine management of the Project is accomplished by the Project Implementation Group (PIG). In 1997, with the support of the Project, workshops and conferences were held, the Informational-Analytical Center was set up and is being equipped, a small-grants bidding for zapovedniks and national parks was conducted, computers and other equipment for protected areas were purchased, and bulletins and other periodic editions were published. The year of 1998 will give a start to the preparation of national and regional strategies, sectoral strategies and action plans in the biodiversity conservation and generation of ecological networks of protected areas, ecological education programs, etc. The Project integrates 74 zapovedniks and national parks, governmental and non-governmental organizations, numerous sectoral and basic science institutes, and international ecological organizations. The GEF Project will retain its key positions in fulfilling CBD obligations by Russia in the coming years.

3. **Biodiversity Conservation Strategy in Russia and Its Key Elements**

Reforms and changes in political, economic and social spheres will affect and are already affecting the biodiversity conservation in Russia. A system of nature and biological resource protection in the former USSR used to be adapted to a totalitarian political system, centralized administration and multilevel structure of the Soviet power. It

featured a number of positive properties which ensured financing of the biodiversity conservation, keeping record of the Red Data Book, regular registration of commercial fauna, etc. Decentralization has brought sound disruption to biodiversity conservation control and management. Sovereignty of Russian Federation subjects and challenges in the issues of ownership, use and management of natural resources aggravate the problem with a political aspect. A transition to a multivariant social and economic structure and new economic policy demands novel approaches to biodiversity issues.

Ratification of the Convention on Biodiversity by Russia in 1995 and law-making activities in this field (the adoption of RF laws On protected areas (1995), On fauna (1995) and On ecological expertise (1995)) have become a milestone in the generation of the national policy with regard to the biodiversity conservation. Yet, current law-making practice is actually lacking a conceptual idea of living nature protection. This was vividly manifested in adopting a new Forest Code (1997) and slow preparation and ratification of federal laws On fishery, On hunting, On flora, etc. This creates a certain gap in legislation and a one-sided approach to biodiversity conservation matters (not all animal and plant species are protected by law at most; until now there have been non-existent legal acts securing allotment of land for the expansion of the protected area system as habitats of diverse plant and animal species in Russia although Russia is already being looked at as a real and rather promising site of action for national and foreign companies).

Considerable drawbacks in the conservation of Russian biodiversity are associated with the absence of efficient economic mechanisms of nature protection and underestimation of their role in the provision of sustainable development of Russia. Approaches to the evaluation of environmental investment efficiency are not operating.

Russia is lacking economic levers for the sustainable use of biological resources, i.e. rational taxation policy that would guarantee priority to the biodiversity conservation in the course of economic activity. Unfortunately, there is no differential economic evaluation of how the country is fulfilling its CBD obligations and that of biosphere functions of Russian ecosystems - climate stabilization, sustainability of air quality and carbon global balance, preservation of fresh water reserves, biodiversity conservation, etc., in Russia.

Environmental policies of Russian ecologically unsafe sectors (ferrous and non-ferrous metallurgy, chemical industry, oil and gas production, lumbering, etc.) are specific of a sectoral approach. Relevant Russian Federation ministries and sectoral agencies have their own environmental services which, as a matter of fact, substitute federal monitoring and independent control bodies responsible for tracking biodiversity environmental exposure. The establishment of the Cross-Sectoral Commission for Biodiversity Problems does not cover all objectives in the coordination of Russia's CBD actions. As a result, the only barrier on the way of ecologically unsafe projects is ecological expertise. Real economic incentives for the implementing clean technologies into industry have not been found so far. Federal environmental agencies ignore almost completely ideas of ecological restoration of degraded lands as the basis for sustainable development.

Russia's coming back to global political, economic and environmental systems after a long isolation period turns the biodiversity conservation issue of this country into a component of a world-wide process. Russia cannot fulfill its CBD obligations without cooperative efforts of other countries. It needs a full information access to data on advanced land-use technologies, toxic waste cleaning, ecosystem restoration, conservation of rare plant and animal populations, etc. It is necessary to develop mechanisms for a joint responsibility of countries-partners in the implementation of large international investment projects in Russia (e.g. in the development of 250 deposits on terms of products' sharing).

Priorities of the future biodiversity conservation strategy may be presented as a totality of legislative, social, political, international, economic, managerial, communicational and scientific initiatives. They will constitute a background for specific biodiversity conservation undertakings - development of territorial forms (creation of zapovedniks, national parks), protection of rare and endangered species of plants and animals, ex-situ conservation of biota, restoration of disrupted ecosystems and habitats, inventory of flora and fauna, anti-poaching actions, implementation of CITES requirements, etc.

The goal of the national biodiversity conservation strategy is to provide legislative and executive bodies, governmental, private and non-governmental environmental organizations, and mass media with scientifically and economically substantiated recommendations, long-term forecast schemes and action plans for management of the biodiversity conservation and sustainable use.

The national strategy should be focused on persons responsible for decision-making in the Government, ministries and sectoral bodies which use natural resources, exercise control over the biodiversity status, and provide financial, legal, scientific and information support to these activities. The General Consumer of the National Strategy is the RF SCEP.

According to the GEF Project Conservation of Biodiversity, the preparation of the Russian National Strategy is to be completed at the end of 1998. By this moment, it is suggested to prepare a long-term program in priority areas, such as:

1. Development of territorial biodiversity conservation forms. Herein the core areas of the strategy are: increasing a share of the zapovedinks' and national parks' area to 3 % of the area of Russia (for November 1, 1997 - 1.92 %) and generating regional ecological networks of protected areas. It is vital for protected areas of European Russia to join the Pan-European ecological network. Russian Federation Government Resolution No 572-r of April 1994 approved the List of state zapovedniks and national parks recommended to be set up on the territory of the Russian Federation in 1994 - 2005 (totally 72 new zapovedniks and 42 national parks with the total area of 103.6 thousand km2). On December 1996, the RF SCEP approved the List of federal-level state zakazniks recommended to be set up on the territory of the Russian Federation for the period up to 2005 (totally 40 zakazniks with the area of over 24 thousand km2). The implementation

of the national strategy is achievable only with the active participation of regional bodies engaged in the creation of ecological networks of protected areas. Local legislative grounds thereof have been created in Kamchatka, Orenburg, Chita, and other oblasts.

2. After collapse of the former USSR, an integral system of protected areas with a 100-year history was also broken. Present-day strategy of Russia in this sphere focuses on the restoration of links and the integral system. On inception steps, it is feasible through the creation of bilateral cross-border zapovedniks and national parks along the borders with Belorussia, Ukraine (along the Vorksla river, Staraya Guta forests), Kazakhstan, Georgia, Mongolia (Ubsunur hollow), China (the Khanka lake), etc.

3. Generation of the integral system of biodiversity conservation management. The creation of the legislative base for the biodiversity conservation is currently being completed. Among strategic objectives, the following should be singled out: the preparation and publishing of a new edition of the Red Data Book of Russia, monitoring of the status of rare animal and plant species populations, fulfilling of CBD obligations by Russia along with obligations under other international conventions and agreements (including CITES, Wetlands Convention, etc.), and joining the Bonn and Bern Conventions. A representative range of biota on protected areas is still rather narrow. Therefore, the key area of the national biodiversity conservation strategy is establishing an appropriate regime to ensure the conservation and reproduction of rare species in their habitats.

4. Improvement of the legislative base (Annex 5.2.1). There are envisaged certain actions to accelerate the adoption of laws important for fulfilling the CBD obligations, namely On fauna, On hunting, On fishery, etc. The key initiator of the development and adoption of new environmental laws is the Government. As for legislative efforts, it is the Committee on Ecology and Committee on Natural Resources and Nature Use under Gosduma. Strategy of the legislative activities suggests to complete the adoption of baseline laws and creation of a standing order for their enforcement on each executive level. New legislation in the biodiversity conservation is forecast to be developed through 5 - 10 years.

5. Creation of sectoral biodiversity conservation strategies and action plans and cross-sectoral coordination strategy. The first step in this direction was made by the Rosleskhoz by having prepared a relevant program. A new Forest Code (1997) regulates nature conservation while using forest resources. There are no analogous legal acts for tundra, steppes, deserts, and mountains. Though there exists a strategic goal according to which sectors-nature users must have biodiversity impact-minimizing programs. In fishery, it is attained through setting norms, quotas and licensing of activities for individual water basins, regions and resource types. In hunting, monitoring of game animal populations serves as the basis for commercial hunting strategy, issuing licenses, establishing norms, terms and methods of animal preying. Strategy applied in agriculture to conserve biodiversity makes for the implementation of clean technologies, reduced use of pesticides, arrangement of the agrarian landscape, conservation of domestic animal and cultural plant diversity. By the end of 1998, independent sectoral strategies will have been generated by specialists of these sectors within the National Strategy efforts under the GEF Project.

6. Improvement of Russian international activities in the biodiversity conservation. Key strategic goals - efficient partnership in conventions: CBD, CITES, Ramsar, Whaling, On the World Cultural and Natural Heritage, etc., participation in the PanEuropean Strategy of Landscape and Biological Diversity Conservation, joining the Bonn and Bern Conventions, conclusion of bilateral and multilateral agreements with countries having common with Russia biodiversity conservation interests in individual regions (the Caspian, Baltic, Black Seas, the Amur, etc.). The Asian region where the PanAsian strategy may be applied offers prospects for expanding Russia's international CBD activities. Yet, for the coming 5 years, the top-priority area will be promotion of the biodiversity conservation cooperation with CIS countries. It has been initiated by the conclusion of the Multilateral Agreement on Migratory Animals.

7. Advancement of scientific research on the biodiversity conservation. In this field, the key strategic area is scientific support to biodiversity conservation measures. This is achieved through promotion of research in the plant and animal classification (a condition for the correct biodiversity identification), study on the rare species ecology, creation of scientific grounds for the in-situ and ex-situ conservation. An important objective for fulfilling the CBD obligations may be considered the utmost restoration of scientific activities at the SCEP Institute of Environment Protection and Natural Reserves Management (national focal point under the CBD).

8. Development of ideas of the openness of biodiversity status information, provision of equal access to biological resources. The strategy lies in the combination of state and public control over the status of biodiversity, support to ecological NGOs and strengthening of mass media activities in this sphere. An important strategic area is publishing of a sectoral journal on biodiversity issues. The GEF Project provides for the financial support to such journal (a quarterly, circulation up to 1 500 copies). This unit also includes ecological education in the field of the biodiversity conservation.

9. Creation of the informational space for biodiversity conservation management. Currently a system of information support to nature protection does not exist in Russia. Strategic actions in this sphere should be focused on the establishment of the Informational-Analytical Center, biodiversity meta-database, respondents' network for collecting, analyzing and communicating information in managerial decision making in the center and regions.

10. Improvement of biodiversity conservation economic and financial mechanisms. Today's strategy consists in upgrading old economic mechanisms and creating new ones to provide actual evaluation (cost) of natural resources, efficiency of environment investments and economic incentives for fulfilling the CBD obligations. Core strategic actions include training of young economists with a new way of thinking and advanced knowledge.

National Biodiversity Conservation Strategy (for the nearest 5 - 15 years) and Action Plan (for 5 years) along with the plan of current actions (for one year) will be developed in Russia in 1998. It is difficult to determine funds required for these purposes - in addition to federal funding, they suggest active involvement of regions and sectors. The GEF Project will be supporting specific actions on the National Strategy implementation for 5 years.

4. Strategy of Safe Transfer, Handling and Use of Genetically Modified Organisms

At present, biosafety is understood in Russia as «safe transfer, handling and use of genetically modified organisms (GMO) and their fragments containing recombinant DNA». This approach seems to be coinciding with the CBD provisions and opens ways for harmonizing a national biosafety mechanism with its international analogs. The CBD key provisions (articles 8, 16, 19, etc.) address prevention of an uncontrolled introduction of GMOs, being biotechnology products able to produce adverse impacts on the conservation and sustainable use of biodiversity, into the environment.

A system of biosafety within the CBD requirements includes four basic sections which, to a great extent, are overrunning:
- legal aspects of biosafety;
- access to genetic resources;
- biotechnology transfer;
- distribution of benefits from the use of biotechnology.

On the national level, building of biosafety mechanisms should start with the generation of a legal system for regulating gene engineering activities and creating an informational infrastructure in this pool. This base will be able to regulate at most an access to genetic resources, biotechnology transfer (and intellectual property issues), and distribution of potential benefits associated with the use of biotechnology.

The beginning of the national biosafety building process may presumably assigned to the middle 1970s. The evolution of the legal base for gene engineering activities in Russia (prior to 199 1 - in the USSR) may be presented chronologically as follows:
1978 Tentative safety rules for handling recombinant DNA molecules
1989 Sanitary-epidemiological safety rules for handling recombinant DNA molecules
1991 USSR draft law «On the organization of works and ensuring safety in gene engineering))
1993 Initiation of the Cross-Sectoral Commission for providing legal grounds to gene engineering activities
1994 Draft law «On gene engineering activities)) was submitted to Gosduma.
1995 Federal law «On state policy in gene engineering activities)) was approved by Gosduma. President of the Russian Federation put a veto on it (September)
1996 Work of the conciliation commission consisting of delegates from the President's Administration, Gosduma and Russian Government. Federal law «On state control over gene engineering activities)) was adopted by Gosduma in the third reading (June 1), signed by the Russian Federation President (July 1) and entered legal force upon its open press release (July 5)
1997 The Russian Federation Government established the Cross-Sectoral Commission on Gene Engineering Issues which started its work on April 22.

As seen from the above chronological list, Russia is focusing on the creation of vertical regulatory-legal control in modern biotechnology. This approach seems to be the only possible for Russia which incorporates 89 Federation subjects.

On the other hand, inevitable integration of Russia with the global economic community and legal pool (its participation in the CBD) governs a necessity of establishing a biosafety system compatible with internationally accepted schemes. This requires the identification of baseline elements of the national biosafety structure (protocol) in biotechnology. It would be logical to assign the following element to this kind:
- scope of action
- goals and objectives
- definitions
- general rules concerning basic principles in supporting a biosafety system
- safety rules specific of individual sectors (protocols)
- application, transfer and joint use of information
- risk assessment mechanisms and protocols
- risk management mechanisms intellectual property rights and commercial secrets
- licensing and certification systems
- ransboundary transfer
- responsibility
- compensation
- changes in the legal system of biosafety
- generation of the national potential

Analysis through official questionnaires sent to Russian ministries and sectoral bodies has shown that in the country exist no less than 40 legal and subordinate legal acts regulating, directly or indirectly, biosafety issues within the above proposed structural elements (Annex 5.2.1.). A number of acts (e.g. draft Federal law on bioethics) are in the process of either development or consideration. Let us specify some of the structural elements of Russian biosafety:

- general rules and principles in supporting the biosafety system - have not been completely finished though principles of risk assessment and management, decision making criteria (e.g. on the basis of a risk/benefit ratio), and terms and definitions common for international practice can be utilized as grounds;
- safety rules specific of individual sectors (protocols) - have been detailed in many instants, primarily for microorganisms and immunobiological preparations. However there are notable distinctions in understanding of pathogenic microorganism lists and their applicability to potential risk assessment schemes depending on a sector they belong to;
- application, transfer and joint use of information - are most mature. Moreover, almost all regulatory materials of specific sectors control information exchange issues;
- copyright - these issues strongly need further elaboration, they feature mostly general provisions or those regarding breeding;
- licensing system - incorporates state legislation on licensing of various activities and is looked at as an opportunity for individual sectors to impose duties and tariffs;

- risk assessment mechanisms and protocols - are lacking as they are, though a number of instructions allude to pathogenic organism lists;
- risk management mechanisms - are absent as they are, with rare exceptions;
- transboundary transfer - there are available general principles and separate cases concerning bacteriological weapons and materials that can be potentially used in their production, maintenance of microorganism culture collections, zoological collections and veterinary products;
- responsibility, compensation - general practice - reference to Criminal and Civil Codes;
- changes in the legal system of biosafety - an opportunity of introducing changes is never mentioned although a periodic revision of regulatory and legal acts is evidently needed with knowledge in this sphere progressing;
- creation of the national potential - the notion as it is does not exist, yet, a number of Governmental acts mention the establishment of coordination centers, including nation-wide ones, target funding and material supply;

A basis for a biosafety regulatory structure is the Russian Federation Federal law On state control over gene engineering activities. The law contains articles on objectives and principal directions of state regulation in gene engineering, on licensing of such activity and standardization and certification of products (services) in this area. Vital are the provisions on responsibility and on general access to data on gene engineering safety.

The second level of the regulatory and legislative base is «Rules for Safe Transfer, Handling and Use of Genetically Modified (Transgenic) Organisms and their Fragments Containing Recombinant DNA». These Rules fall into two groups:

1. General rules - «General Principles in Risk Assessment and Management and Information Supply in Transfer, Handling and Use (including introduction to the environment) of LMOs and their Fragments Containing Recombinant DNA». The most close analogs of «General Principles)) may be the OECD «blue Book» (Recombinant DNA Safety Considerations, OECD, Paris, 1986), «UNEP International Principles of Safety in Biotechnology)) and respective articles in the draft ((Protocol on Biosafety» within the CBD.

2. Safety rules specific of individual sectors (protocols): «Rules for Safe Transfer, Handling and Use of Genetically Modified (Transgenic) Organisms and their Fragments Containing Recombinant DNA» a) for closed systems and industrial microorganisms; b) in voluntary introductions of microorganisms into the environment.

- «Rules for Safe Transfer, Handling and Use of Genetically Modified (Transgenic) Plants and their Fragments Containing Recombinant DNA».

- «Rules for Safe Transfer, Handling and Use of Genetically Modified (Transgenic) Animals and their Fragments Containing Recombinant DNA».

- «Rules for Safe Transfer, Handling and Use of Living Vaccines Containing Recombinant DNA».

A mechanism for adopting these «Rules» by executive power bodies admits on-line editing and introducing corrections in accordance with the growth of knowledge in gene engineering and modern biotechnology. In so doing, initial data on LMOs are transformed into information and undergo expertise. In line with the expertise findings, they are compared with one of the potential risk groups, this being decisive in setting rules (protocol) for a specific activity (including a risk management procedure). Monitoring enables to achieve a feedback, i.e. to have a mechanism for verifying information credibility and correctness of decisions made as well as introducing corrections at each phase.

A relevant biosafety infrastructure is needed to implement this scheme. For this purpose (implementation of the Russian Federation Federal law On state policy in gene engineering activities), the Russian Federation Government set up the Cross-Sectoral Commission on gene engineering activities. Among its key functions, it features those of an agency similar to the National Biosafety Committee. Its key objectives include the following:

- creation of infrastructure for gene engineering biosafety control;
- generation of rules for safe transfer handling and use of LMOs and their fragments;
- creation and maintenance of a centralized database on gene engineering and biosafety;
- coordination of gene-engineering research and developments based on the evaluation and management of potential risks;
- coordination of activities of federal agencies, RF subjects executive power bodies: scientific, production and educational institutions in developing the order and guarantees for safe transfer of LMOs, their fragments and gene engineering technologies;
- control over harmonization of the Russian biosafety mechanism with acting international analogs.

Decisions of the Cross-Sectoral Commission are obligatory for all executive bodies it has representatives of and for enterprises and organizations operating within their administration. The Commission is headed by the Russian Federation Minister of Science and Technology who has four deputies representing the Russian Ministry of Health, Ministry of Agriculture, The State Committee for Environment Protection and Russian Academy of Sciences. It has delegates from 14 ministries and sectoral agencies and state scientific centers engaged in gene engineering.

The Commission's work scheme is compatible with the Clearing House structure provided for CBD articles 16 - 19. Implementation of the biosafety mechanism is achieved through a system of links established by the Commission with ministries, state sectoral agencies and gene engineering commissions at organizations and enterprises (an analog to the Institutional Biosafety Committee). Russian current mechanism of getting approval for submitted applications on LMOs is based on Commission's

recommendations for concerned ministries and state sectoral agencies. This was the way passed to receive a positive decision on the limited field tests (on biosafety) of Monsanto potatoes resistant to Colorado beetle and of soy resistant to Roundup herbicide. Field tests of a number of transgenic plants applied for by other Russian organizations are also being carried out.

5. **Partners of the hiodiversity conservation strategy in Russia**

A rather complex system of the biodiversity conservation and biological resource use management has been established in Russia. All branches of power, many economic sectors and various population pools have organizations that participate in the implementation of biodiversity conservation strategy and tactics actions.

President of the Russian Federation. The President has undertaken certain environmental actions to bridge a gap in Russian legislation. His Decrees On state strategy of the Russian Federation in environmental protection and sustainable development (of February 4, 1994) and On the concept of transition of the Russian Federation to sustainable development (of April 1, 1996) are currently governing policy in environmental protection, including the biodiversity conservation.

Security Council. The Security Council incorporates the Cross-Sectoral Commission on Environmental Security (established in 1993). It has an important coordinating state management function in national security, including environment. Issues of the biodiversity conservation, directly and indirectly, have been discussed repeatedly at Commission meetings. During the last years, the Commission has made a number of decisions significant for nature protection regarding reduction of risk of technogenic accidents, radiation safety, soil degradation prevention, forest protection, chemical weapons storage and disposal, protection of Arctic environment, forest-and-park belt of Moscow, environmental security of the Baikal region, etc.

Executive power. Back in 1995, the Cross-Sectoral Commission for Biodiversity Issues (the Chairman - V.I. Daniliv-Danilyan) was set up under the Russian Federation Government to coordinate actions of various ministries, sectoral agencies and organizations.

A state body authorized for the implementation of Russia's fulfilling the CBD obligations is the Russian Federation State Committee on Environmental Protection (SCEP). Direct administration stays with the Department for Biodiversity Conservation and Department for Natural Reserves Management and Protected Areas. Under the RF SCEP, there is the All-Russia Scientific Research Institute of Environmental Protection and Natural Reserves Management - focal point of the Convention on Biological Diversity in Russia. It is the leader in scientific substantiation of practical actions addressed to rare plant and animal species, evaluation of the biodiversity status in this country, and implementation of the Convention's obligations and of other international agreements.

Among Federal ministries and agencies responsible for specific areas of nature protection, the following should be singled out:

- Rosleskhoz (forest biodiversity conservation, operation of national parks, conservation of high-value forest lands, monitoring of the forest ecosystem status through periodic forest taxation;
- Ministry of Agriculture (conservation of agricultural animal and plant diversity, keeping record of the state cadaster for cultural plant sorts and forms and domestic animal breeds, veterinary control, state quarantine - control over the import and export of quarantine plants and animals, conservation and use of sea and inland water biological resources, and commercial fauna conservation, reproduction, registration and use);
- Ministry of Natural Resources (compliance with ecological regulations in mineral resources prospecting and extraction, conservation and monitoring of the water ecosystem status); - the Russian Federation Ministry of Health and Medical Industry (putting medicinal plants resources into practice, implementation of biosafety objectives, support to scientific and technological microorganism collections, maintenance of medicinal plants breeding farms);
- Ministry of Science (development and implementation of scientific and science&technology programs on biodiversity conservation issues);
- Ministry of Culture (fulfilment of Russia's obligations under the Convention on World Cultural and Natural Heritage, including those to be fulfilled in cooperation with the State Committee for Environment Protection; control over the status of natural heritage sites; conservation of natural complexes on areas of museums-zapovedniks, historical and cultural monuments, ex-situ conservation of plants and animals in arboreta, dendrological parks, resort forests and zoos);
- State Customs Committee (control over the export and import of fauna and flora items, including Russia's fulfilling some of CITES obligations, participation in veterinary, sanitary and quarantine control on state borders);
- Federal Border Service (protection of sea biological resources on high seas and in the Caspian Sea, assistance in the CITES obligations' fulfillment);
- Federal Postal Service (control over the export and import of flora and fauna items, zoological and botanical collections).

State management of the biodiversity conservation process - protection of rare species and functioning of federal protected areas is exercised within the executive power authority. However direct planning, financing, monitoring, etc. are accomplished on the regional level. That is why a leading position in the Russian biodiversity conservation belongs to regional authorized agencies - ecological committees, oblast administration structures responsible for the environment, hunting and fishing control agencies, zapovedniks and other protected areas.

Legislative power. Gosduma incorporates the Committee on Ecology which is an operating body in the nature conservation. It played the key role in the ratification of the Convention on Biological Diversity by Russia (1995) and in the preparation and adoption

of Federal laws: On fauna (1995), On protected areas (1995), and the like (Annex 5.2.1.). At present, the Committee on Ecology in cooperation with other committees is preparing other laws for adoption: On fishery, On hunting, On flora, etc. During 1996, the Committee prepared 29 draft laws for consideration, yet none of them was approved and submitted to the Federation Council (there were more than 10 such draft laws in 1995).

Active in environmental law-making is the Committee on Natural Resources of Gosduma which prepared a number of key laws regulating the biological resources use (Forest Code, Water Code, Law on product sharing, etc.). The Committee has lately started the work over the law on land reservation for developing a system of protected areas.

Both Committees participate in the work of the Interparliament Assembly of CIS countries, directly in the Commission on Environment. The High Ecological Council that was created as a public organization consisting of scientists and specialists for expertise and lobbying of environmental projects functions under the Committee on Ecology.

Prospects in the operation of the above bodies are associated with the completion of law-making activity and adoption of about 50 new environmental laws, including those regarding the biodiversity conservation and preparation of CIS agreements on nature protection and biological resources use. Russia also needs a law On environmental performance management to regulate and coordinate biodiversity conservation actions of various state bodies.

Research institutions of RAS, ministries, universities. Institutes of the Russian Academy of Sciences (RAS) together with the RF Ministry of Science, universities and some sectoral scientific research institutes provide scientific support to biodiversity conservation undertakings. It includes identification of biodiversity objects, inventory of flora and fauna of the whole country and its regions, evaluation of biota genetic diversity, reveal and description of both typical and unique nature objects to be conserved, grounds for norms and regulations in biological resources use, and generation of approaches and methods for biota recovery and ecosystem ecological restoration. The subprogram Biological Diversity has been working within the Federal Target Science&Technology Program since 1995. In the Biological Sciences Division of the RAS, research in the biodiversity pool is carried out by dozens of institutes, among them those of Botany and Zoology (St. Petersburg), on Ecology and Evolution Problems (Moscow), on Ecology of Plants and Animals (Ekaterinburg), on Animals Systematics and Ecology (Novosibirsk), Marine Biology Institute (Murmansk), Biology and Soil Institute (Novosibirsk), etc. RAS botanic gardens of Moscow, St. Petersburg, Kirovsk, Novosibirsk, and other, constitute a critical element in the ex-situ conservation of flora. The Russian Fundamental Research Foundation supports a great number of basic science projects on biodiversity.

Environment-focused NGOs and mass media. Environmental NGOs has been acting as stakeholders in the generation and implementation of biodiversity conservation national strategy for a long time. The All-Russia Nature Protection Society, which held its 10th Congress (230 delegates from 61 Federation subjects) in 1996, has been keeping up

traditions of attracting public to nature protection. Local units of the Society participate actively in the identification and conservation of natural monuments (totally over 11,500). The largest public ecological movement on the territory of the former USSR is the Socio-Ecological Union. Among union's multiple areas and projects, the top position is occupied by nature protection, support to local initiatives on the rare plant and animal species conservation, development of the ecological network of protected areas, etc. Recently, NGOs have started working on a more professional basis. The Wild Nature Center can be taken as an example. It realizes several biodiversity conservation projects (including that on the Russian Biodiversity Atlas), assists in expanding a system of protected areas and releases periodicals on nature protection (Forest Bulletin, Wild Nature Protection, Bulletin for Zapovednik and National Park Personnel). Since 1993, the Union of Bird Conservation that publishes bulletin World of Birds has been functioning in Russia. Numerous scientific, governmental, private and international environmental funds, including Eurasia, WWF, J. and K. McArthur Foundation, Know-How , V.N. Vernadsky Foundation, etc. provide financial support to certain biodiversity conservation projects.

Russian television has special nature protection shows on actually each state, public and private channel. High-circulation publications on biodiversity conservation matters in special central and regional editions are released in Russia (magazines Nature, Nature and Man, Young Naturalist, Ecos, In the World of Animals, Nature of Russia, Hunting and Management, etc., bulletins - Russian Conservation News, Living Arctics, On the Way to Sustainable Development, etc., newspapers - Green World, Salvage, Bereginya, ZapovedniksT News, and others). Anyhow, the number of environmental editions, volume of publications and public interest to nature protection problems has dropped dramatically for the recent years. Therefore one of the biodiversity conservation strategy objectives should become a search for new partners in mass media.

6. Terms of the preparation and implementation of the Russian biodiversity conservation strategy

Basic phases in the development of the National Biodiversity Conservation Strategy and Action Plan are to be realized within the GEF Project in 1998. Through the same year, it is suggested to prepare a series of sectoral strategies and action plans for the biodiversity conservation in agriculture, forestry, fishing, hunting, etc.

Designing of a model for the regional biodiversity conservation strategy (with Nizhni Novgorod oblast as a pilot site) and its implementation in other regions are scheduled for 1998 - 1999 and the circulation of the outputs of these efforts will proceed till 200 1.

A process of setting up and equipment of the Informational-Analytical Center on Biodiversity will be completed in 1998 and the creation of the respondents' network for information reception, communication and processing will start. In 1998 - 2001, the Center will be functioning as an information support provider for the CBD science &

technology cooperation (international focal point for the Clearing House Mechanism of the Convention).

Starting with 1998, a regional bulletin on biodiversity conservation in Russia will be published (tentatively - 4 issues per year). Training workshops on biodiversity conservation economics and workshops for zapovedniks' personnel are scheduled to be held in 1998 - 2000.

Federal laws On hunting and On fishing (protection of water basin biological resources) are supposed to be adopted, preparation of draft laws On fauna, On land reservation for developing a system of protected areas, etc. is intended to be finished in 1998.

Implementation of the Federal Target Program Conservation of Amur Tiger will be underway in 1998 - 2003. In addition to the expansion of the protected area network, it makes for fostering the anti-poaching campaign and actions against illegal tiger trade, public ecological education, etc.

Implementation of the subprograms Biodiversity and Priority Areas in Genetics (the Russian Federation Ministry of Science) is to be continued in 1998 - 2000.

Main areas and periods set for the efforts under the GEF Project Conservation of Biodiversity can be judged from the Table on the Project Budget in 1997 - 2001 (Table 1).

7. **Budget of biodiversity conservation**

Total budget of Russia's actions addressed directly to the implementation of the CBD requirements amounts to no more than 270 - 300 billion rubles (45 - 50 million US dollars) annually. This is 2 - 4 times less than required for maintaining the biodiversity conservation in the country. Lack of funding most acutely tells on protected areas, rare species conservation, practical implementation of information technologies, ecological education and setting up of the monitoring system for tracking the biodiversity status.

The GEF Project Conservation of Biodiversity allocates funds to the fulfillment of the CBD obligations by Russia in accordance with priorities set at the phase of the Project preparation (Table 1). Their bulk was received to support the Russian network of protected areas having an important biosphere function in the global biodiversity conservation. At the same time, the state budget funding of merely Russian zapovedniks constituted 6.7 million US dollars in 1996.

The total budget of the subprogram Biological Diversity (RF Ministry of Science) under the Federal Target Science&Technology Program is 47.43 billion rubles (7.9 million US dollars).

The overall system of Russian environmental funds was evaluated to have received 1,200 billion rubles in 1996. In 1996, 58.7 billion rubles were directly allocated to the Federal Ecological Fund, 7.7 billion rubles of which went to protected areas. As a whole, it is difficult to estimate the size of local environmental funds' investments to the biodiversity conservation.

One of the outputs of the GEF Project implementation in Russia will become a system of collecting and analyzing data on biodiversity conservation financing and their accessibility for all concerned parties. It will make possible to specify investment priorities and attract donors to solving biodiversity conservation problems.

Table 1

Budget of the Global Environment Facility Project Conservation of Biodiversity in Russia for 1996 - 200 1

Index	Component, Subcomponent, Task	Annual budget, thousand US dollars						
		1 year	2 year	3 year	4 year	5 year	6 year	Total
A	**Biodiversity Conservation Strategy**	**600**	**959**	**615**	**217**	**49**	**0**	**2,440**
A.1	*National and regional strategy*	*115*	*274*	*148*	*81*	*0*	*0*	*618*
A.1.1	Development of national strategy	88	139	43	6	0	0	276
A.1.2	Regional strategy model	27	135	105	75	0	0	342
A.2	*Socio-economic mechanisms for biodiversity conservation*	*85*	*315*	*265*	*106*	*29*	*0*	*800*
A.2.1	Biodiversity economics workshops	30	30	30	15	0	0	105
A.2.2	Economic mechanisms analysis	23	152	122	17	6	0	320
A.2.3	Financial mechanisms for biodiversity conservation	32	133	113	74	23	0	375
A.3	*Information support to biodiversity conservation actions*	*400*	*370*	*202*	*30*	*20*	*0*	*1,022*
A.3.1	Establishment and operation of the Informational-Analytical Center	230	180	62	20	20	0	512
A.3.2	Information projects	55	35	20	0	0	0	110
A.3.3	Northern Eurasia Biodiversity Atlas	50	50	40	0	0	0	140
A.3.4	Database on mammal number dynamics	30	30	40	0	0	0	100
A.3.5	GIS users workshops	35	75	40	10	0	0	160
B	**Protected areas**	**2,824**	**2,680**	**2,295**	**1,159**	**299**	**0**	**9,257**
B.1	*Institutional support to the management system*	*346*	*286*	*120*	*60*	*0*	*0*	*812*
B.1.1	Consolidation of the SCEP Department of Natural Reserves Management	120	50	0	0	0	0	170
B.1.2	Consolidation of the Rosleskhoz National Parks Management	85	35	0	0	0	0	120
B.1.3	Establishment and operation of the Expert Council on Natural Reserves Management	50	50	0	0	0	0	100

B.1.4	Regional associations of protected areas	60	120	120	60	0	0	360
B.1.5	Consolidation of protected areas regional top management	31	31	0	0	0	0	62
B.2	*Increase in protected areas efficiency*	*1,125*	*1,090*	*830*	*330*	*0*	*0*	*3,375*
B.2.1	Development of management plans	310	330	330	330	0	0	1,300
B.2.2	Consolidation of guarding service	500	500	500	0	0	0	1,500
B.2.3	Setup of the information network	90	260	0	0	0	0	350
B.2.4	Setup of the ecosystem monitoring station	25	0	0	0	0	0	25
B.2.5	Team-grant bidding for zapovedniks and national parks	200	0	0	0	0	0	200
B.3	*Public support and educational programs*	*568*	*719*	*600*	*369*	*19*	*0*	*2,275*
B.3.1	Pilot ecoeducational projects	280	280	345	280	0	0	1,185
B.3.2	All-Russia action "March for Parks"	10	10	10	10	0	0	40
B.3.3	Guides and expositions	0	90	106	60	0	0	256
B.3.4	TV shows	0	120	120	0	0	0	240
B.3.5	Bulletins and other periodicals	38	19	19	19	19	0	114
B.3.6	Ecoeducational Center in Teberda zapovednik	200	200	0	0	0	0	400
B.3.7	Meeting of zapovedniks' directors	40	0	0	0	0	0	40
B.4	*Protection of ecosystems*	*680*	*485*	*675*	*350*	*280*	*0*	*2,470*
B.4.1	Rare species and ecosystems conservation	160	SO	80	0	0	0	320
B.4.2	Setup of new protected areas	280	145	345	350	280	0	1,400
B.4.3	Setup of protected areas regional networks	240	260	250	0	0	0	750
B.5	*Training of specialists*	*105*	*100*	*70*	*50*	*0*	*0*	*325*
B.5.1	Work groups, workshops, publishing of educational materials	30	25	20	0	0	0	75
B.5.2	Training courses for universities. Other forms of personnel training.	75	75	50	50	0	0	250
C	**Baikal Region Component**	**170**	**1,645**	**2,145**	**1,290**	**715**	**375**	**6,340**
C.1	*Cross-regional actions*	*20*	*285*	*410*	*180*	*55*	*0*	*950*
C.2	*Pilot project in the Goloustnaya river watershed*	*0*	*220*	*435*	*170*	*45*	*20*	*890*
C.3	*Pilot project in the Tugnui river watershed*	*0*	*355*	*480*	*240*	*40*	*20*	*1,135*
C.4	*Pilot project in the Khilok river watershed*	*0*	*285*	*320*	*200*	*60*	*0*	*865*
c.5	*Local initiatives program*	*1.50*	*500*	*500*	*500*	*515*	*335*	*2,500*
C.5.1	Administrative support	*50*	*50*	*50*	*50*	*50*	*0*	*250*
D	**Project management**	**461**	**317**	**307**	**287**	**287**	**147**	**1,806**
GEF grant total		**4,055**	**5,601**	**5,362**	**2,953**	**1,350**	**522**	**20,1010**

According to Goskomstat, funding of wild animal counts and protection in 1996 did not exceed 6 and 13.5 billion rubles respectively and that of their maintenance 14.1 billion rubles. The total funds available from different sources for game species conservation,

counting, and reproduction in Russia in 1996 was 106.2 billion roubles or 1/3 of the respective 1990 budget.

8. **Monitoring and Evaluation**

Evaluation and monitoring of the biodiversity status. Russia is lacking an integral state system of biodiversity status monitoring. A system of observations in zapovedniks most fully corresponds to conditions of continuous control over biodiversity components. Annually, zapovedniks (most of 95 available ones), especially those included in the international network of biosphere reserves (1 8), prepare detailed reports (Chronicles of Nature) which contain uniform-scheme and template information on the status of ecosystems and biota.

Russian Federal Forestry Service performs monitoring in the course of forest development taking place on one and the same areas once in 10 - 15 years. In addition, National Forest Inventory is made every 5 years under the State Registration of forest fund. As a result, such indicators as changes in areas occupied by various forest types, composition of forest breeds, reserves of wood and other forest resources, clearings, forest injuries and diseases, etc. are subjected to monitoring and evaluation. State registration data are of official character, they are most accurate and comprehensive to be used for the characterization of Russian forests. Annual statistics on forests are generalized by the All-Russia Scientific Research Institute of Forest Reserves under the Rosleskhoz (starting from 1995) in the annual report Status and Use of Russian Forests.

The evaluation of the game animal resource status (mammals and birds) on the Russian Federation territory is carried out annually by the State Service for Registration of Game Resources of Russia within the authority of Hunting Department under the RF Ministry of Agriculture in 84 RF regions. These data are generalized in special reference books once in 5 years. The latest Resources of Key Game Species and Hunting Lands of Russia (199 1 **- 1995)** was published in 1996. Currently, attempts to organize a system of periodic registrations of Russian water fowl are being undertaken. A network of stations for monitoring of water fowl populations is being developed on 35 sites identified by the Ramsar Convention (Annex 5.2.2).

RF Ministry of Agriculture Fishery Department performs evaluations of the water biological resources status on the annual basis along with setting norms, periods and commercial use methods (permissible catches, confiscation quotas, etc.) for individual water basins and resource types. Annual statistics on the status of resources are generalized in sectoral reports and in the Russian Federation State Report on the Environment Status.

Monitoring of the exchange of quarantine plants, animals and microorganisms and control over invasions of species unsafe for economy are exercised by the State Service for Plants Quarantine under the RF Ministry of Agriculture. Unfortunately, it does not

control consequences from voluntary and involuntary plant and animal introductions, thus leading to the intensification of biological pollution of the Russian territory.

Evaluation and monitoring of the Russian biodiversity conservation strategy and action plan implementation. The preparation of the national biodiversity conservation strategy has just begun in Russia. The available Russian Federation Government Action Plan for environmental protection and nature use for 1996 - 1997 (approved by the Russian Federation Government Edict No 155 of February 19) covers only some of the actions on the biodiversity conservation: on the generation of sustainable development policy and its legislative support (e.g. preparation of the Federal Program Creation of the Integral State Ecological Monitoring System); on ensuring environmental security (e.g. Government edicts On the order of state control realization in protection, reproduction and use of fauna objects and their habitats, On the order of issuing long-term licenses for fauna use, Federal Program for Amur Tiger conservation, etc.); on the participation of Russia in solving interstate and global environmental problems (e.g. Federal Programs for the complex management of maritime zones of the Black and Azov Seas, Improvement of the Environment Situation in the Baltic Sea Basin).

Control over the Action Plan realization is placed on the Russian Federation Government and budgets of Federal Programs are approved by the RF Ministry of Economics.

Evaluation and monitoring of the GEF Project Conservation of Biodiversity implementation. The Russia-WBRD Project Agreement singles out areas for monitoring of the GEF grant implementation: by its content, terms of execution and budget. Moreover, the Project has a special section that deals with the audit of all efforts within Project Components and the evaluation and monitoring of the Project efficiency. Independently, it is suggested to evaluate efficiency of biodiversity conservation investments through the last years and in the course of the Project tasks implementation (1997-2001). Within the Component «Biodiversity Conservation Strategy)), evaluation and monitoring mechanisms addressing the national biodiversity conservation strategy and action plan realization and control over Russia's fulfillment of the CBD obligations have been designed.

Part 2.
Status of biodiversity

1. Status of landscape and biological diversity

1.1. Landscape characteristics

Russia occupies the 1/8th part of global land and most of non-tropical Eurasia. Despite its rich landscape diversity, it is rather poor in biological diversity if compared with countries of a more southern geographic position. Its territory presents landscapes of 8 natural zones (Annex 5.1.2) with over 11,000 species of vascular plants, 320 - of mammals, about 730 - of birds, 75 - of reptiles, about 30 amphibians and 270 fresh-water fish species (data of the Institute of Botany RAS and Institute of Ecology and Evolution Problems RAS). About 8 % of global vascular plant flora, 7 % of mammal fauna and almost 8 % of bird fauna are represented in Russia. The environment of lands which presently are integrated into Russia has been exposed to human activities since long ago. During many centuries steppe areas were used as a famous migration passageway between Asia and Europe, a zone populated by nomadic tribes and a trade way from China and India to European countries (silk way). Russia as a state was established about 11 centuries ago and expanded its frontiers mainly through annexation of low-populated lands of the North (since 12th - 13th centuries) and Siberia (since 14th - 16th centuries) and then of more developed western (16th -17th centuries) and southern (18th - 19th centuries) areas. In spite of its long history of economic development, lands of Northern Eurasia proved relatively little disturbed, especially in Siberia and Far East. Constraints in industrial and agricultural expansion into these regions are associated with wide propagation of permafrost, cold climate and poorly cultivable lands (Strategic Resources of Russia, 1996). The highest transformation of biological and landscape diversity is specific of Northern Caucasia, Volga Region, Central European Russia and Southern Siberia. The other regions have been experiencing basically local anthropogenic impacts (extraction of oil, gas and other mineral resources, forest clearings, building of hydraulic engineering facilities, local agriculture) and due to this almost 90 % of tundra, up to 70 - 75 % of taiga forests and 20 -30 % of Asian steppes preserve their close-to-the-wild state. Large areas of mountain ecosystems, particularly in the North-East of Siberia, Kamchatka peninsula and Okhotsk Sea coast still remain close to the wild.. At the same time, 2 biomes of Russia, namely broad-leaved forests and steppes, became almost extinct under the human impact in historic time and are found on small areas, most of them being protected. For example, zapovedniks within a steppe biome occupy only 0.4 %.

A system of protected natural areas encompassing all natural zones and principal mountain massifs has been being generated in Russia for more than 80 years. A vegetation layer and ecosystems of Russia are conserved in 95 zapovedniks and 31 national parks. In addition, there are several thousands of protected areas with restricted natural resources use. However their distribution over the country lacks uniformity and they do not reflect overall natural diversity of ecosystems and landscapes. In the nearest

future, it will become difficult to solve a problem of a representative biodiversity range on protected areas of North Eurasia.

Russian landscapes may also be considered as a reserve for developing an international network of protected areas.

1.1.1. Physico-geographic features of Russia governing its biological diversity

Key geographic specific features of Russia that govern biological diversity and conditions for its conservation are determined by its continental part sizes, geological background (relatively young landscapes), specifics of relief (combination of mountains and flatlands), biogeographic homogeneity (the whole territory is incorporated into a single Holarctic Region), climatic and landscape mosaics, and in the regions of ancient assimilation - by the impact of economic activities. Some of the above features will be discussed in more detail below.

Paleographic and geomorphological factors. Russia occupies a northern part of the largest continent, including both oceanic and continental sectors of Eurasia. Its most ancient parts pertain to the pre-Cambrian platforms - Russian and Siberian, which now are overlapped by young deposits (glacial, aeolian). Between the platforms there is a zone of Hercynian orogenesis represented by low Urals ridge and West Siberian and North Siberian sloping lowlands. These lowlands used to be covered with the sea not once in the past.

In the north, Russian boundaries are formed by arctic seas, maritime zones of which are migration passways for circumpolar arctic and boreal plants and animals. Therefore over the most of the Russian territory flora and fauna lack originality and has few endemic species. In the south, this region is bounded by high mountains of Transbaikalia, Sayans, Altai, Tien-Shan, and Caucasus which served as plain biota refugiums in the periods of glaciation and sea transgressions. At present they are kind of a sound biogeographic barrier on the biotic exchange path and are characteristic of high endemism.

Hydrological network and climate. Russia's hydrological network is indicative of exclusively high density. Main continental areas are occupied by water basins of the Arctic Ocean rivers (Severnaya (Northern) Dvina, Pechora, Ob, Yenisei, Pyasina, Khatanga, Olenek, Lena, Indigirka, Kolyma), of the Black Sea rivers (Dnieper, Don, Kuban) and those of the Caspian Sea (Volga, Ural). Most of the rivers are characterized by meridional streams, thus facilitating migration of southern species to the north (e.g. taiga ones to tundra, nemoral - to taiga, steppe - to the forest zone and more hygrophilous species of plants and animals to arid zones). Abundance of rivers, lakes and marshes leads to a high share of water and circumaqueous species in Russian biota, particularly among plants, birds and mammals.

The Russian territory is open for western atmospheric transfer. However monsoon transfer of the eastern ocean sector is limited mainly by eastern ridges along the Pacific

coast. Russia is also open for the Arctic atmosphere mass throughout its northern boundary. Nearly all Russian territory is situated in the negative winter temperature zone, this imposing constraints on the distribution of many thermophilic plants and animals (subtropical and tropical). In the course of holocenosis, the territory of Russia and some neighboring countries underwent six powerful humidization-aridization and warming-cooling climatic cycles accompanied by biota migrations and formation of refugiums with relict species. Sections with relict biota left from past climatic epochs (glacial and interglacial periods) are rather frequent in European Russia (sections with calciferous flora) and Eastern Siberia (fragments of relict steppes).

Biogeographic features. Together with Western and Central Europe and countries of Northern Eurasia, Russia is situated inside the Holarctic Region. According to the IUCN classification, the following biomes are presented within Russian borders: tundra, temperate zone coniferous forests, temperate zone broad-leaved forests, grasslands (steppes), drylands, and East Siberian cold mountains. This differentiation of land ecosystems is rather inadequate due to poor knowledge of Russian-language biogeographic literature. A biodiversity level of Russia is dictated by a higher landscape diversity level presented by zonal ecosystems: polar deserts, arctic and subarctic tundras, forest tundra, northern, central and southern taiga, larch forests and thin forests, mixed coniferous and broad-leaved forests, broad-leaved forests, forest steppe, grasslands, moderately dry and dry steppes, semiarid and arid regions, intrazonal ecosystems - marshes, and oligotrophic, mesotrophic and eutrophic swamps, floodplain meadows and forests; various mountain ecosystems (forest, steppe, grassland, tundra, nivalic and petrophilic).

1.1.2. **Land ecosystems and wild vegetation**

1.1.2.1. Biological and landscape diversity of principal land biomes

Polar deserts. This biome is characterized by its circumpolar disposition. In Northern Eurasia it is spread over the Arctic Ocean islands and archipelagoes (Northern Island of Novaya Zemlia (New Land), Franz Josef Land, etc.). Landscape diversity of these regions is poor due to the young age of surfaces, climate extremes and, correspondingly, poor biota scope. Landscapes of various-age moraine and sea sediments and stony substrates are widely displayed. Micro- and nanoreliefs are formed by stony rings, spots, mineral polygons, and mounds. The vegetation cover is noted for absolute domination of spore plants - algae, lichens, liverworts *(Hepaticae)* and mosses *(Bryophytes).* They form a fine film of life together with flower plant fragments (*Saxifraga sp.sp.*, *Puccinelia* sp.sp., *Poa* sp.sp.). Local flora of vascular plants (species number per 100 km2) amounts to only 20 - 30 species. For instance, flora of the Franz Josef Land located totally in the polar desert biome comprises about 60 species. Common species from the vertebrate animals' pool are those associated with the sea - polar bear *(Ursus maritinus),* polar fox (*Alopex lagopus),* walrus *(Odobaenus rosmarus),* and seals. Landscapes and biota of this biome are conserved in a special zakaznik Zemlia Frantsa Iosifa (Franz Josef Land).

Arctic tundras. The biome has circumpolar disposition. In European Russia, arctic tundras are presented on the Arctic Ocean islands (Southern Island of the Novaya Zemlia (New Land), the Kolguev, etc.). In the Asian part of Russia it forms a relatively narrow belt along the Kara, Laptev, North East and Chukchee Seas (peninsulas Yamal, Taimyr, coast of Yakutia and Chukotka) and on archipelagoes Novosibirskie Islands and Sevemaya Zemlia (Northern Land). Maritime plain landscapes with polygonal, spotty and spotty-moundy tundras, polygonal wetlands and brine marshes of delta areas are common for these regions. The vegetation layer demonstrates a large share of flower plants with dominating *Dryas octopetala, D. puctata, Cassiope tetragona, Salix polaris, Graminae, Cyperacae and Saxifragacea.* Lichens and mosses form a 5 - 10 cm stratum preventing deep melting of permafrost. Local flora of this biome comprises 70 - 100 species per 100 km2. Vertebrate fauna normally contains reindeer (*Rangifer turandus),* polar fox *(Alopex lagopus),* lemmings *(Lemmus sibirica, Dycrostonyx torquatus), geese,* alpine ptarmigan (*Lagopus mutus),* numerous species of ducks and waders. For the last decades, a tendency to arctic tundra destruction has been manifested in locations of oil and gas prospecting, extraction and transportation, i.e. on the Kolguev island, Yamal and Gydan peninsulas. The Novaya Zemlia nuclear test site is situated within this biome. Rare and extinct plant species are few in number and best known of rare animal species are walrus *(Odobaenus rosmarus),* Bewick's swan *(Cygnus bewickii),* snow goose *(Chen hyperboreus)* and barnacles *(Branta sp.sp.).* Biota and landscapes of arctic tundra are presented in zapovedniks Bolshoi Arktichesky (on islands and coast of Taimyr peninsula), Ust-Lensky (in the Lena river estuary) and Ostrov Vrangela (Vrangel Island) (in the Chukchee Sea).

Subarctic tundra. This landscape structure is dominated by spotty and polygonal plain tundras, moundy wetlands, and bushlands in tundra river valleys. The vegetation layer demonstrates a wide range of shrubs (*Betula nana, Salis sp.sp., Alnaster fruticosa),* small shrubs *(Vaccinium sp.sp., Empetrum nigrum), Graminae* and *Cyperacae.* Bryoflora is remarkably abundant in species (150 - 200 in specific points). Local flora of vascular plants, in comparison with the previous biome, is more than doubled and comprises 250 - 300 species per 100 km2. Vertebrate fauna also is several times richer - at a specific geographic point there are found 70 - 100 bird species and about 20 - 25 mammals (Annex 5.2.16-A.5.2.21). Among rare species, most interesting are falcons (*Falco rusticolus, F. peregrinus),* swans *(Cygnus bewickii), geese (Anser erythropus)* and barnacles (*Rufibrenta ruficolis*). In European Russia, subarctic tundra biota is conserved only in the Lapland zapovednik (Kola peninsula) and in Asian Russia - in Taimyrsky and Putoransky zapovedniks (mountain tundras of the Taimyr), in Ust-Lensky zapovednik, in the Bering natural park and some zakazniks.

Boreal coniferous forests (dark-coniferous taiga). This biome is common for flatlands and mountains of European Russia and Siberia. It is specific of a comparatively high level of landscape diversity, even though its vegetation layer is monotonous and consists of merely 2 - 3 tree species: spruce (*Picea abies, P. obovata),* fir tree *(Abies sibirica),* cedar (*Pinus sibirica),* pine tree (*Pinus sylvestris*), and larch *(Larix sp.sp.*). Diversity of taiga landscapes is dictated by a lot of factors: paleogeographic, geochemical, climatic and biogeographic. For example, mountain spruce forests on nepheline rocks and fresh

moraine deposits are common for the Kola peninsula. On the Valdai Uplands in the north-east of European Russia, taiga landscapes (spruce forests, wetlands, meadows) are formed on the argillaceous moraine of oses and kames, fluvioglacial sands of the outwashed plain and in river valleys. In West Siberia they are formed on horizontal tertiary and quaternary deposits (glacial and marine). This biome is notably more diverse, if compared with tundra: local vascular floras consist of 400 - 700 species, nesting bird fauna - 120 -150 species, and mammal fauna - up to 40 - 50. Russian taiga flora and fauna almost completely lack endemic species, Rare plant and animal species are low in number (Annex 5.2.16-A.5.2.26). For instance, there are no rare mammal species and among birds may be singled out only predators and Siberian spruce grouse (*Falcipennis falcipennis*). In this biome, landscapes of plain and mountain taiga and habitats of typical forest animals, such as brown bear (*Ursus arctos),* elk (*Alces alces*), lynx (*Lynx lynx*), otter (*Lutra Zutra),* beaver (*Castor fiber*), and sable (*Martes zibellina*), *can* be identified as subjects for conservation. Ecosystems of the biome are protected in zapovedniks Kivach, Kostomukshsky, Pinezhsky, Pechoro-Ilychsky, Malaya Sosva, Kerzhensky, Visimsky, Zeisky, Barguzinsky, Central Siberian, etc (Annex 5.2.11, A.5.2.28).

Larch forests (light-coniferous taiga and thin forest). This biome is common for central and eastern Siberia, Okhotsk coast, Far East and Transbaikalia. Larch forests (Larix dahurica, L. sibirica, L. sukaczewii) occupy slopes of low mountains and northern river valleys filled with loose quaternary sediments permafrost-fixed for hundreds of meters deep. Debris of Japanese stone pine (*Pinus pumila*), mountain thin forests and tundra are widespread in these regions. This biome is the poorest in biodiversity among forest biomes. Its local flora comprises no more than 400 - 450 vascular plant species, mammal fauna consists of 30 - 40 species and nesting birds are represented by 70 - 80 species (Annex.5.2.16-5.2.26). Fragments of cold relict steppes until they reach the boundary with tundra are the only exception. They often occupy southern slopes of mountains or wide sections of river valleys, incl. the Lena river. The biome of Siberian larches actually has no endemic plant and animal species, rare and endangered species are scarce. Landscape and biological diversities of this biome are protected in Putoransky, Magadansky, Olekminsky, and other zapovedniks.

Broad-leaved and coniferous-broad-leaved forests. In Russia, this biome has a disjunctive geographic range, i.e. it is found on the Russian Plain and in the south of Far East. Forest dominants are oak, maple, linden, and ash tree species (*Querqus sp.sp., Acer sp.sp., Tilia sp.sp., Fraxinus sp.sp.*). Close to the northern boundary of the range, forests are marked with coniferous species: spruce (*Picea abies, P. obovata, P. ajanesis),* cedar (*Pinus sibirica),* and fur tree *(Abies sibirica, A. nephrolepis, A. holophilia*). Pine tree (*Pinus sylvestris*) is spread over the most dry sections with sandy and stony soils almost throughout the geographic range. As this part of the biome is located close to the boundary, it is noted for a high level of plant and animal diversity both boreal and nemoral. Local flora reaches 700 - 800 species, mammal fauna consists of 50 - 60 species (up to 70 in Far East) and bird fauna offers 120 - 150 species (Annex 5.2.16-A.5.2.26). Biota endemism is not high though rare species of plants *(Cyprepedium sp.sp., Panax schin-seng, Trapa sp.sp.*) and animals *(Panthers tigris, P. pardus)* have relatively wide

representation. Broad-leaved forests are protected in zapovedniks Bashkirsky, Volzhsko-Kamsky, Voronezhsky, Bryansky Les, Zhigulevsky, Ilmensky, Kedrovaya Pad, Sikhote-Alinsky, Les na Vorksle, Prioksko-Terrasny, Ussuriisky, Khopersky, Shulgan-Tash, Khingansky, and others (see Annex 5.2.11).

Forest steppe and steppe. Within Russia and adjacent countries, zonal steppe ecosystems have a broad geographic range that includes a southern part of the Russian Plain, south of West Siberian Lowlands, and intermountain hollows in the south of Central Siberia and Transbaikalia. The landscape is dominated with monotonous grasslands where the gramineous prevail. Biological diversity of the biome is very high. In forest steppe, for example, local floras are composed of up to 900 - 1,100 species of vascular plants, in dry steppes - 600 - 700, and in arid steppes - 400 - 500 species. Local fauna is a little inferior to the forest one and comprises 40 - 50 mammal species and 80 - 90 nesting birds. Flora and fauna endemism is not vividly expressed. Endemic plants include a lot of relict species that have habitats on limestone and has remained in the steppe zone since the interglacial period.

Steppes, particularly in European Russia, are almost completely plowed up. That is why their landscape and biological diversities need urgent conservation and restoration. This zone is indicative of a high level of rare and endangered flora and fauna species: among plants - *Stipa sp.sp., Adonis vernalis, Crambe tatarica, Centaurea sp.sp., Fritillaria sp.sp., Paeonia tenuifolia*, among vertebrates - *Vormela peregusna* and birds of prey. Positive experimental results of ecological restoration efforts were obtained in Northern Caucasia and some of Central Russian oblasts. The steppe biome is facing a burning problem of generating an ecological network of protected areas. Current conservation of steppe ecosystems is carried out in zapovedniks Bashkirsky, Galichia Gora, Dagestansky, Povolzhskaya Step, Severo-Ossetinsky, Khopersky, Tsentralno-Chernozemny, and Orenburgsky (Annex 5.2.11).

Semiarid and arid lands. Semiarid and arid ecosystems of Russia are located to the south of arid steppes. As a zonal phenomenon, they are spread over the Caspian Lowlands and in Dagestan (deltas of the Terek and Samur rivers, and others). Asian Russia demonstrates semiarid and arid fragments on the Kazakhstan border, in hollows of the South Siberian mountains, in the south of Tuva and in Transbaikalia. Within this biome, prevailing are found ecosystems with wormwood *(Artemisia sp.sp.),* gramineous *(Festuca sp.sp., Agropyrum sp.sp., Poa Bulbosa, Stipa sp.sp., Bothriochloa sp.sp., Aristida sp.sp.),* ephemerals and ephemeroids *(Tulipa sp.sp., Eremurus sp.sp., Alyssum sp.sp., Papaver sp.sp.*) along with shrubs and trees *(Calligonum sp.sp., H. aphyllum, Cragana arborescens). Forests consisting of Populus sp.sp., Salix sp.sp.., Eleagnus sp.sp.* and meadows *with Phargmites communis, Calamagrostis sp.sp., Elytrigia repens, Glycyrrhiza glabra* are common for banks and deltas of arid zone rivers.

Semiarid and arid ecosystems of North Eurasia are basically used for cattle grazing, occasionally - for hay-making and lumber harvesting. Biome large areas are used for irrigated land cultivation. Anthropogenic transformation has led to drastic changes in the

biome landscape and biological diversities. Wild ecosystems on tremendous areas are replaced by broken sands, saline lands and depleted pastures. All periphery lands of the biome are undergoing intensive aridization.

Local floras of semideserts consist of 150 - 250 species, those of deserts - 100 - 150 sp.; mammal fauna enumerates 25 - 30 and that of nesting birds - 40 - 50 species. In addition, high diversity of reptilian species should be particularly marked with their local fauna comprising 25 - 30 species. A valuable biological object to be conserved and reasonably used is saiga population *(Saiga tatarica)* in the Caspian Lowlands (Astrakhan oblast and Kalmykia). Intensive exploitation of Russian arid ecosystems has led to the biodiversity depletion and growth of the rare species number, especially among vertebrates: *Felis manul, Aquila rapax, etc.*
Biological and landscape diversities of Russian semiarid and arid lands are protected in zapovedniks Chernye Zemli, Dagestansky, and Ubsunurskaya Kotlovina.

1.2.2. Changes in terrestrial ecosystems and flora caused by human impact

Russian landscape and biological diversities have been preserved much better than the same in Central Europe and South and South-East Asia, for the exception of biomes of European steppes and broad-leaved forests which became almost completely extinct as far back as past centuries. The anthropogenic transformation level of North Eurasian ecosystems can be judged from the data listed in Table 2.

Table 2. Share of lands that undergone complete transformation in the course of economic activities in key natural zones of Russia

Natural zone	% of completely transformed lands	Key transformation factors
Polar deserts and tundras	0.06	mineral resources extraction
Taiga: northern central southern	0.84 1.80 10.20	cuttings, fires, mineral resources extraction, air pollution, land plowing
Broad-leaved and mixed forests	32.65	land plowing, populated sites, communications, hydraulic engineering
Forest steppes and steppes	40.50	land plowing, cattle grazing. water erosion, hydraulic engineering, populated sites communications
Semiarid and arid lands	21.18	cattle grazing, irrigation, salinity of soil
Mountains of Caucasus, Central Asia and South Siberia	29.20	cattle grazing, mineral resources extraction

Apart from the fully transformed lands, large areas of natural biomes are occupied by ecosystems under various degradation or restoration phases. Up to 20 % of the tundra zone lands demonstrate various pasture degression phases as a result of domesticated reindeer grazing. In vicinities of the Copper-Nickel Complexes in Norilsk (Taimyr peninsula) and Monchegorsk (Kola peninsula), vegetation is destroyed for dozens kilometers in radii by air emissions of sulfur and nitrogen compounds.
Locations marked with technogenic violations in oil, gas and other mineral resources extraction sites make up 3 - 8 % of the taiga zone lands in various regions. The same sites are common for the Kola peninsula, West and North-East Siberia. Annually, over 10,000 km2 forest areas are cut out and withdrawn; tens of thousands km2 are marked for forest fires. A certain portion of clearings and burnt-out lands get waterlogged, though reforestation occurs on about all destroyed areas.

A share of plowed fields deviates from 35 to 80 % of the total steppe area, with interfluve black soils being plowed up almost completely. A humus content in steppe soils has 1.5 - 2.0 times decreased for the last one hundred years. Considerable areas of the zone are eroded, salinated and flooded. Large artificial water basins were built on steppe rivers - the Volga, Dnieper and Don, this having resulted in destruction of floodplain ecosystems and extinction of unique interfluve steppes.

Russian dry steppes and semideserts have been dramatically transformed into devastated pastures which caused wind erosion, substitution of aboriginal vegetation, and massive loss of cattle in the 1980s. To-day, the natural vegetation cover is gradually recovering.

Analysis of the data on primary and secondary successions of tundra, taiga, steppe and arid ecosystems (Table 3) will allow to make a real assessment of how profound are alterations in North Eurasian ecosystems as a result of economic activities and whether they are potentially reproducible.

Table 3. Age of primary and secondary successions in certain zonal ecosystems of North Eurasia.

Succession type, ecosystem	Duration of a succession, years	Region of Russia
Primary successions		
Arctic tundra on marine swells	3.000 - 3.5000	Arctic Ocean islands
Arctic tundra on moraines	1,000 - 1,500	Islands and littoral of the Arctic Ocean
Larch taiga on volcano lava	800 - 1,200	Kamchatka peninsula
Larch taiga on pebble bed	800 - 1,000	Kolyma Highlands
Dark-coniferous taiga consisting of *Picea ajanesis* on volcano lava	150 - 200	Kamchatka peninsula
Dark-coniferous taiga consisting of *Picea abies* on sand soils	150 - 200	Valdai Uplands

Oak woods on alluvial soils	300 - 500	Flood plain of the Vorksla, center of European Russia
Grassland steppes on river benches	150	Benches of the Vorksla and Psel rivers, center of European Russia
Secondary successions		
Arctic tundras on tailings	*400 - 500*	Islands and littoral of the Arctic Ocean
Subarctic lichen tundras after fire	*20 - 30*	North of Yakutia
Subarctic moss-lichen tundras after fire	80	Komi Republic., Bolshezemelskaya Tundra (*Big Land Tundra)*
Larch taiga consisting of *Larix dahurica* on gold-extraction tailings	350 - 400	Kolyma Highlands
Dark-coniferous taiga consisting of *Picea abies* on long_-fallow land	120 - 150	Valdai Uplands
Dark-coniferous taiga consisting of *Picea abies* after fire	150	Valdai Uplands
Oak woods consisting of *Ouercus robur* after cutting out	100 -200	Moscow Region
Gramineous steppe on long-fallow land	*35 - 40*	Center of the Russian Plain

The data available on the length of vegetation restoration periods after anthropogenic disruptions make it feasible to single out a number of zonal ecosystems according to their adaptability to fast restoration: steppes, semiarid areas, dark-coniferous taiga, oak woods, light-coniferous taiga, and tundra.

However, for the regions with large concentrations of disruptions and transformed aboriginal biota, restoration of ecosystems is challengeable. On the one hand, availability of species-introducents (Table 4) can serve as obstacle to the initiation of the second succession, and on the other hand, this role can be played by total depletion of flora and fauna, incl. rare species extinction. Their share is the highest in Northern Caucasia: in Dagestan, Chechnia, Kabardino-Balkaria, North Ossetia, Ingushetia, Krasnodar and Stavropol krais, where it makes up from 12 to 25 %. Steppes of the south of European Russia and regions of South Siberia, Transbaikalia and Far East incorporate from 7 to 12 % of rare species in their floras. Central regions of European Russia are marked for no more than 5 - 7 % and the taiga zone flora - below 2 - 5 % (Annex 5.1.2).

Table 4 Share of synanthropic species in flora of individual Russian zapovedniks

Name of a zapovednik	**Number of vascular plant species**	**Synanthropic species, %**
Ostrov Vrangela (*Vrangel* 3 70 *Island)*		0.5
Malaya Sosva	368	9.3
Kivach	567	13.8
Pinezhsky	476	5.0
Tsentralny Lesnoi *(Central Forest)*	*552*	*15.9*
Okskv	825	14.7
Mordovsky	734	12.9
Ilmensky	815	12.7
Voronezhsky	996	41.8
Altaisky	1,445	7.0
Kedrovaya Pad *(Cedar Ravine)*	*903*	*8.9*
Lazovskv	1.212	12.3

Vegetation cover status. A status of the Russian vegetation cover causes serious alarm due to high rates of substitution of primary vegetation for secondary one (Annex 5.2.3). Within the last 25 years, the tundra zone has experienced a 2-fold reduction of lichen tundra areas; degradation processes of reindeer pastures are observed on 700 thou sq km areas versus total 2 800 thou sq km. Anthropogenic gramineous communities are frequently found to have replaced typical moss-shrub vegetation.

Annual clearing areas have twice reduced in the taiga zone for the past 10 years (from 1998 to 1997), yet negative processes in the taiga vegetation layer are still underway. First, intensive rejuvenation of forests, substitution of zonal coniferous forests (*Picea abies, P. obovata, Pinus sibirica, P. sylvestris)* for birch *(Betula sp.sp.*), aspen *(Populus tremula)* and alder (*Alnus incana)* forests as well as death of young trees in the course of cutting are going on in Russia. Protection of Russian forests is accomplished in compliance with the Russian Federation Forest Code (1997) which ranks all forests in three categories: 1 - prohibited for cutting (forests of zapovedniks, national parks, forest tundra, resorts, river banks), 2 - restricted forest use in low-in-forest locations and mountain regions, 3 - with prohibited industrial timber harvesting. A share of forests belonging to the 1st and 2nd category has been growing in the few past years due to a territorial increase of protected areas. Reforestation is carried out on 3,000 - 3,500 km 2 per year. Efforts to assist natural forest restoration are being undertaken on another 8,000 - 10.000 sq km.

Most serious vegetation destruction problems are being faced in the Kalmyk Republic and Astrakhan oblast where intensive aridization is taking place. Here, reclamation of eroded lands is fulfilled annually on 300 - 400 km 2.

Northern Caucasus is suffering notable losses in steppe ecosystems and Mediterranean-type xerophilic forests. About 80 % of Krasnodar krai steppes are plowed up and they fully vanished on the Azov-Kuban plain. Mediterranean-type xerophilic forests of the Black Sea coast are also under threat of getting extinct. They still exist only in fragments in the vicinity of Novorossiisk, Anapa and Gelendjik on steep mountain slopes and are insufficiently presented on protected areas.

Forest status. In 1993, the total area of lands owned by the Russian Forest Fund was 11,81 mln sq km. The current forest structure and dynamics will be possible to accurately evaluate after the completion of the 1998 inventory to be made by the State Forest Fund. Changes in the forest area and age structure in Russia are illustrated by table 5.

Table 5 Dynamics of forest area and age structure during 1966-1993 and prospects for 2000 (for Rosleskhoz forests, as per 1 January 1993)

Groups	Years of registration	Forest areas, mill. sq km				
	Age-structure	Total	Yung-age	Middle-age	Muture-age	Old-age
Spruce	1966	4.79	0,42	0,66	0,46	3,25
	1973	4,93	0,60	0,74	0,44	3,15
	1978	5,00	0,72	0,79	0,43	3,06
	1983	5,06	0,78	0,87	0,47	2,94
	1988	5,06	0,84	0,97	0,48	2,77
	1993	4,77	0,85	1,07	0,46	2,38
	2000	4,81	0,88	1,15	0,48	2,29
Broad-leaved	1966	0,14	0,03	0,03	0,02	0,07
	1973	0,17	0,03	0,04	0,02	0,072
	1978	0,18	0,03	0,05	0,02	0,074
	1983	0,19	0,03	0,06	0,03	0,072
	1988	0,18	0,03	0,05	0,02	0,074
	1993	0,15	0,02	0,04	0,02	0,074
	2000	).15	0,02	0,04	0,01	0,073
Mild-leaved	1966	1,07	0,23	0,27	0,13	0,45
	1973	1,08	0,23	0,28	0,13	0,044
	1978	1,09	0,26	0,31	0,12	0,40
	1983	1,09	0,25	0,34	0,13	0,38
	1988	1,09	0,24	0,36	0,13	0,37
Total	1966	6,01	0,67	0,96	0,60	3,77
	1973	6,18	0,85	1,06	0,60	3,66
	1978	6,27	1,06	1,15	0,58	3,53
	1983	6,34	1,06	1,27	0,63	3,39
	1988	6,33	1,11	1,38	0,63	3,21
	1993	6,03	1,12	1,48	0,60	2,83
	2000	6,08	1,15	1,57	0,61	2,75

Protection of forests in Russia is regulated by the Forest Code (1997) which categorizes them into 3 groups: 1 - strictly protected (forests in zapovedniks, national parks, forest tundra, recreation zones, riversides), 2 - forests in poorly deforested and mountain regions where limited exploitation is allowed, 3 - forests allocated for industrial timber harvesting. The area of forests designated as group 1 is progressively growing during the last years due to increasing area of protected territories.

Larch *(Larix sp.sp.)*, pine (*Pinus sylvestris*), birch (*Betula sp.sp*), and spruce *(Picea abies, P. obovata)* forests predominate at the territory of Russia. Areas occupied by different types of forests are compared in table 6.

Table 6 Areas occupied by different types of forests (as per 1 January 1993)

Tree breeds	**Area, thou sq km**
Pinus sylvestris	1143,26
Picea abies. P. obovata	*758.66*
Larix sp.sp.	2633,48
Pinus sibirica	397,98
Abies sibirica, A. nephrolepis	143,71
uercus robur	38,08
Q. robur (low-thrunked)	*29,71*
Fagus sylvaticus	7,01
Acer sp.sp.	2,98
Betula erdmanii	83,40
Tilia cordata	30,18
Betula sp.sp.	877,33
Populus tremula	1 ***X9.08***

Taken together, forests that have water-conserving, sanitary, protective and other functions along with forests of protected areas occupy about 20 % of the total deforested territory.

In 1996, reforestation was carried out at the total area of 11 097 sq km. This area included 8 045 sq km where natural restoration of forest vegetation was assisted and 3 052 sq km where artifical reforestation was needed. Forest cultures planted on about 500 sq km in various periods did not survive, including one-year species on 44 square km. In comparison with 1995, reforestation areas reduced by 3 440 sq km. Forest cultures planted on about 500 sq km in various periods did not survive, including one-year species on 44 square km. In comparison with 1995, reforestation areas reduced by 3 440 square km.

The total of 32,834 fire episodes were recorded at the territories owned by the State Forest Fund. They affected 18 535 sq km of forests and 4 588 sq km of woodless lands. A major cause of woodfires is careless handling of fire sources (93%). Damage inflicted by fires amounted to about 30 billion US dollars (in prices for November 1996). Fire area and frequency vary considerably through years. The most fire-hazardous districts are concentrated in Middle and East Siberia, Yakutia, Transbaikalia and Far East.

The total area of pest and forest disease concentration sites was 42 068 sq km (0.4 %) in 1996. The largest areas were marked in the Kemerovo, Omsk, Tyumen and Amur oblasts, Republic of Bashkortostan, Primorski and Krasnoyarsk krais. The largest pest reproduction concentrations in Russia are formed by Siberian silk worm (average area - 22 247 sq km2 for the last 17 years) and most popular forest diseases are caused by butt-rot fungus (average area - 767 sq km for the last 17 years).

Dead forest area tends to be increasing. In 1996 it amounted to 5 252 sq km, being 3.2 times that in 1955. The most disastrous effect of atmospheric deposition on forest vegetation have been reported from Murmansk oblast (around Pechenganikel and Severonikel smelters), South Ural, and the vicinity of Norilsk (Norilsk smelters).

According to the Institute of World's Resources, Russia possesses 26% of all world's unexploited forests (3 448 thou sq km). Cutting these forest may contribute to the global climate change and the loss of habitats of many rare plants and animals including Amur tiger, leopard, etc. Also, minor ethnic groups living in boreal and temperate forest areas are likely to suffer great damages. A major risk factor for 85% of the so far unexploited Russian forests is timber harvesting coupled to fires, prospecting and extraction of mineral resources. Large boreal forest massifs threatened with degradation are situated along the Russian/Finnish border ("Green Belt of Carelia"), Arkhangelsk oblast, Khabarovsk and Primorsky krais.

1.1.3. **Coastal and marine ecosystems**

Russia is the world largest sea state and it has the most extended continental coasts on the planet. They are washed by 13 seas, among which are Baltic, Barents, Black, Caspian Seas, Sea of Japan, White, Kara, Laptev, East Siberian, Bering, Chuckchee, and Azov Seas.

Russian coasts house about all zonal ecosystems - from polar deserts and arctic tundras to Far East broad-leaved forests, semiarid areas on the Dagestan coast of the Caspian Sea to Mediterranean-type xerophilic thin forests on Russian coasts of the Black Sea.

Russian coasts as «land-sea» ecotones are distinguished with extremely high biological and landscape diversities. It is Far East and Black Sea coasts that are indicative of the highest level of flora and fauna species richness, with local flora reaching 1 200 (1 100) species and local mammal fauna - 75 (70) species per 100 sq km, respectively. Sea coasts house the largest wetlands where dozens millions of waterfowl concentrate during nesting, migration and wintering - in the Volga delta, on the Murmansk coast, etc.

Russian sea coasts are habitats of many rare and threatened plant and animal species, including those introduced to the IUCN List of Threatened Species and Red Data Book of Russia: mammals - Atlantic walrus, gray seal, polar bear; birds - rare species of geese, barnacles, swans, and many birds of prey; fish - sturgeon and many salmon species.

Biota and ecosystems of the Russian maritime zone are conserved in 15 state zapovedniks and 2 national parks with the total area exceeding 120 thou sq km. By the year of 2005, another 15 zapovedniks are planned to be set up on more than 70 thou sq km. Zapovedniks combined with numerous zakazniks, natural monuments, protected fish spawning sites, protected littoral forests, and other protected areas constitute an ecological network. Only on the Russian coast of the Black Sea there are over 30 protected areas that are to be integrated into a regional ecological network - part of a unified network of Black Sea countries' protected areas (Turkey, Georgia, Russia, Ukraine, Bulgaria, and Romania).

Three zapovedniks carry out target protection of maritime ecosystems, namely sea shores and shelf - Dalnevostochny Morskoy (Far East Marine), Komandorsky (Commander Islands)), and Ostrov Vrangela (Vrangel Island). In terms of the increasing oil and gas extraction on the sea shelf, a need for creation of marine protected areas on the Barents Sea coast, in the Chuckchee Sea and various sections of the Caspian Sea is becoming urgent.

Landscape diversity of the Russian sea coast is extremely abundant (Table 7), this being vital for biodiversity advancing.

Table 7 Types of the Russian coastline

Sea	**Characterization of the coastline (shore):**
Barents Sea	faulted regular (Murmansk), abrasive and accumulative (Pechora Gulf), fjord and ice - on islands
White Sea	fjord, with skerries, abrasional and abrasional-accumulative
Cara Sea	with skerries, abrasive, with bays, accumulative., with beaches
Laptev and East Siberian Seas	fjord, deltoid, abrasional-denudational, abrasional-accumulative (Vrangel island)
Chuckchee Sea	accumulative (lagoonoid)
Black Sea	abrasional, accumulative
Caspian Sea	biogenic (reed), deltoid, accumulative
Bering Sea	(12 types are singled out) key types - abrasional accumulative, accumulative, glacial-tectonic abrasional-denudational (Commander islands)
Okhotsk Sea	(13 types are singled out) key types - with bays erosion-tectonic, abrasional, slimy, marshy (Penzhina Gulf), abrasional-accumulative (Sakhalin)
Sea of Japan	(8 types are singled out) key types - faulted, abrasional-bay, abrasional-accumulative
Azov Sea	deltoid, abrasional-accumulative (bays, beaches)

A full-size evaluation of biological diversity for Russian highs seas has not been done so far. The most close to realistic results of their flora and fauna evaluating attempts date back to the 1960s (Table 8).

Table 8 Evaluation of species richness for key pools of organisms in Russian high seas (without specific identification of territorial waters)

Sea	Number of benthonic invertebrate animal species	Number of fish and Cyclostomata species	Number of algae species
Black Sea	791	166	236
Azov Sea	186	79	33
Caspian Sea	400	78	116
Sea of Japan	2,000	603	379
Okhotsk Sea	2,100	276	299
Bering Sea	1,500	297	138
Baltic Sea	20 (marine)	50	50
Barents Sea	1,800	144	no data
White Sea	1,000	51	200
Cara Sea	1,300	54	134
Laptev Sea	500	37	no data
Chuckchee Sea	800	37	70

Littoral fauna and flora reach their highest maturity on the Barents Sea coast where the width of the littoral achieves hundreds of meters with tides being 3 - 5 meters high. Several vertical zones can be identified: zone of dominating *Semibalanus balanoides*, *Litorina saxsatilis* zone, and that of *macrophites (Ascophillum nodosum, Fucus vesiculosus*). On soft ground, most of the littoral is inhabited by *Fabricia sabella* and *Arenicola marina* communities and the sublittorals are occupied by *Laminaria sp.sp. communities.*

Tides of other arctic seas are not that high (30 - 60 cm). Rising waves and storms overlap the tidal effect. Therefore littoral communities are depressed.

Far East manifests rich flora and fauna of the littoral and sublittoral owing to a diverse coastline and different tidal levels. Their communities are similar in structure to those of the Barents Sea. The Okhotsk Sea is notable for the highest tidal fluctuations among all Russian seas. In the Sea of Japan, sublittoral invertebrate animal and fish diversity increases drastically due to the penetration of warm streams from the south.

The Black and Azov Seas have no littoral area as they lack tidal fluctuations. Affected by waves, here is formed a pseudolittoral zone with poor biodiversity.

The Caspian Sea is specific of multi-year sea level fluctuations. In the last years it has been noted for transgression that leads to the formation of pioneering communities from flooded coastline sections. Introducents, such as *Nereis and Abra species,* that have found their habitats here quite recently are prevailing.

Great colonies of sea birds, bird clifs («bazars»), endow coasts of the Barents, Bering and Okhotsk Seas with high originality. In the Barents Sea, sea bird colonies are located on small islands and on the Novaya Zemlia archipelago. Species most characteristic of the colonies are: guillemots *(Uria aalga, U. lomiva*), black guillemots *(Cepphuss grylle, C. columba*), little auk *(Plautus alle*), puffin (*Fratercula arctica),* and kittiwake (*Rissa tridactila).* In the north of Far East, they are joined by tufted puffin *Fratefcula corniculata)*, horned puffin (*Lunda cirrhata),* auklet *(Aethia sp. sp.*), and ancient mm-relet *(Syntliboramphus antiquis*).

Littoral shallow waters of the Black, Azov, Caspian and Japanese Seas are important sites of nesting, migration halts and winterings for sea birds and waterfowl.

Russian fauna of sea mammals includes three orders: the pinnepedes, whale-like, and predators. Twelve species from the Pinnepedea order (a Japanese subspecies of sea lion and a Mediterranean subspecies of seal-monk are extinct within Russian borders) have habitats in Russian sea waters. Sea lion population amounts to about 50,000 specimens on the Pacific Ocean islands. Two walrus subspecies (Laptev and Atlantic) are registered in the Red Data Book of Russia. Regeneration of the Atlantic subspecies is going on in the Barents Sea though very slowly hampered by the start of oil deposit development among other reasons.

From among seals *(Phocidae)* living in the Russian coastal waters, two species *(Phoca vitulina and P. hispida)* are recorded in the Red Data Book of Russia and six species are subject to commercial fishing.

Russian fauna comprises nominally 32 whale species, two of them being subjects of fishing - white whale and gray whale (there are special quotas for aboriginal people of the North inhabiting the Arctic and northern Far East coasts). Most of whales and dolphins of the Russian high seas are recorded in the Red Data Book of Russia.

Outlook for anthropogenic transformation of coasts and sea environment. Russian sea coasts are inhabited by more than 10 % population of the country, including residents of large cities, such as St. Petersburg, Kaliningrad, Murmansk, Arkhangelsk, Vladivostok, Novorossiisk, etc. The last years are noted for a growing role of coasts as a zone of freight transit, oil and gas transportation, and active economic development - building of terminals, ports, new industrial enterprises, and recreation complexes.

Oil and gas terminals and an oil pipeline are planned for building near Novorossiisk and along the Black Sea coast. This will bring a more burning character to the issue of expanding the protected areas network in this region, including set-up of a zapovednik on

the Abrau peninsula (Utrish) where a northern extreme of Mediterranean-type xerophilic forests has remained preserved with habitats of several tens of endangered plant species and Mediterranean turtle (*Testudo graeca*).

Similar problems arise with regard to the development of oil and gas deposits and their transportation on the Barents shelf (Shtokman and Prirazlom deposits), in the maritime zone of the Nenets Autonomous Area, Yamal peninsula, in coastal waters of Sakhalin (Sakhalin-1 and Sakhalin-2 projects) and in the Caspian Sea northern and western aquatic areas. A mature network of protected areas has not been established there, yet, the biodiversity level is extremely high.

After collapse of the USSR, Russia is experiencing a drastic shortage of maritime recreation areas. That is why the recreation-use significance of Russian coasts of the Black and Azov Seas and, in sight, of the Caspian Sea is growing. Recreation capacity of a single Black sea coast amounts to several million people.

1.1.4. **Wetlands**

Russia possesses the richest wetland resources in the world. About 120 000 rivers with the total length of 2,3 mln. km and almost two million lakes, their total area being 370 000 sq km, are located on its territory. Swamps occupy 1,8 mln sq km and the coastline is around 60 thou km.

A major international mechanism for wetland protection is the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention) in 1975 signed by Russia joined the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention) in 1975. After the USSR collapsed, only three wetlands under the Ramsar Convention has remained on the territory of Russia. In 1994, a special RF Government Edict confirmed the international status for the three areas and assigned it for another 32 areas. Hence, the total of Russian wetlands of international importance has reached 35 at the territory of 10 700 thou sq km (Annex 5.2.2).

At this territory, a broad spectrum of wetland ecosystems are protected. A characteristic feature of Russian wetlands of international importance is a large amount of natural flatland and estuarian complexes as well as huge massifs of peat-bogs. Up to 35 mln waterfowl are annually concentrated on 35 wetlands of international importance during autumn migrations (12% of the Russian population).

In 1994-1997, State Committee for Environment Protection in cooperation with RF subjects and assisted by international organizations Wetlands International and Ramsar Convention Secretariat generated the legal protection mechanism and informational base on the status of wetlands. The effort on generalization of the preliminary information on the status of protected ecosystems and its determinant factors has been accomplished for all 35 wetlands. Regulations on conservation of 12 Ramsar territories have been

developed to control human activities. Twenty six territories have been outlined and mapped.

Efforts on protection of 35 Ramsar wetlands are only first steps in solving this problem. Focusing on world practice, it is necessary to generate a network that would provide protection to highly valuable wetlands and encompass no less than 400 locations in long-term prospect. At present a specific list comprising 77 wetlands is already available. A Ramsar-territory status should be given to wetlands of international, national and regional importance. This long-term effort needs a specific program to be developed for the whole country.

1.2. Characterization of the Species and Genetic Diversities

1.2.1. Current status of flora and fauna

1.2.1.1. Flora

Till now no special master files to characterize flora diversity of Russia at a species level have existed. That is why our judgment had to be based, as a rule, on materials of a more general scope which deal with the territory of the former USSR.

Vascular plants. The analysis of taxonomic data given in a 30-volume «Flora of the USSR» (1934 - 1964), S.K. Cherepanov's reference book «Vascular Plants of Russia and Adjacent Countries)) (these plants are encountered in ((regional floras)) of Siberia, Far East, etc.) and a number of large monographs on individual pools of plants enables to conclude that about 11,400 species of aboriginal and endemic plants belonging to 1,488 genera and 197 families are presently registered on the Russian Federation territory. Totally, this makes up approximately 50 % of the flora range in the former USSR. The identification of the flora taxonomic composition is far from being completed and annually the exploration of the country's territory yields dasozens of species earlier unknown to science; plants common for adjacent territories and multiple adventive species, particularly of the North American origin, are discovered to be growing in Russia. A lot of groups need a modern taxonomic revision.

Approximate evaluation shows that endemic species constitute ~ 20 %. Their exact number will have been specified by the end of 1998 within a specific research.

The RSFSR Red Data Book (1983) incorporates 440 *Angiospermae,* 11 *Gymnospermae* and 10 fern species. No less than 2,000 species are actually subjected to one or another degree of threat. Other calculations give a higher number (up to 3,000). About 75 % of vascular plants of Russian flora are represented in protected areas (state zapovedniks, national parks). Specific data on the number of species protected in zakazniks is lacking. The effort on taking inventory of zapovedniks' flora is still underway.

Only few species are considered extinct as a result of human activities (IUCN category Ex-extinct). In fact, their number is likely to be higher (it is much more difficult to register an absolute lack of a plant than to state its availability). Out of 44 *Angiospermae* species included in the RSFSR Red Data Book, 36 % are being endangered and can be lost at any moment since they are being conserved neither in-situ nor ex-situ.

Among vascular plants of Russian wild flora, have been identified 1,363 species with various usable properties. 1,103 out of these species are used in scientific and traditional folk medicine (200 are officially permitted to use in medical practice), 350 - as foodstuffs. From among the species with obscure practical value, 460 grow on the RF territory. A lot of taxons, including medicinal plants (e.g. *Sunssurea, Thimus, Astragalus, Potentilla, Alchemilla, Artemisia,* etc.), have not been studied well enough in the applied aspect although they are of high economic potential («Flora Resources of Russia and Adjacent Countries)), v.v. 1 - 9).

Bryophyta. Russian flora contains representatives of all 3 classes of the moss-like: *Anthocere, Hepatice, and Bryales.* The total number of species is 1 370, 1 000 of which are attributed to Bryales. Endemic species make up only 0.1 % of the total Russian moss-like species, at the same time, up to 40 % of species have very small geographic ranges and 22 species among them are included in the Russian Red Data Book. Bryoflora of Western Siberia, Central Yakutia, certain areas of the Arctic Region and Far East and on the East of European Russia has not been studied well enough.

Algae. Over *9 000* sea, fresh water and soil algae species (macro- and microphytes) that amounts to about 1/4 of world algae flora are registered on Russian land and water areas. Due to large geographic ranges, the number of endemic species is not high and deviates from 2 - 3 % in inland basins to 6 - 10 % in sea ones. The highest degree of algae endemism is characteristic of the Lake Baikal. No more than 1 % of rare, relict and endangered species are identified, first of all, because these pools of plants have not been thoroughly studied. More than 160 algae species are of economic value and have found wide application in food, medicinal and other areas, Yet, the estimation of their natural resources, operation modes and resources renewing calls for an independent investigation. Project «Alga Flora of Russia)) is being developed to generalize data on taxonomic diversity, geographic ranges, ecology and usable properties of all algae systematic pools.

Lichen. Russian lichen flora contains about 3 000 species. The largest fundamental master file on lichens of the former USSR, including Russia, is a multi-volume edition ((Guidelines for Lichens», v.v. 1 - 5 (1971 - 1978) and its logic follow-up - ((Guidelines for Lichens of Russia)), v.v. 6 - 7 (1996 - 1997) developed at the Institute of Botany RAS (IB). This master catalogue incorporates detailed data on taxonomic diversity, geographic ranges, ecology and usable properties of 2,160 lichen species grouped in 167 genera and 45 families.

Lichen species normally have broad geographic ranges and this accounts for a relatively low number of endemic forms - no more than 50 in Russia. Simultaneously, certain pools

are distinguished for elevated endemism (e.g. the *Chaenothecopsis incorporates '7* Russian endemic species) and a high number of species group with those relict and rare: the USSR Red Data Book lists 36 of them and Russian Federation Red Data Book - 27.

Being characterized by a high response to unfavorable environmental changes, a lot of lichen species are nature indicators. In addition, they are utilized in medicine. Fodder value of lichens is well-known in Northern regions of Russia.

Fungi. Fungi are one of the key components of nature, they are specific of a high degree of diversity and part to actually each land ecosystem. Meanwhile, fungi are highly sensitive to anthropogenic exposure, thus involving urgent measures on their protection and rational use. Strategic significance of these measures is dictated by the ability of fungi to grow in various types of substrates (rhizo-fungi, xylotrophous, phylloplanous, etc.) and to form communities (cenophobous, cenophilous) with trophic specialization (saprophytous, symbiotrophous, epiphytous).

Myxomycetes refer to one of the less studied pools of fungi. On the territory of Russia, 211 species from 5 orders and 10 families responsible for about 30 % of world microbiota were identified though another 75 - 80 % of *myxomycetes* species known to science may be expected to be revealed.

A class of *Uomycetes* is represented by 350 water and land species in Russian flora, this corresponding to over 50 % of their total composition on this country's territory.

Russian microbiota comprises 323 species (on 600 plant species) pertaining to *Ustilaginaceae* - a key group of agricultural parasites, this making up about one third of their global diversity.

Macromycetes, a large and versatile, in biological and systematic aspects, pool of fungi that includes most of edible and micorhiza-building forms, has not been studied well so far and the total number of its species in Russia has not been estimated. The Russian Red Data Book (1988) enumerates 17 subject-to-protection species. A list comprising 24 1 species from the category of the rare and 103 species in need of protection was compiled at the IB RAS.

1.2.1.2. Fauna

Inventory of Russian fauna has not been completed yet. A relatively comprehensive study was done on vertebrates. Invertebrates, especially insects, have been studied poorly. Modern taxonomic reviews and revision for major taxonomic groups of insect and fauna have been lacking so far.

Vertebrate animals. Vertebrate animal fauna of Russia is rather well investigated and enumerates over 1,300 species falling in 7 classes, this being responsible for 2.7 % of global diversity (Table 9).

Table 9 Diversity, endemism and status of vertebrate animal species in the Russian Federation

Taxonomic groups	Key taxonomic groups	Total number of species		Number of endangered species		Endemic species			National list	
		Known	Estimate	On a nation level	On a region level	Number	Share of the total, %	Number of endanged species	List of taxons	List of rare and extinct species
Animals vertebrates	Mammals	276		64	90	22	8	0	available	available
	Birds	732		109	62	1	0.1	0	available	available
	Reptilia	75		11	7	0	0	0	available	available
	Amphibia	27		4	3	0	0	0	available	available
	Fish	268		9	27	57	28	2	available	available
	Cyclostomata	8		0	3	0	0	0	available	available

Fauna of birds, mammals and *Cyclostomata* is characteristic of a wide range (7 % and 40 % of world diversity, respectively). The following Russian regions are defined as those with a high degree of species richness: Northern Caucasus, South of Siberia and South of Far East. These regions are also noted for high fauna endemism what is motivated by their historical role as refugiums of Glacial period. A comparatively high species diversity is also characteristic of central and southern regions of European Russia in broad-leaved forest and steppe zones. As a whole, species richness has roots both in history and in specific features of a modern geographic zoning system.

Rare and almost extinct species of vertebrate animals in Russia, according to the RSFSR Red Data Book (1988) amount to 197 (-15 %). This testifies to an unfavorable status of fauna. Under current conditions of transient economy and structural crisis, the risk of losing the most valuable part of vertebrate diversity is growing.

***Mammalia** are* the best-known group of vertebrate animals of Russia. The number of species accounts to about 7 % of their world diversity. Teriofauna is not distinguished by

high endemism and the overall country's territory does not pertain to regions specific of a high level of mammal species diversity. The order of *Rodentia* is the richest in species. The highest species diversity is specific of the Northern Caucasus, southern Siberia and southern Far East. For the last decades, the application of cytogenetic methods has enabled to identify numerous species (twin species) that had not been previously differentiated by taxonomists.

About 23 % of mammal species are included in the RSFSR Red Data Book. Eleven species are represented only by their subspecies and individual populations. Due to a different status of certain subspecies within one species (sea otter, snow leopard, etc.), the Russian Red Data Book employs a differentiated approach to the evaluation of their nature protection status. Another 64 mammal species and subspecies are planned for introducing in the Red Data Book of Russia.

About 90 mammal species of Russia (33 %) are under threat both on regional (mainly in Central and Western European countries) and on global levels (39 species or 14 %). The latter, above all, refers to a number of whale species and subspecies of Pantera-like large cats. Note that some species being endangered on a regional level are widespread and abundant in Russia, e.g. brown bear (*Ursus arctos)* and wolf (*Canis lupus).*

About 61 % of Russian mammal species diversity (excluding the whale-like) and about 60 % of species recorded in the Russian Red Data Book are encountered on protected areas (Status of Biological resources..., 1994). Species and subspecies of Pinnipedia *(Odobenidae and Phocidae* families) and Ungulata (*Artiodactila*), with the share of those rare and protected in zapovedniks among them not exceeding 40 %, are in the worst condition.

Russian seas and inland waters are populated or visited during migrations by 56 species of sea mammals including 40 cetaceans, 15 pinnipeds, and sea otter *(Mustelidae).* About 50% of sea mammals and some of their local populations are included in the Russian Red Data Book, the IUCN Red List, annexed lists of CITES and Bonn Convention (e.g. *Halichoerus grypus, Phoca sibirica, Balaenoptera acutorostrata, B. borealis, B.physalis, B.musculus, Physeter catodon, Balaena mysticetus, Hyperoodon ampullatus, Monodon monoceros, Phocoenoides trui, Campus griseus, Globicephala melaenas, Ornicus orca, Ziphus cavirostris, Eumetopias jubatus, Phoca vitulina,* etc.). The Okhotsk-Korean population of the grey whale *(Eschrichtius gibbosus)* appears to be on the verge of extinction numbering not more than 100 animals. Their summertime habitats are in close proximity to oil extraction sites on the north-east Sakhalin shelf (international project "Sakhalin-2"). With this in mind, SCEP is now developing a proposal to organize a special zakaznik to preserve summer feeding grounds of these whales.

Approximately 50 land mammal species are commercial and non-professional hunting objects. Among them, the most valuable are widespread and numerous Ungulata species.. *Cervus elaphus, Alces alces, Capriolus capriolus and C. pygargus, Sus scrofa, Ursus*

arctos; about 20 fur animal species - *Martes martes, M. zibelina, Lutra lutra, Alopex lagopus, etc.*

Aves fauna has been extensively studied in Russia (732 species) and makes up 7.6 % of this class world diversity with almost absolute absence of endemic species. The largest number (515 species) are nesting birds including 27 that nest only in Russia. The most numerous are *Passeriformes, Charadriiformes and Anseriformes.* About 9 % of bird species are registered in the Red Data Book of Russia.

About 9 % of bird species are considered rare on a regional level (mostly representatives of *Falconiformes*) and 30 species are recorded in the IUCN Red List. Among them, there are species attributed to EN and VU categories *(Pelecanus crispus, Ciconia boyciana, Crus leucogeranus,* etc.). Among nesting birds, 83 % of species are found on zapovedniks' areas and a similar indicator for rare species is about 60 %. Most alarming is the status of *Anseriformes* loculating in tundra, forest tundra and steppe zones as well as that of several *Gruiformes.*

Most economically valuable are waterfowl - *Anus, Anser and Galliformes* - which are key sport hunting objects.

Reptilia fauna of Russia is not multiple (75 species) due to rather severe climate on the most part of the territory. It constitutes approximately 1.2 % of global diversity in this class of vertebrates. Endemic species are lacking. The richest species diversity is observed on the South of Far East and in Northern and Western Caucasus. A more detailed taxonomic revision of *Vipera and Agkistrodon* species may extend the number of species.

About 15 % of species refer to the category of rare and under extinction on a national level, 4 % are recorded in the IUCN Red List. Over a half of reptilia species are found in zapovedniks, including all tortoise species *(Testudines)* and about 30 % of *Squamata* registered in the RSFSR Red Data Book . The second edition of the Red Data Book of Russia will be supplemented with 2 1 reptilia species.

Economic significance of most species is associated with their commercial value on the world market of wild animals. The latter presents a tangible threat for tortoise and snake groups and alike.

Amphibia fauna of Russia constitutes as low as 0.6 % of global diversity in this class of vertebrates (27 species). There no endemic species. About 15 % of the species are recorded in the Red Data Book of Russia. Three species are under threat in the European region - *Triturus vittatus, Bufo calamita, and Pelodytes caucasicus.* Almost all amphibia species (96 %) are encountered on protected areas. Endemic value of the amphibia is not high. Another 8 amphibian species are in plan of the second edition of the Red Data Book of Russia.

Pisces fauna of Russia is diverse and still understudied. Many fish species, for example *Salmoniformes, Cypriniformes, etc.,* form multiple varieties, races, subspecies, including endemic, that differ in ecological and morphological aspects within a wide geographic range. To specify their taxonomic status, further investigations are needed with the application of updated cytogenetic and genetic methods. Fish fauna comprises 268 fresh-water, semimigrating and migrating species (sea\fresh-waters) and no less than 400 species observed in coastal waters. Totally, this constitutes about 2 % of this class global diversity. Fresh-water fauna is indicative of a high per cent of endemic species. The Lake Baikal basin ranks first in endemics. The highest species diversity is specific of the above region and the Amur basin.

The Red Data Book of Russia lists nine taxons (-4.5 % of inland waters fauna), one species of which - *Acipenser sturio* - is registered in the IUCN Red List (status EN). The evaluation of the environmental status is accomplished on a subspecies level and in the case of *Thymalllus arcticus baicalensis* infrasubspecies *brevipinnis* even on a lower level. Sakhalin sturgeon and white salmon are also recorded in the International Red List with the EV status. As a whole, almost 8.5 % of fresh-water, semimigrating and migrating species are endangered on a regional level. The second edition of the Red Data Book of Russia will be supplemented with 44 fish taxons.

Current state of a whole range of species, subspecies and individual geographic fish shoals are under threat on a national level due to both water environment deterioration (various types of pollution, control over flow of rivers) and extensive commercial use, including poaching. This concerns actually all sturgeon species (basic world reserves of this family are concentrated in Russia) and a considerable part of salmons and carps.

Priority lines of the fish conservation strategy in Russia include protection of waterbodies and breeding grounds, establishment of new aquaculture facilities, maintenance of natural hydrobiont collections (fish-ponds, aquaria, fish-breeding farms, zoos), and cryobanks.

Commercial fishing occupies one of the most important places in the country's economics. Above all, sturgeons, most of salmons and a number of perches and carps are assigned to the most economically valuable fish.

A class of *Cyclostomata* is represented by 8 species (1 species from the *Myxine* and *7* species from *Petromyzontidae* family), this corresponding to 40 % of this group global diversity.

Three species are endangered on a regional level, Ukrainian lamprey *(Lampetra mariae)* among them, which is recorded in the IUCN Red List with a VU status. Status of all lampreys living in European Russia is alarming and they need legal protection. Four *Cyclostomata* species are planned to be included in the second edition of the Red Data Book of Russia. Caspian *(Caspiomyzon)* and river (*Lampetra fluviatilis*) lampreys are of commercial value.

Invertebrate animals. No official and trustworthy information on invertebrate animal fauna of Russia is available at present. This situation has historical background and dates back to the years of the former USSR when biological resources of Russia were not singled out from those of the whole country. Moreover, all-USSR indicators for invertebrate animals often had a tentative character. They were characterized by a constant increase of species from 96,000 to 106,000 as a result of growing understanding of domestic fauna.

As a whole, Russian invertebrate fauna has not been investigated comprehensively. Currently, only a rough amount of invertebrate species in the Russian Federation fauna can be discussed: 130,000 - 150,000, or about 10 % of global diversity. Insects predominate in this fauna (97 % of all species). A share of their species in the global amount among orders deviates from 4 to 30 %. (Table 10).

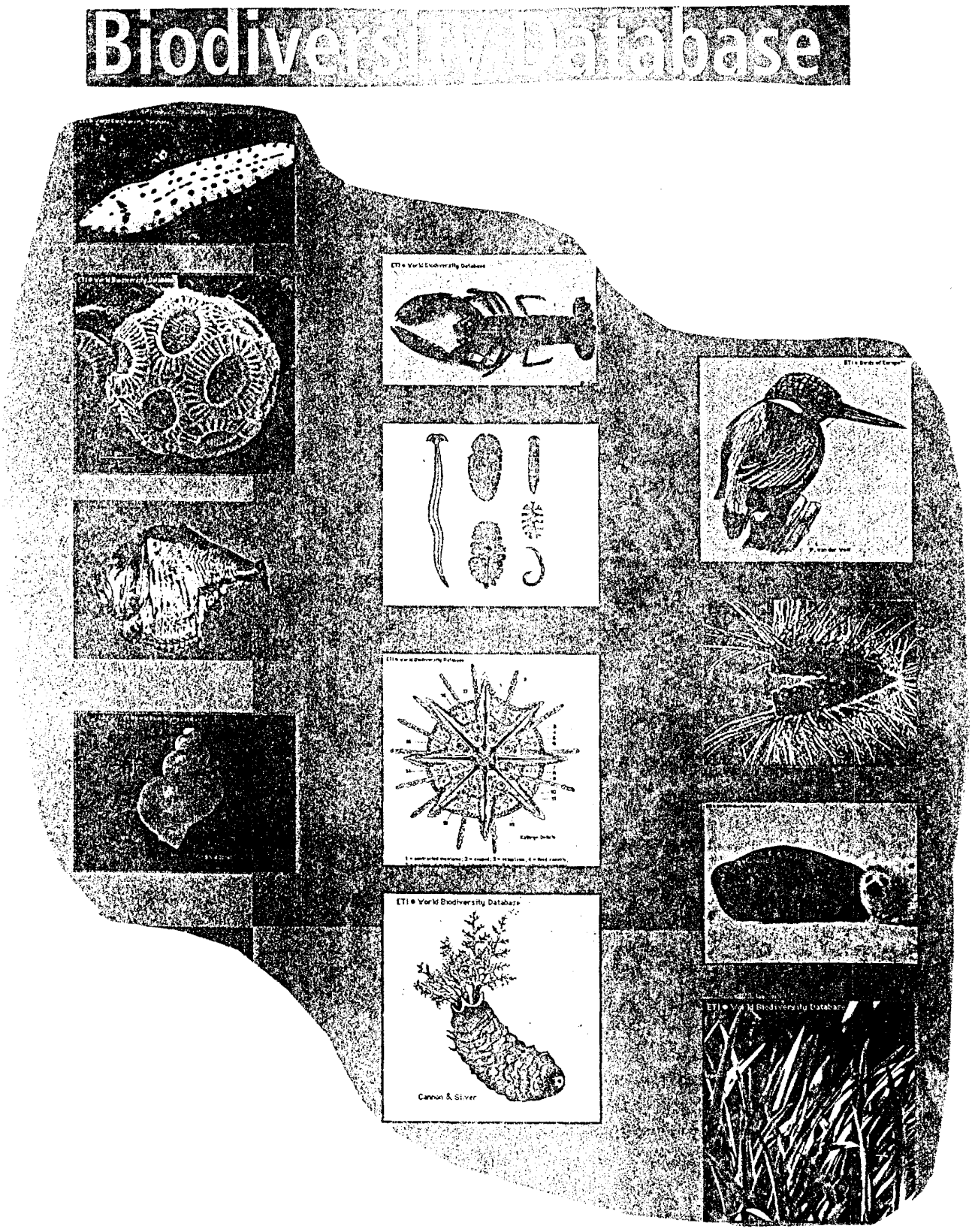
A relatively narrow range of invertebrate species in the RF results from the country's northern geographic position. Most of its territory (over 75 %) is characterized by rather monotonous landscapes of taiga and tundra zones with a poor species range. Extinction of many species caused by climate changes at the end of the Neogene system and in the Quaternary period also played its negative role.

Russian rare and extinct invertebrates are represented in the RSFSR Red Data Book (1983) by 49 species, or 0.033 % of their total number. This points to a safety of domestic fauna as a whole. Yet, if we consider these indicators in terms of the data from the List of Animals recommended for the second edition of the RF Red Data Book, a clear tendency for the growth of the number of species (to 155) in need of urgent protection and extension of the number of classes from 2 to 9 and that of types - from 2 to 5 may be marked.

A transient period of Russian economics as a whole and weakness of local authorities in RF subjects enhance the risk of losing this part of biodiversity.

Research efforts undertaken in a number of areas should be considered as those of priority in the field of study and description of species diversity. First, the efforts on taking inventory of this group of animals throughout Russia and in specific regions are still standing urgent. Second, ecological studies on invertebrates falling in neither usable nor harmful pool, this approach having been characteristic of Soviet zoological science, need further extension and deepening. Third, efforts on landscape-zoogeorgaphic registration to identify animal types according to zones they inhabit should be fulfilled.

A top-priority objective in conservation and regeneration of biodiversity elements is carrying out research focused on the identification of invertebrates in need of urgent protection both on a national (federal) and on a regional (Federation subjects) level. This will enable to understand a distinct relation between Red Data Books of two levels and simultaneously to achieve a more efficient use of extremely poor technical and financial support to the current animal protection system.



«Biodiversity conservation in Russia»

Table 10

Diversity, endemism and status of invertebrate animal species in the Russian Federation

Key taxonomic groups	Total number of species		Number of endangered species		Endemic species			National list	
	Known	Estimate	On a nation level	On a region level	Number	Share of the total, %	Number of endangered species	List of taxons	List of rare and extinct species
Protozoa		6,500							
Mesozoic		19							
		350							
Sponges									
Coelenterata		450							
Platyhelminthes phylum		1,900							
Round worms		2,000							
Nemertinea		100							
Segmented worms		1,000	(13)* 5**	1					available
Phoronidea		5							
Bryozoa		500	(1)8						available
Brachiopoda		23	(1)*					available	available
Mollusks, incl.		2,000	15 (42)* 15**	4				available	available
Arthropoda		120,00	34 (98)*						available
Crustacea		2,000	(3)*	1					available
Arachnida		10.000		1					
Insects, incl.:		100,000	34 (95)* 128*	31				under way	available
2	3	4	5	6	7	8	9	10	11
dragon flies		150	(1)*	3					available

praying mantis		20	1**	1					availa ble
Orthoptera		500	2(2)* 7**	2					availa ble
Neuroptera		400	1**	1					availa ble
Aphids		800							
Hemiptera		2,000							
Coleoptera		22.000	13(36)* 25**	6					availa ble
Lepidoptera		12,000	12 (33)* 60**	15					availa ble
Diptera		9,000							
Hymenoptera		13,000	7 (23)* 23**	3					availa ble
Echinoderms		280							
Chaetognata phylum		10							
Pogonophor a phylum		19							
Hemichorda		3							

Note: * - figures in brackets stand for the number of species recommended for the 2nd edition of the Russian Federation Red Data Book by the RF SCEP Commission for Rare and Extinct Animals, Plants and Fungi, ** - figures given in the bottom line denote the number of species according to the USSR Red Data Book (1984).

1.2.1.3. Domestic animals and plants

All existing animal breeds and plant sorts are registered in special catalogues: State Catalogue for Protected Advances in Breeding and State Catalogue for Advances in Breeding Approved for Practical Implementation (the term ((advances in breeding)) means sorts of plants and breeds of animals). These data are listed in Tables 1 1 - 13.

The number of many domestic agricultural animal breeds has reduced to the limit threatening for their existence. A particularly hazardous situation is observed in poultry farming where almost all domestic breeds are fully withdrawn from production and are conserved only by non-professional poultry breeders and at special collection farms.

The concept of the agricultural animals' genofund as part of national wealth was a starting point for the Federal Program Conservation of the Genofund of Small-in-Number Breeds of Agricultural Animals which envisages incentives for conservation primarily of aboriginal breeds through creation of pedigreed stock farms and genetic banks.

Table 11

The number of animal breeds in the Russian Federation recorded in the catalogue for 29.09.97

Species and groups of domesticated animals	**Total**	**Including those under protection**
Cattle	55	11
Buffaloes	2	-
Horses	41	13
Pigs	47	8
Sheep	58	11
Goats	10	5
Reindeer	4	
Camels	3	1
Rabbits	9	3
Minks	24	***12***
Sables	1	1
Foxes	11	6
Polar foxes		
Nutrias	10	5
Hens	104	20
Turkey	9	6
Geese	23	13
Guinea hens	4	4
Ducks	10	4
Quails		
Honey bees	4	-

Mulberry silk worms	13	
Carps	5	
Total	454	129

Table 12 The number of plant sorts in the Russian Federation for 29.09,97

Groups of cultivated plants	Sorts, total	Including:	
		Russian	Foreign
Arid	35	5	30
Cucurbits	534	213	321
Leguminous herbs	881	379	502
Grapes	537	160	377
Grain-leguminous	757	290	467
Grain-leguminous fodder	423	164	259
Cereals	4,371	1,603	2,768
Cereal fodder	3,292	721	2,571
Gramineous	916	359	557
Tuber roots	703	276	427
Root fodder	211	39	172
Groats	553	342	211
Medicinal	58	35	23
Forest	87	58	29
Oil-producing	1,558	556	1,002
Nectariferous	2	2	0
Vegetables	4,820	1,371	3,449
Nuts	271	87	184
Kernel fruit	896	489	407
Seed fruit	1,003	663	340
Textile	843	137	706
Silage	62	19	43
Technical	910	232	678
Ornamental flowers	5,112	2,344	2,768
Citrus and subtropical	375	35	340
Essential-oil	159	26	133
Berries	821	735	86
Total	30,119	11,117	19,002

Table 13 The number of protected plant sorts in the Russian Federation for 1.10.97

Protected cultivated plants	**Sorts, total**	**Including:**	
		Russian	**Foreign**
Watermelon	2	2	0
Beans, fodder	1	1	0
Vetch, common hairy	2	2	0
Cherry	4	4	0
Gladiolus	20	20	0
Pea, vegetable	5	5	0
Pea, garden	4	4	0
Pear	3	3	0
Melon	1	1	0
Orchard grass	2	2	0
Cabbage, white	1	1	0
Potato	22	17	0
Clover, red	8	8	5
Corn	28	28	0
Sweet corn	1	1	0
Flax, oil-bearing	4	4	0
Flax, fiber	1	1	0
Onion	3	2	1
Lucerne	2	2	0
Carrot	1	1	0
Oats, summer crop	5	5	0
Cucumber	22	17	5
Sweet pepper	4	3	1
Sunflower	11	11	0
Bread wheat, winter	32	26	6
Bread wheat, summer	40	38	2
Hard wheat, winter	2	2	0
Hard wheat. summer	17	16	1
Rape, summer crop	1	1	0
Radish	1	1	0
Rice	24	24	0
Rye, winter crop	6	6	0
Lattice	2	2	0
Black current	2	2	0
Soya	3	3	0
Tomato	33	32	1
Triticale	6	2	4
Triticale, summer crop	3	2	1
Cotton	4	4	0
Apple	8	8	0
Barley, winter crop	2	2	0
Barley, summer crop	31	25	6
Total: 43	375	342	33

1.2.2. *Ex-situ* Conserved Species

Ex-situ biological diversity conservation measures are taken to supplement efforts for in-situ conservation of flora and fauna species.

Ex-situ conservation of Russian biodiversity components - genetic resources of wild and domesticated flora and fauna species - is accomplished through a variety of methods: creating and extending microorganism culture collections (generally those of microbial genetic resources), plant and animal tissue collections; creating and managing gene banks (including cryobanks) and seed banks; captive breeding and reproduction of animals, artificial propagation of plants with their potential re-introduction into the wild (setting up of special breeding centers, arboreta, and farms); creating and maintaining collections of living organisms in zoos, aquaria., botanic gardens and dendroparks.

Ex-situ microbial genetic resources. For the nearest future priority should be set on the actions addressing a sustainable targeted and centralized financial support to the existing collections, being minimum sufficient for preventing their loss, together with simultaneous inventory measures for maintained funds within independent expertise; elaboration of specific recommendations to reduce duplication. Efforts should also be undertaken to: specify collection profiles (public, institutional, industrial, etc.), rules for the access to bioresources, and rights for ownership and exchange of cultures (including international) in terms of the Convention on Biodiversity and Concept of Sustainable Development; to assess possibilities in the national-level application in Russia of the World Federation of Culture Collections, IUMS and IUMS proposals on the creation of an international network of Microbial Genetic Resources Centers to coordinate the agreed strategies of *ex-situ* bioresources conservation.

The term «collections» (particularly in Russia) also implies quite a broad variety of laboratories and institutions, a part of their activities being identification, study, and conservation of microorganism cultures and their presentation to users. Collections vary in their specialization (profile), size of maintained funds, dominating focusing on deposit functions in connection with the national or international patenting procedures, etc.

We have prepared a list of Russian collections of microorganisms and culture tissues (Annex 5.2.5). A criterion for its composition served the commitment of the listed collections to culture depositing in connection with the national patenting procedure. Among the collections given the annexed list, only collections NN 1, 2 and 3 are International Depositing Agencies operating under the Budapest Treaty on Mutual Acknowledgment of Depositing in Connection with the Patenting Procedure.

Both species and strain diversity being maintained in microorganism collections are reflected in catalogues which are either published or/and stored in electronic databases. The annexed list of collections does not cover all collection-focused laboratories. In Russia, there are laboratories with reviewing functions under the WHO systems, institutions of sanitary and phyto-sanitary profiles, etc. However most of these collection-

focused centers do not publish catalogues and, due to that, it is rather difficult to evaluate a scope and character of their funds. . Active culture collections belong to institutions and institutes under various kinds of departments: Russian Academy of Sciences, Russian Academy of Medical Sciences, Russian Academy of Agricultural Sciences, Ministry of Public Health, Education, Agriculture and others.

This results in the actual lack of national-level responsibility for ex-situ microbial genetic resources conservation. Accordingly, plans for the collection activities and regulatory materials needed for their routine work are, in most cases, of sectoral character.

The analysis of catalogues published by collections and other sources shows that in many cases it is unfeasible for collections to characterize the biodiversity managed by them in line with modem taxonomic and nomenclature standards. Therefore, the generally accepted professional language is often substituted for «sectoral slang)), for example, when the sustained microorganisms are grouped according to the features of their immediate use («agricultural», «medical», etc.) or identification sources («marine», «soil», etc.). Apart from hampering the evaluation of actually sustainable biodiversity, this slows down any effective communications.

Certain positive experience has been gained for the last years in the course of the operation of International Microorganism Depositing Agencies in connection with the patenting procedure (IDA) under the Budapest Treaty. The existing recommendations were discussed and then agreed upon in detail by experts and delegates of all Governments-Parties. Thus, these recommendation has become minimum though obligatory standards for fulfilling the IDA function of the Parties' collections. This experience
on coordinated ex-situ conservation and use of microbial biodiversity seems reasonable to be closely studied and then used to achieve objectives originating from the implementation of the Convention on Biodiversity. In the opinion of the professional community, it could bring certain details and optimization to national mechanisms for the realization of the sovereignty principle concerning ex-situ conserved microbial biodiversity.

Plants ex-situ. (Annex *5.2.5-5.2.7).* Although particular attention to biodiversity issues has been being paid since comparatively recent time, botanic gardens of Russia have accumulated significant collections of rare and endangered plants. By the beginning of the 80s, botanic gardens of the former USSR were growing 1,117 plants species that required protection. They were represented by 5,000 specimens of various origins (Rare and Endangered Species.. ., 1983). Although the exact total number of the species in need of protection on the territory of the former USSR was not estimated, approximate calculations give the figure of about 2,000. Hence, more than the half of their number wa.s cultivated.

Out of *440* species of *Angiospermae* plants listed in the RSFSR Red Data Book (1988), 274 species are grown in Russian botanic gardens, all 11 *Gymnospermae* species are

cultivated in culture and only 3 fern species (*Pyrrosia lingua, Osmunds claytoniana* and *Leprotorumohra miqueliana*) from among 11 are found available in gardens' collections. In botanic gardens of Kirovsk and Stavropol, the O(Ex) category is represented by *Gladiolus palustris* and *Solla scilloides* though the species' starting material was taken not from the wild but from foreign botanic gardens in the form of seeds. 33 species attributed to category 1 (E) are grown in the culture and 17 species among them are represented in the collections of three or more botanic gardens (i.e. they have a sound insurance fund in the culture): *Galanthus boykewwitschianus, Aristolocola manshuriensis, Panax ginseng* and others. Category 2 (V) is represented by 84 species and 44 of them are available in the collections of 3 or more botanic gardens.

Currently there are 76 botanic gardens and other introduction centers, their efforts being coordinated by the Russian Council of Botanic Gardens, on the territory of Russia. Among them, the following are considered to be the largest having benefited at most to the ex-situ conservation of endangered plants:

1. N.V. Tsitsin Central Botanic Gardens RAS, Moscow (PBG RAS). Total area - 361 ha. The collections of wild and cultivated flora amount to over 21,000 items (over 11,000 species, forms and varieties and about 10,000 garden forms and sorts). The rare and endangered plantsT collection comprises 320 species.

2. Botanic Gardens of the V.L. Komarov Botanic Institute RAS (Saint Petersburg). Total area - 22.6 ha. The collections accumulated 11,664 taxons with over 300 species of rare and endangered plants of Russia and adjacent countries among them.

3. Botanic Gardens of the Research and Production Association «Niva Stavropolia» RAAS (Stavropol). Total area - 207 ha. The collection funds contain over 5,000 taxons. Rare and threatened plants are represented by 291 species.

4. Botanic Gardens of the M.V. Lomonosov Moscow State University (Moscow). Total area - 36 ha. The Gardens manages 6,500 species, sorts, and cultivated plants, including 74 rare and threatened species of Russian flora and 92 - of Moscow oblast flora.

5. Botanic Gardens of RAS Urals Division (Ekaterinburg) (BG RAS UrD). Total area - 50 ha. The collections incorporate 3,000 taxons, including 130 rare species of the Urals.

6. Botanic Gardens-Institute of RAS Far East Division (Vladivostok). Total area - 170 ha. The collections comprise more than 4,000 taxons. The number of rare and endangered species - 120, 100 among them - local flora species.

7. Polar-Alpine Botanic Gardens-Institute RAS (Kirovsk). Total area - 350 ha. The number of species in collections is over 2,000 with 120 of them - rare and threatened.

8. Central Siberian Botanic Gardens of RAS Siberian Division (Novosibirsk) (CSBG RAS SD). Total area - 1,062 ha. The botanic collections contain about 5,000 taxons, rare and endangered species - 92.

Botanic gardens have accumulated sound practical experience in growing rare and endangered plants, designed and advanced various methodical approaches to rare plant conservation in the culture. Baseline methods are listed below.

1. Many botanic gardens practice an archaic technique (on small beds) for growing rare plants. This method is being criticized by many specialists as it does not provide a sufficiently representative range of the ex-situ conserved species genotype. At the same time, a necessity of creating such collections is emphasized for the reproduction of rare useful plants or as educational expositions.

2. The creation of modeled artificial cenosis as a way of conserving endangered species on the florogenetic and phytocenotic basis is intensely practiced in Russian botanic gardens (PBG RAS, CSBG RAS SD, BG RAS UrD, etc.). This trend has been advancing due to the existence of botanical-geographical expositions in many botanic gardens. These expositions place each introduced plant species into its appropriate place or ecological niche in combination, ecology- and phytocenosis-based, with other plant species. The creation of ecological-phytocenotic pools of plants enables to extend drastically the indroducents' species composition in the context of new ecological niches. In so doing, various niches are enriched with relevant species, incl. rare ones, and plant species are selected in terms of their environment for each stratum. For example, the PBG RAS exposition of Far East broad-leaved and coniferous broad-leaved species under the arboreal plant cover demonstrates such rare species, as: *Phododendron schlippenbachii*, *Deutzia glabrata, Daphne kamtschatica, Hydrabgera petiolaris,* and in the herbaceous stratum - *Hepatica asiatica, Flritillaria ussuriensis, Acjnitum desoolavyi, Paeonia vernalisl, etc.* Since 1969, the CSBG RAS SD has been creating an exposition of relict vegetation - chernevaya taiga with dominating arboreal species: *Abies sibirica, Tilia sibirica and Pinus sibirica.* This cenosis preserves 17 relict types with seed and vegetative reproduction.

In the Botanical Gardens RAS UrD, for the specific purpose of growing rare plants, were set up 5 land sections imitating various habitats: steppe, rock and mountain-steppe, mountain-tundra, meadow and forest plants sections and the one for orchids.

3. The method for regeneration and introduction of plant communities has been developing in the Stavropol BG since 1959. It is based on sowing of multi-species wild seed mixtures harvested by mechanized means in herbaceous ecosystems of semiarid and steppe zones into pre-treated soil. Thus regenerated communities are added up, by sowing or planting, with tubers, bulbs and rhizomes of plants intended for conservation. In the Gardens were set up sections of meadow and mixed-grass-gramineous steppe, birch, oak and beech woods in the herbage of which there a lot of normally evolving and fruit-bearing species, including rare and endangered ones. Multi-year observations have shown

that none of the species fell out of the meadow steppe community comprising 250 species though the role of individual species in the aspect was constantly changing.

4. The method for introducing endangered species into wild vegetation of botanic gardens is being developed in the Polar-Alpine Botanical Gardens-Institute. It lies in setting up grounds with rare species in wild vegetation conserved on the territory of a garden or park. The species are not specially managed and their micro-populations are created. Similar efforts are carried out in other botanic garden with reserved sections of wild vegetation: in PBG RAS, Yakutsk BG, BG of the Ekaterinburg University.

Despite the success achieved by leading botanic gardens in ex-situ plant growing, the protection of endangered species ex-situ in the form of sample conservation under artificial conditions has certain demerits reasoned by the following: - a small number of specimens able to survive in the culture; - a methodically wrong selection of samples for their transfer into the culture that does not provide a sufficient representative range of the protected genofund; - a growing probability of autocrossing leading to a decrease in fertility or its full loss and to homozygosity; - a limited genotype diversity of material obtained in vegetative reproduction; - failing viability of many plants in the culture, particularly under artificial environment, e.g. in conservatories.

These reasons lead almost inevitably to one or another degree of genetic erosion of an ex-situ conserved taxon. Anyhow, a thorough selection of the starting material that ensures the highest attainable conservation of genotype diversity, precise documentation, employment of various lines and clones in cross pollination, and proper spatial isolation of protected collection funds can ensure a considerable erosion decrease. Efficiency of the ex-situ plant genofund conservation can be also elevated sharply through the creation of plant gene banks.

The most feasible and low-cost method for the conservation of plant genetic resources lies in establishing seed banks for plant seeds' long-time storage at low positive temperatures (+50C) and mild freezing (to 20 - 250C). The Russian Federation seed bank for cultivated plants was founded in 1976 (Krasnodar krai) though its focusing on low positive temperatures has made lasting seed storage unfeasible without sowing. Building of a cryobank with a deep-freeze regime (- 1600C) is underway in the. All-Russia Institute for Plant Growing (ARIPG, Saint Petersburg). Most of this bank's cultivated species seed collections is being maintained under mild freezing (-18 - -200C). Since 1982, experimental works have been conducted to study a deep and mild freezing effect on seed viability, growth and evolution of plants grown from frozen seeds, their chromosome apparatus, etc. The work was launched in the All-Russia Scientific Research Institute of Nature Protection (ARSRI NP) and lately has been taken up by the Principal Botanic Gardens RAS. In ARSRI NP was created a seed bank for wild plants (protected, medicinal, ornamental, etc.) under low positive temperature regimes (150 species) and since 1986 a seed cryobank has been operating at the Institute of Plants Physiology RAS (120 species).

Conservation of animals *ex-situ* (tables 14-15). For the last years in Russia, the number of institutions responsible for ex-situ animal conservation has diminished for economic reasons in biodiversity conservation. We can identify 3 areas in *ex-situ* animal conservation in Russia:

1. Captive breeding of rare animals aimed at their re-introduction into the wild to support existing, restore lost and create new populations ex-situ.
2. Breeding of economically valuable species to increase resources of populations in current use. 3. Management and breeding of animals for cultural and educational purposes.

Institutions of the latter area (mostly zoos) carry out activities on breeding animals usable for cultivation and implementation of in-situ re-introduction programs and those addressing economic areas (hunting, fishery, fur animal farming). Priority lies with breeding of vertebrate animals listed in the RF Red Data Book and IUCN Red List.

Table 14 Ex-situ Conservation of Land Vertebrates in Russian Zoological Breeding Centers in 1997

Species	**Type**	**Institution**
Bison bonasus	A	Prioksko-Terrasny zapovednik (*Oka Region-Bench Reserve)*
Bison bonasus	A	Oka zapovednik
Bison bonasus	A	Zoocenter for genofund conservation (settl. Cherga) of RAS Siberian Division
Alces alces	A	Elk farm of Pechoro-Ilych zapovednik
Alces alces	A	Elk farm of Kostroma forest management
Moschus moschiferus	A	Biostation of IEEP RAS, Chernogolovka, Moscow oblast
Mustilidae	A	Breeding farm, Novosibirsk, RAS SD
Mustilidae	A	Central Forest zapovednik
Meles meles	A	Experimental breeding farm of Biology and Soil Institute of RAS Far East Division
Nyctereutes procyonides	A	Experimental breeding farm of Biology and Soil Institute of RAS Far East Division
Felis lynx	A	Saltikovka fur animal farm, Moscow oblast
Felis lynx	A	Biostation of IEEP RAS, Chernogolovka, Moscow oblast
Felis lynx	A	Experimental breeding farm of Biology and Soil Institute of RAS Far East Division
Felis bengalensis cuptilura	A	Experimental breeding farm of Biology and Soil Institute of RAS Far East Division
Pesmana	A	Khoper zapovednik

moschata		
Castor fiber	A	Voronezh zapovednik
Marmota bobak	A	Pushkino fur animal farm, Moscow oblast
Gruidae		Oka zapovednik
Gruidae		Khingan zapovednik
Falcone formes		Zapovednik "Galichia Gora"
Falcone formes		Center "Falco", Barnaul
Predatory birds and owls		All-Russia Scientific Research Institute for Nature Protection of RF SCEP
Tetrao urogallus		Darwin zapovednik
Tetrao urogallus		Breeding farm of Central Research Laboratory under Department of Hunting Management, Moscow

Table 15 *Ex-situ* Collections of Vertebrates in Russian Zoos, Zoological Gardens and Aquaria in 1997

Taxon	**Number of species and subspecies**		**Number of reproducing species**	
	Total	**incl. those in RF Red Data Book**	**Total**	**incl. Those in RF Red Data Book**
Pisces	**456**	**7**	**144**	3
Amphibia	*60*	1	12	
Reptilia	436	41	103	8
Aves	519	56	I 154	I 17
Mammalia	371	78	205	38
Total	1,842	183	619	66

A crane breeding farm of the Oka biosphere state zapovednik is engaged in compiling a pedigreed crane register (*Grus leucogeranus*) *ex-situ.* The Moscow Zoo has established the Eurasian Regional Association of Zoos and Aquaria (ERAZA) that offers consultative and methodical assistance to CIS zoos and manages a periodic edition Informational Bulletin of Zoological Collections. The Moscow Zoo is a participant to EEPs (European Breeding Programs for Rare Species) that cover 23 bird and mammal species.

A notable drawback in the current state of efforts on ex-situ animal conservation in Russia is a low number of actually protected domestic fauna species and insufficient number of zoological breeding centers. In addition, there are few technologies developed

for mass ex-situ cultivation of animals in the amount that would meet needs of re-introduction into the wild. Russia has been lacking so far specialized cryobanks for storage of genomes of wild land vertebrates as their creation requires large capital investments. There is also no integrated scientific-methodical and informational center for ex-situ animal conservation that would generalize data on all animal pools and institutions having animals *ex-situ.*

1.2.3. **Red Data Book of the Russian Federation and its subjects**

Keeping of Red Data Book of the Russian Federation and Red Data Books of RF subjects as key elements of the biodiversity conservation ranks among the most important efforts on the conservation of rare and endangered species. The Russian Federation Red Data Book was initiated in 1982 by the Edict of the RSFSR Council of Ministers. A new Edict of the Russian Federation Government on the initiation of the Russian Federation Red Data Book and Red Data Books of RF subjects was issued in 1996.

The RF SCEP was entrusted with keeping up of the Russian Federation Red Data Book and scientific support to it was placed on the All-Russia Scientific Research Institute of Nature Protection.

To provide keeping of the Russian Federation Red Data Book, the Commission for Rare and Endangered Animals, Plants and Fungi has been established. It consists of leading scientists from RAS and sectoral institutes, universities, and specialists from various ministries and state sectoral bodies. Currently lists of rare and endangered animal species have been compiled to be included in the new edition of the Russian Federation Red Data Book (Annex 5.2.8). This list is much wider if compared with the 1st edition and includes 155 invertebrate, 4 *Cyclostomata*, *39* fish, *8* amphibian, 221 reptile, 123 bird, and 65 mammal species. Some of animal species are represented on the levels of subspecies or individual populations.

18 Russian Federation subjects have regional Red Data Books. By now lists of rare and endangered plant and animal species have been prepared and approved in 39 subjects, lists of rare plants - in another 6 subjects and a list of rare animals in 1 more RF subject.

1.3. Protected Areas

1.3.1. Current status of protected areas

The key legal act in Russia that governs relations in the protected area organization, protection and use is the Federal Law «On protected areas)) adopted by Gosduma on February 15, 1995.

In compliance with the above law, protected areas are attributed to national wealth objects. To protect them from adverse anthropogenic impacts, protected zones or districts with a controlled regime of economic activities can be set up on adjacent lands and aquatics.

Each protected area must be taken into account in designing local complex development schemes, land management and local planning. In terms of guarding regime specifics and status of environmental agencies located there, the above areas are categorized as follows:
- state natural zapovedniks (strict reserves), including biosphere reserves;
- national parks;
- state natural zakazniks (reserves);
-natural monuments;
- dendrological parks and botanical gardens;
- rehabilitation remedial localities and resorts.

At the same time, the Russian Federation Government, relevant executive bodies of Russian Federation subjects and local self-governance bodies may establish other categories for protected areas (e.g. areas where green zones, town woods, gardens and park art monuments, etc. are located). In Russia, the most wide-spread and traditionally protected areas of top-priority for the national heritage and biological diversity conservation are state natural zapovedniks, national parks, state natural zakazniks, and natural monuments.

State natural zapovedniks. Russian state natural zapovedniks are the most strictly protected natural areas. Protected natural complexes and objects (lands, waters, mineral resources, flora and fauna) that are especially significant for environment, science and ecoeducation and located within state zapovedniks are completely withdrawn from any kind of economic use.

In the Russian Federation, by October 1 1997, the number of state zapovedniks has reached 95 with the total area of 310 265 sq km, including the land area (with inner aquatics) of 261 898 sq km. This constitutes 1.53 % of the whole territory of Russia. Zapovedniks are located in 18 republics, 4 krais, 35 oblasts, 6 autonomous areas within the Russian Federation. The majority (88) of state natural zapovedniks are under direct management of the Russian Federation State Committee on Environmental Protection (RF SCEP), 4 - in the system of the Russian Academy of Sciences, 2 - under the RF Ministry of Education, 1 - under the Forest Service (Annex 5.1.27-5.1.28; 5.2.11).

Withdrawal or any other termination of rights for land plots or other natural resources of state natural zapovedniks is prohibited.

Any activities conflicting with state natural zapovednik objectives and specific guard regime are prohibited on the zapovednik territory, among them are:
-activities involving changes in a land hydrological regime;
- mineral resources development, soil layer disturbance, exposure of minerals and outcrop of rocks;
-timber harvesting, sanitary clearings and leaving cuttings, medicinal plant and technical raw material harvesting, and other types of forest use, for the exception of those envisaged by the Statute on forest use in state natural zapovedniks of the Russian Federation ratified by the Russian Federation Government on December 18, 1991 No 48;
- haying, cattle grazing, setup of beehives and apiaries, harvesting of wild fruit, berries, mushrooms, seeds, flowers and other flora uses; building and placing of industrial and agricultural facilities and their individual sites, building of houses and constructions, roads and overpasses, power supply lines and other communications, except those required for maintaining zapovednik's viability;
- commercial, sport and non-professional hunting, other fauna uses, excluding those listed in the above Statute;
- introduction of life organisms for the purpose of their acclimatization;
- employment of mineral fertilizers and chemical flora protective means;
- transit of cattle;
- presence, passing and driving through of aliens and any motor vehicles out of prescribed roads;
- collecting zoological, botanical and mineralogical collections, except those specified by scientific research topics and plans of a zapovednik;
- helicopters and airplanes flying over below 2 000 m above the zapovednik's area without concurrence with its administration or the State Committee for Environment Protection; breaking-through of the sound barrier above a zapovednik;
- other activities that disturb natural evolution of wildlife processes and threaten a state of natural complexes and objects as well as those with no relation to zapovednik's objectives.

The presence of people who are not zapovednik's employees or officials who are not employees of the SCEP or its local agencies on the territory of an RF SCEP zapovednik is permitted only in case RF SCEP or zapovednik administration's permits are available. Similar rules operate in other zapovedniks.

Areas of state biosphere zapovedniks may be added up with areas of biosphere test sites, including those with specific protection and operation regimes, to carry out scientific research, ecological monitoring and testing and implementation of rational nature-use methods that do not destroy environment and deplete biological resources.

The protection of natural complexes and objects within state natural zapovedniks is accomplished by a special state inspection on the guard of state natural zapovedniks. Inspection personnel are on zapovedniks' staff.

In 1996, guard service units functioned in 88 state natural zapovedniks (in three more, Tungus, Rostov and Koryak zapovedniks, their organization was underway).

In 10 zapovedniks (Chernie Zemli (Black Lands), Dzhugdzhurski, Rdeiski, Pasvik, Yuganski, Bureinski, Timirski, Putorangki, Olekminski, and Ostrova Vrangelya (Vrangel Islands)) guard service has not recorded any strict protected area regime violations for this period.

In other 75 zapovedniks, guard service recorded 2,596 cases (in 1995 - 2,941) of various regime violations, including: unauthorized cutting - 17 1 (the same in 1995), illegal haying and cattle grazing - 80 (61), illegal hunting - 439 (381), illegal fishing - 712 (839), illegal wild flora collecting - 219 (348), non-sanctioned land occupation and illegal building - 38 (8), illegal presence (driving, walking, transport parking) - 710 (906), pollution - 58 (66), violations of Forest Fire Management Rules - 41 (51). There were officially registered cases of preying of 94 ungulate animals (versus 85 in 1995) and 5 big predators, 2 polar bears among them (Big Arctic zapovednik). In Darvinski and Kerzhenski zapovedniks a fact of illegal wolf hunting was revealed. In 67 cases (versus 44 in 1995) criminal suits were filed and against 20 violators (like in 1995) criminal proceedings were instituted. In 29 zapovedniks (like in 1995) violators' detention was accompanied by confiscation of 260 weapon units.

In addition, for the reported period, 2,33 1 illegal fishing gear items (nets, traps, etc.) and about 3 tons of illegally caught fish (1995 - 7,437 kg) were confiscated.

Annual forest fires are a challenge for state natural zapovedniks. Starting with a current year fire- hazard period, fires occurred in 13 RF SCEP state natural zapovedniks with the total area of about 3.500 ha (-0.02 % of the whole area of zapovedniks). The overall number of fires - 30. Forests of Altai (Republic of Altai), Komsomolsk (Khabarovsk krai) and Sikhote-Alin (Primorski krai) zapovedniks suffered from fires more than the others. Almost all the fires were of natural thunderstorm origin.

Nationalparks. A state system of Russian Federation national parks has been establishing since the recent past. The first Russian Federation national park (Sochinski) was founded in 1983. By October 1 1997, 32 national parks with the total area of 66,45 thou sq km (Annex 5.2.9), corresponding to 0.39 % of the territory of Russia, has been set up in the Russian Federation. National parks are located in 9 republics of the Russian Federation, 2 krais and 21 oblasts. Most (30) of the national parks are in the jurisdiction of the Russian Federation Forest Service, one - in the jurisdiction of Moscow Government (Losiny Ostrov (Elks Woods)) and one - under the Yaroslavl oblast administration (Pereslavski).

National parks are nature protection, ecological education and scientific research establishments, territories (or aquatic areas) of which incorporate natural complexes and objects of particular environmental, historical and aesthetic value and are designated for nature protection, educational , scientific and cultural purposes and controlled tourism.

In specific cases, land plots of other users and proprietors may be located within the limits of a national park. Currently there are land plots of other proprietors, owners and users in 19 national parks from among 32. A share of such lands is extremely high in a number of parks (75 % in Pereslavski, 58 % in Orlovskoe Polesie, 54 % - Meshcherski and Russki Sever (Russian North), 48 % - Samara Luka, and 41 % in Sebezhski). National parks establish a differentiated regime in terms of their natural, historical, cultural and other specific features. Initiating from the above specifics, various - functional zones can be singled out in national parks, including:

- reserved zone, within the limits of which any economic activities or recreation use are prohibited;
- protected zone, within the limits of which conditions for natural complexes and objects conservation are provided and only strictly regulated visits are allowed;
- ecotourism zone designed for ecological education and sightseeing;
- recreational zone designated for recreation, including non-professional hunting and fishing;
- zone of historical and cultural monuments protection, within the limits of which conditions for their conservation are provided;
- visitors' service zone for accommodation sites, camping or other tourist, cultural, informational and general service facilities;
- maintenance zone, within the limits of which economic activities necessary for sustainable functioning of a national park are accomplished.

Any performance, which is likely to impose damage on natural complexes or objects, flora and fauna, historical and cultural monuments and which does not comply with goals and objectives of a national park, is prohibited, including:

- mineral resources prospecting and development;
- activities leading to soil cover disturbance and geological outcrops;
- activities resulting in hydrological regime changes;
- allotment of land parcels for orchard-and-garden management communities and country homes (dachas);
- building of highways, pipelines, power supply lines and other communications as well as building and exploitation of economic or residential sites which do not pertain to the functioning of national parks;
- timber harvesting, cuttings and clearings, galipot harvesting, commercial hunting and fishing (except the cases under this statute), commercial wild flora collecting, activities resulting in the disturbance of flora and fauna habitats, collecting of biological collections, and introduction of life organisms for the purpose of their acclimatization;
- traffic and parking of mechanized transport vehicles with no relation to national park functioning, passing-through of cattle out of general-use roads or waterways and outside specifically designated places, and timber floating;

- organization of mass sport and entertainment actions, arrangement of camping sites and setting bonfires outside prescribed places;
- taking-out of subjects of historical and cultural value.

In national parks situated in areas of aboriginal communities, the allocation of customary extensive nature-use zones is acceptable. Traditional activities, such as commercial hunting and fishing, handicrafts and customary nature uses and other similar activities can be permitted on specific land parcels if approved by the national park top management.

On lands included into the national park limits without their withdrawal from economic operation, expansion or construction of new economic sites are prohibited. A regime of these land use is defined by a statute approved by a Russian Federation state body to which this national park pertains upon agreement with executive power bodies of relevant Russian Federation subjects. Land lots within the national park limits and buildings, constructions and premises located on them are not subject to privatization.

National parks may carry out self-management of hunting and fishing on their territory or lease hunting lands and fishery water basins to other users.

National parks may carry out self-management of controlled tourism and recreation on their territories in line with approved projects or transfer this right to other concerned parties on the basis of controlled tourism and recreation management licenses. The licenses are issued by the national park top management provided the proposed services do not contradict with the objectives of national parks and inflict no damage on natural complexes and historical and cultural objects.

*State natural zakazniks.*State natural zakazniks are areas having a particular value for conservation or recovery of natural complexes or their components and sustainable ecological balance. An area can be declared a state natural zakaznik both with or without withdrawal of land parcels from users', owners' and proprietors' possession. They can have federal or regional significance.

For October 1 1997, there were over 1 600 state natural zakazniks with the total area of above 60 000 thou sq km in the Russian Federation, including 66 federal-level zakazniks, their total area being about 17 000 tho sq km. Most of federal zakazniks are in the jurisdiction of the Department on protection and rational use of hunting resources under the RF Ministry of Agriculture and 10 - in the authority of the RF SCEP. Among the latter is the largest state natural zakaznik «Zemlia Frantsa Iosifa» (Franz Joseph Land) within the same archipelago, total area 42 000 sq km, founded in 1994. 19 state natural zakazniks (both federal and regional) fall under the jurisdiction of the Ramsar Convention.

Dictated by specific objectives in the environment and natural resources protection, state natural zakazniks can have different profiles, according to which they are classified as follows:

- complex (landscape) reserves designated for natural complexes (nature landscapes) conservation and regeneration;
- biological (botanical and zoological) reserves established with the purpose of conservation and regeneration of rare and endangered flora and fauna species (subspecies, populations) as well as of those having economic, scientific and cultural value;
- paleontological reserves designed for conservation of sites where scientifically valuable remnants of fossil animals and vegetation or their petrified samples were found or accumulated; hydrological reserves (wetlands, lakes, rivers, seas) for preservation and recovery of valuable water objects and ecosystems; - geological reserves intended for conservation of valuable objects and dead nature complexes (peat bogs, mineral and other useable resources deposits, notable relief forms and landscape elements related to them).

On areas of state natural zakazniks or their individual parts there are prohibited, on a regular or timely basis, any activities being at variance with the purpose of state natural zakazniks or inflicting damage on natural complexes or their components, including the following:
- land plowing;
- timber harvesting and all kinds of cuttings, galipot harvesting, haying, cattle grazing, harvesting of mushrooms, berries, nuts, fruit, seeds, medicinal and other plants, and other types of flora use;
- commercial, sport and non-professional hunting, fishing, preying of animals that do not rank among hunting and fishing objects, and other fauna uses;
- collecting zoological, botanical and mineralogical collections, and paleontological objects;
- allotment of land parcels for housing and garden-and-orchard management communities; hydromelioration and irrigation works, geological prospecting and mineral resources development;
- erection of buildings and constructions, building of roads, pipelines, power supply lines, and other communications;
- employment of toxic chemicals, mineral fertilizers, chemical flora protective means and growth stimulants;
- any other economic activities, recreation and other types of nature use that hamper conservation, regeneration and reproduction of natural complexes and their elements.

On the areas of state natural zakazniks inhabited by multiple ethnic communities, natural resources use is admissible in the forms that provide protection for the above ethnic communities' habitats and conservation of their traditional way of life.
Proprietors, owners and users of land parcels located within the limits of state natural zakazniks as well as all other physical or juridical persons are obliged to observe a special guard regime established in state natural zakazniks and may be brought to administrative, criminal or other legal responsibility for its violation. Boundaries of state natural zakazniks are marked physically on the ground by warning or information-bearing signs.

Natural monuments. Natural monuments are nature complexes and objects of natural or artificial origin that are unique, unrenewable and valuable in ecological, scientific, cultural and aesthetic aspects.

The main purpose for which natural complexes and objects are declared natural monuments is their conservation in the natural state.

Giving natural complexes and objects a status of natural monuments and the areas occupied by them that of protected areas can be accompanied by withdrawal of land plots, on which they are located, from possession, rent or use of other proprietors, owners or users. The order of withdrawal and transfer of rights on such land plots is regulated by the land legislation of the Russian Federation and its subjects.

In order to protect natural monuments from adverse anthropogenic impacts of adjacent lands and waters, protected zones with a controlled regime of economic activities may be established.

Natural monuments can have federal or regional significance resulting from a degree of the environmental, aesthetic and other value of protected natural complexes and objects.

For October 1 1997, in the Russian Federation there were about 8 000 natural monuments, including 29 ones of federal level. Among the latter there are 16 natural monuments (total area - about 107 sq km) created for the protection of a small unique forest section in European Russia (Kologrivski Les (Kologriv Forest) in Kostroma oblast, upland oak woods Shipov Les in Voronezh oblast, Racheiskaya Taiga in Samara oblast, and others).

Land and water areas as well as single natural objects can be declared natural monuments, among them may be:
- parts of picturesque localities;
- reference samples of intact nature;
- local sites with predominating cultural landscape (old parks, alleys, canals, ancient pits, etc.);
- growing places and habitats of valuable, relict, scanty, rare and treatened flora and fauna species;
- large forests and forest sections especially valuable in their characteristics and exemplary samples of outstanding forest science and practice achievements;
- natural objects playing a key role in a sustainable hydrological regime;
- unique topographic forms and adjacent natural landscapes (mountains,
rock complexes, ravines, canyons, cave systems, glacier circuses and moraine-boulder ridges, dunes, barhans, giant icings, etc.);
- geological outcrops of a specific scientific value (open-cut mines,
rare minerals, rocks and usable resources exposures);
- other unique objects of dead and alive nature.

A passport for each monument is issued by the Russian Federation environmental bodies specifically authorized for this purpose with the approval of a relevant executive power body.

1.3.2. **The perspective network of protected areas**

The President's Decree of October 2, 1992 No 1155 «On the Russian Federation protected areas)) entrusted the Russian Federation Government in cooperation with executive power bodies of republics within the Russian Federation, krais, oblasts and autonomous areas with specifying the Project on a rational network of state zapovedniks and national parks by making provision for the expansion of these areas to three per cent of the Russian Federation area.

This effort resulted in the List of state zapovedniks and national parks recommended for establishing on the Russian Federation territory in 1994 - 2000 approved by the RF Government resolution of April 1994 No 572-r. This List recommended to set up 72 new state zapovedniks and 42 new national parks with the total area of 1 035,5 thou sq km i:n 8 republics, 6 krais, 28 oblasts and autonomous districts and areas by the end of 2005.

Due to certain socio-economic challenges, the implementation of this document in its full size seems rather unfeasible. Yet, starting with 1992, the state zapovedniks network has been developing quite intensively: 20 new zapovedniks were set up and areas of another 11 were expanded, thus the area of Russian zapovedniks has increased by 30 %. The same period was marked with the creation of 15 new national parks, their total area being 301 th.sq km, i.e. the total area of Russian national parks has grown by 45 % (Table 16).

Table 16 Dynamics of the Russian zapovednik and national park system development

Year	Zapovedniks			National parks			Number of
	Number	Area, thou sq km	% of area of Russia	Number	Area, thou sq km	% of area of Russia	zapovedniks to number of national parks
1991	77	199,14	1,16	17	36,50	0,21	4,5
1992	79	202,85	1,19	22	42,88	0,25	3,6
1993	84	284,76	1,39	25	44,49	0,26	3,4
1994	89	292,77	1,44	28	64,21	0,38	3,2
1997 (for 1.10)	95	310,27	1,53	32	66,45	0,39	3,0

A network of federal-level state natural zakazniks has been developing less intensively for the recent years. Anyhow, since 1992 4 federal zakazniks has been established with the total area of over 48 000 sq km, including the largest natural reserve of Russia - state natural zakaznik Zemlia Frantsa Iosifa with 42 000 sq km area.

On the basis of proposals received from RF SCEP local bodies, on December 18, 1996 the RF SCEP approved the List of federal-level state natural zakazniks recommended for establishing on the Russian Federation territory for the period to 2005. This list provides for the creation of 40 federal zakazniks with the total area of over 24 000 sq km on the territory of 25 Russian Federation subjects.

In a number of Russian regions, state authorities have ratified regional schemes for perspective development of protected areas. For example, the decision of the Nizhni Novgorod oblast executive body of March 22 1994 No 57 approved the List of newly revealed and being designed unique natural objects and areas potentially belonging to the nature conservation fund. According to this decision, privatization, land lease, land allotment, building, melioration, road-breaking and mining were suspended (if there is no positive conclusion of the state ecological expertise) within the limits of these areas and objects until passports (statutes) for these areas and objects are issued and approved.

Fauna species representativeness on Russia's protected areas.

Mammals. 25 1 land mammal species, 215 of which are preserved in zapovedniks (86% of mammal fauna), are represented on the territory of Russia. From among 41 land mammal species and subspecies listed in the Russian Red Data Book, 36 (89 %) have their habitats in reserved areas. As for 22 endemic mammal species of Russia, only 15 (68 %) can be found in zapovedniks. Zapovedniks are lacking the following Red Data Book species: *Rangifer tarandus peatsoni* (its habitat is located on the Novaja Zemlia archipelago where there are no zapovedniks); *Rhinolophus mehelyi* (there is one colony in Dagestan, RF, having no protected area status; the species dwells on the Northern area1 boundary); *Myotis emarginatus* (this species is highly probable to be found in Northern Caucasus zapovedniks as its population density is very low everywhere); *Cardiocranius paradoxus* (a very small part of the area1 is located in Russia and this area has no zapovedniks); *Spalax giganteus* (this Russian endemic species dwells in the North-East Cis-Caucasus and there is a single Dagestan zapovednik on this territory).

An indicator of the endemic mammals representativeness of Russia in zapovedniks is lower than that of a general mammals range. Four endemic species were singled out not far ago and there is a high probability of encountering them in zapovedniks since there are located habitats of the species to which they had been attributed previously: *Lemmus trimicronatus* (differentiated from *L. sibiricus),* two species of field mice from the *"maximowichi"* pool: *Microtus mujanensis* and *M. evoronensis,* and *Alticola lemminus* which is united with *A. macrotis* by certain authors. These four species taken into account, endemics occurring on the territory of zapovedniks achieve 86%.

Out of 36 mammal species not noted in zapovedniks, 2 species are introducents from America: *Castor canadensis* and *Procyon Zotor.* A *Felis libyca* area1 boundary lies near the Russia/Kazakhstan border and this species may be rather conventionally assigned to Russian fauna. The same problem arises with Japanese *Sorex shinto* (a lot of authors attribute it to *S. caecutiens* or reduce its area1 to Japan only) and *Cricetulus*

pseudogriseus described in 1975 (a lot of researchers group it with C. *Barabensis).* Two other species *Alticola tuvinicus* and *A. semicanus* that were identified comparatively recently and are missing in classification guides might also be found in zapovedniks. *Spermophilus erythrogenys* is a common species for the territory of Barabinski zapovednik being currently designed. If consider all the above, the land mammal fauna representativeness in zapovedniks may reach 90 % in the nearest future.

Amphibian. Currently 26 amphibian species are known to have habitats in ussia. From among them, 24 species are registered in zapovedniks, i.e. 92 %. Russian fauna lacks endemic amphibian species. Out of 4 amphibian species listed in the Russian Red Data Book, 3 (75 %) are preserved in zapovedniks. A single Red Data Book species lacking in zapovedniks is *Bufo calamita* which is encountered only on the Territory of Kaliningrad oblast.

Reptilian. Russian reptilian fauna comprises 77 species with 59 (77 %) of them dwelling on the territory of zapovedniks. Russian Red Data Book lists 11 species and there are only 6 (55 %) being conserved in zapovedniks. The five Red Data Book species missing in zapovedniks inhabit the Russian Northern extremity. Four species: *Eumeces schneideri, Eirenis modestus, Eirenic collaris, and Telescopus fallax, are* encountered only in Dagestan and *Ophisops elegans* forms an isolated population on the territory of Chechnia Republic. These species are not conserved in existing zapovedniks and new protected areas are needed to guard them. There are no endemic reptilian species in Russian fauna. Out of 18 species lacking in zapovedniks, *13* occur only in the Caucasus and Cis-Caucasus, the only place of the *Alsophylax pipiens* habitat in Russia is Astrakhan oblast and 4 species, *Phrynocephalus helioscopus, Phrynocephalus versicolor, Eremias multiocellata, and Eremias przewalskii, are* found solely in the South of Tuva. These species can be encountered in the fauna inventory of a new zapovednik "Ubsunurskaya kotlovina".

The expansion of the Russian reserved areas network gives grounds to a presumption that the representativeness of vertebrates in zapovedniks would not undergo radical changes. Taking comprehensive inventory and involvement of specialists-system makers in the identification of biota samples from protected areas will bring considerable improvement to the presented overview

1.3.3. **International conventions and programs on protected areas**

Currently, the following international treaties on protected areas of Russia fall among the key ones:

- Convention on Wetlands of International Importance Especially on Waterfowl Habitat;
- bilateral (trilateral) agreements on the creation and functioning of protected areas adjacent to the state border.

For October 1 1997, the jurisdiction of the Ramsar Convention spread over 35 Russian Federation wetlands within which areas of 9 state zapovedniks, 1 national park, 10 federal state zakazniks and 8 regional state zakazniks were located.

The World Heritage Convention was adopted in 1972 in Paris. The USSR joined the Convention in 1988, and in 1990 first cultural heritage objects were nominated, namely, Moscow Kremlin and Red Square, historical center of St. Petersburg with palace-and-park ensembles of its vicinity, Pogost Kizhi and later - Solovki monastery, ancient town Suzdal and cultural monuments of Vladimir oblast, and Troitsko-Sergiev lavra in Sergiev-Posad (Moscow oblast).

In 1995, the UNESCO introduced 32 thousand km2 of the Komi Republic virgin taiga, including the Pechoro-Ilychsky zapovednik and national park Yugyd Va, into the World Heritage List. It was the first natural heritage nomination in Russia and Convention's pioneering in the field of wild nature conservation. This action rescued the old-age forest from cutting out and stopped a gold-extraction project in the national park Yugyd Va. Swiss Government allocated several millions of Swiss francs for this area protection and tourism advance.

For October 1 1997, the World Heritage List provided for by this Convention listed 5 Russian Federation territorial sites classified as natural heritage objects: Komi Virgin Forests (including the areas of Pechero-Ilych state zapovednik and national park Yugyd va), Volcanoes of Kamchatka (including the areas of Kronotski state zapovednik, federal state zakaznik Yuzhno-Kamchatski (Southern Kamchatka) and national parks Yuzhno-Kamchatski, Nalychevo and Bystrinski), lake Baikal (including the areas of 3 state zapovedniks - Barguzinski, Baikalski, and Baikalo-Lenski, national parks Pribaikalski, Zabaikalski, Tunkinski and federal state zakaznik Kabanski).

The World Heritage List may be further extended by including two more Russian territories: Altai mountains and Karelian forests and lakes.

The Agreement between the USSR Government and Government of the Republic of Finland of 26.10.1989 made provision for the creation of the international reserve Druzhba (Friendship) on their state border. To extend this agreement, the state zapovednik
Kostomukshski(Republic of Karelia) was enlisted into this international protected area by the RSFSR Council of Ministers Resolution of 18.09.1991.

The Agreement between the Russian Federation Ministry on Environmental Protection and Natural Resources, Mongolia Ministry of Nature and Environment and Chinese Peoples Republic Environmental Protection Agency of 29.03.1994 stated the creation of an international nature reserve. In compliance with the Agreement, this reserve comprises state zapovednik Daurski (Chita oblast), nature reserve Mongol Daguur (aimak Dornod, Mongolia) and reserve Dalainor (Inner Mongolia Province, China).

The Agreement between the Russian Federation and People's Republic of China Governments of 2604.1996 stated the creation of an international nature reserve on the Khanka Lake. Article 1 of this Agreement defines the composition of this reserve. It

incorporates state zapovednik Khankaiski (Primorski krai) and reserve Khanka Lake (China).

A well-known international program in this field is the UNESCO Program Man and Biosphere (MAB) that coordinates the creation of an international network of cross-sectional landscape reserves with the purpose of their conservation, investigation and monitoring. A document to confirm a status of a specific protected area as an international biosphere reserve is a special certificate signed by the UNESCO General Secretary. The international network of biosphere reserves has been establishing since 1976. Such biosphere reserves are located in more than 80 countries and amount to about 340. For October 1 1997, from among 95 state natural zapovedniks of Russia, 18 had the status of a UNESCO biosphere reserve.

1.4. Biological pollution

The issue of biosafety is of versatile nature and great importance for the conservation of biodiversity. In addition to biotechnology, the following actual aspects of biosafety should be singled out:

- transfer of genetic information from domestically created forms to wild species;
- genetic exchange between wild species and subspecies, including the risk of genetic pollution of the rare and endangered species genofund;
- genetic and ecological consequences of voluntary and involuntary introduction of animals and plants.

For example, a biosafety risk assessment for mammals, i.e. risk of polluting the natural genofund with biotechnology products obtained on the basis of a mammal genome, has not acquired an urgent character so far. Though, in future, such risk should be hypothetically considered as part to the most general postulates of the biosafety concept.

Changing of inherited properties as a result of accidental or intentional breeding has a long history in human activities. In a number of cases (horse, cow), species that served as an origin for the artificial selection do not exist in nature. There is no direct channel of the genetic information exchange with natural populations of initial species. Predecessors or predecessor species of other domestic animals (pig, cat, dog) continue living in the wild, including habitats located in a close neighbourhood with their domestic pools. This problem is extremely pressing for Russia, especially for its anthropogenically transformed European part where under certain conditions successful hybridization between parental and domestically created species occurs resulting in fecund progeny (e.g. wolf-dog, wild boar-pig, forest-steppe cat-domestic cat hybrids). Practical experience shows that one of the most important prerequisites of hybridization and subsequent pollution of the natural genofund by wild species is disruption of the structure (ecological, ethnological) and mechanisms of their population self-control. If normal, these mechanisms prevent hybridization preserving natural priorities in reproduction. As follows from the above, it is rare and endangered species with their populations degrading that are under the highest risk of pollution. The best example is hybridization of a European subspecies of forest cat

with domestic forms (note: domestic cat is likely to be an interspecies hybrid of steppe and forest cats).

Therefore, two approaches to the control over the genetic information transfer between domestic forms and rare species may be singled out:

- strict control over domestic forms spreading in the wild (catching of homeless animals and those grown wild) and liability of juridical and physical persons-owners of domestic animals;
- maintaining a normal structure of wild populations of potential genetic information recipients and natural protective mechanisms of populations.

Interspecies and intersubspecies hybridization processes are rather wide-spread phenomena. Yet, a degree and potential occurrence of hybridization as well as fertility of hybrid progeny are governed by the properties of the chromosome apparatus organization and genetic similarity of initial species or intraspecies forms and vary with various taxons.

A threat of interspecies hybridization for Russian aboriginal fauna is also characteristic of the regions with anthropogenically transformed environment and disruptions in population control mechanisms. Changes in habitat conditions can provoke interspecies hybridization, e.g. hybridization of Cervus *elaphus and Cervus nippon* in re-introduction sites of the latter in European Russia.

Biosafety problem still remains actual in the context of artificial interspecies and even intergenera hybridization. In most cases such hybrids prove sterile or with only one sex surviving, e.g. an intergenera hybrid of *Bison bonasus* and cow. Therefore, these experiments probably are not of much threat, at least now. Nevertheless, in certain instances when it concerns close species and when human control over the process is lacking, hybridization effects are hardly predictable. For example, some European populations of Cervus *elaphus* are hybrids themselves and there is a share of American wapiti in their genofund. It is interesting that nobody could predict a possibility of hydridization between Cervus *elaphus and Cervus nippon* as no hybridization had been noted in Far East where both species had close habitats.

Voluntary and involuntary introductions. A risk assessment for aboriginal population genetic pollution caused by introduced or re-introduced species or subspecies presents certain challenges. In Russia, re-introduction of species, which have grown extinct in individual regions for different reasons, into the wild is looked at as one of a means for the conservation and restoration of biological diversity. A lot of positive re-introduction outputs can be enumerated, among them are:

- formation of the *Ovibos moschatus* population on the eastern coast of the Taimyr lake (Krasnoyarsk krai);
- restoration of the *Martes zibellina* population in the taiga zone;
- restoration of the *Bison bonasus* population in the center of European Russia and on the Caucasus;

- return of *Castor fiber* to its former habitats in European Russia;
- return of *Marmota bobac* to its former habitats in the Russian steppe zone.

Considerable negative consequences for Russian biodiversity took place as a result of wide-scale experiments on the animal and plant introduction in the 1930-50s under the slogan of enriching Russian flora and fauna. A review of their genetic, ecological and other effects will enable future evaluation of real changes in Russian biodiversity brought by these actions. A lot of these changes proved hardly predictable. For example, multiple experiments on introducing mammals in new habitat locations resulted in species naturalization only in a few cases:

- *Procyon lotor* formed populations in Primorsky krai and Republic of Dagestan;
- *Nyctereutes procyonoides* assimilated in forests of European Russia, Caucasus and Far East;
- *Castor canadensis* formed populations on rivers and lakes in Republics of Karelia and Komi, in Murmansk and Leningrad oblasts, Khabarovsk krai, etc.;
- *Mustela vison* settled in the forest and forest steppe zones of European Russia and Caucasus where it forced out aboriginal *Mustela lutreola*;
- *Ondatra zibethica* assimilated in actually all water and circumwater habitats, except the Arctic Region.

Ecological and genetic consequences of involuntary introduction are even less predictable than those of re-introduction or voluntary introduction. Invasions of species-introducents can illustrate ecological crisis consequences primarily for Russian agriculture and forestry (Table 17). For example, for only a 35-year period of work of the former USSR Quarantine Service, the expertise of about 1 million imported plant freights revealed more than 1,000 species of various insects (mainly pests), about 600 species of disease:-transmitting microorganisms (viruses, bacteria, fungi), and seeds of over 400 weeds (Annex 5.2.3-5.2.4).

Table 17 Examples of plant and animal species invasive for the Russian territory

Taxonomic position of species-introducents	***Impact on biodiversity***	***Control measures***
Plantae (Plants)		
1. *Ambrosia artemisiifolia L.*	0	B
2. *A. trifida L.*	0	B
3. *A. maritima L.*	0	B
4. *Solanum rostratum Dun.*	O	B
5. *S. carolinense L.*	0	B
6. *Salvia lanceifolia Poir.*	*0*	B
7. *Amaranthus retroflexus L.*	0	B
8. *Elodea canadensis*	0	*N*
9. *A. blitoiddes S. Wats.*	O	B
Insecta (Insects)		

Coleoptera (Beetles)		
1. Acanthoscelides obtectus Say.	O	B
2. Callosobruchus chinensis L.	o	B
3. Leptinotarsa decemlineata Say.	O	B
Lepidoptera (Butterflies)		
4. Grapholitha molesta Busck.	O	B
5. Hyphantria cunea Drury	o	B
Coccidea (Coxides)		
6. *Quadraspidiotus perniciosus Comstock*	o	B
Aves (Birds)		
1. Streptopelia decaocto	n	N
2. Pastor roseus	no	N
3. Branta canadensis	no	N
Mammalia (Mammals)		
1. Castor canadensis	no	B
2. Ondatra zibethica	no	B
3. Nyctereutes procyonoides	o	B
4. Procyon lotor	no	N
5. Mustela vison	o	B

Notes: o - negative impact on biodiversity, n - unknown impact; no - neutral or sometimes economically important; B - under control measures (chemical and biological anti-pest and anti-weed methods, hunting); N - no control measures.

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Invasion rates of species-introducents can be judged from expansion rates of geographic ranges of both under-quarantine and voluntary introduction objects. For instance, during past 60 years Ondatra zibethica has assimilated in actually all regions of Russia - frorn tundra to arid zones, and Leptinotersa decemlineata has settled in agrolandscapes of European Russia and south of West Siberia since the 60-s.

A lot of other current transformation processes in Russian biodiversity that could be assigned, in a broad sense, to the biodiversity scope can be only roughly approached as the research in this area is not conducted and relative indicators are not employed in monitoring.

1.5. Monitoring of biodiversity

Traditionally, according to the multi-year Russian practice, ministries and sectoral agencies-users of natural resources, including biological ones, has been making inventory and control of these resources. These state bodies have special divisions that are responsible for control and defining the policy in the conservation of a specific resource type. In its turn, this dictated in the past and has been dictating today a set of biota monitoring parameters with a wide range of tools to evaluate the status of objects as that of resources. This situation has changed to some extent after the creation of an

independent ministry (presently - RF SCEP) to the management of which were transferred: control over the status of rare and threatened species, control over the fulfillment of international agreements and conventions in biodiversity conservation, development of local forms of nature protection and monitoring of the conserved biota and ecosystem status, and other functions. However, the advancement of this progressive trend for separating biodiversity conservation use and control functions has been slowing down since recently. Alternatively, a tendency to going back to the past practice and switching over the control functions for individual biological resources to sectoral agencies has been observed in the last years.

Nevertheless, a system of monitoring over various objects, which can be looked at as an element of the national system, has been generated in the course of many years. The best progress has been achieved in sectoral monitoring of abiotic factors, including, first of all, monitoring of air and soil contamination, quality of surface waters and their resources, geological environment, its quality and resources, etc. A focal point for this work is RF State Committee on Hydrometeorology and Environment Monitoring. In addition, the Federal Forest Service and RF Ministry of Agriculture and Food incorporate divisions that execute control over the environment and ecosystem status on territories in their jurisdiction (forests, agrolands).

Of special note is the monitoring program Chronicles of Nature - annual master data bulletin on the status of protected areas, conserved plant and animal populations, and interesting natural objects. Some of zapovedniks have been keeping record of their Chronicles for 40 - 50 years. They list continuous data on the number of animals, biological diversity, and ecosystem dynamics as well as climate observation data. With such a highly developed network of biological stations (zapovedniks) available, for many years Russia has been having access to credible information on biodiversity changes on pilot territories in all natural zones and principal physico-geographic regions.

In terms of the vast territory and a variety of physico-geographic regions and ecological situation as a whole in different parts of the country, a differential approach taking in account regional specifics is most reasonable for Russia. Independent sectors cannot provide it as they locate observation posts in line with the distribution of the resource they use.

The state is still lacking a federal-level body and infrastructure for collection, processing, analysis and verification of the information supplied by sectoral ministries, scientific institutions and other sources. A complex of priority parameters for monitoring of biodiversity components being vital for their conservation and sustainable use is being prepared. The effort to identify a scope of anthropogenic factors that produce the strongest impact on biodiversity and are taken into account in the monitoring of their status is underway.

The Integral State Ecological Monitoring System (ISEMS) as a cross-sectoral informational-measuring system is being generated to establish the national monitoring

system and provide informational support to the nature protection management in Russia. It will function at two vertical levels - federal and administrative-territorial to be linked with relative environmental management levels.

At the federal level, this work has been initiated in a number of RF subjects (Amur, Kaluga, Kurgan and Kirov oblasts). In a number of regions, regional informational-analytical centers equipped with advanced computer technologies, including GIS data processing, are in operation.

Quarantine monitoring. An issue of invasive microorganisms has two components - ecological and biotic. From the ecological standpoint, the appearance of a new organisrn inside the country is a disaster, a threat to aboriginal plant and animal populations and potential degradation of wild and agrarian ecosystems. In the context of the biotic aspect, invasion of species-introducents leads to a buildup of the biodiversity level, occasionally - to forcing out of indigenous species.

The RF State Plants Quarantine Service is coordinated by the RF Ministry of Agriculture and Food. It comprises the following organizations:

- Rosgoskarantin (Russian State Quarantine Service) under the RF Ministry of Agriculture and Food;
- state frontier services of plants quarantine (together with All-Russia Scientific Research Institute of Plants Quarantine, quarantine laboratories and fumigation units) in republics, krais and oblasts (Rosgoskarantin regional divisions);
- Rosgoskarantin cross-raion (district) and raion divisions;
- frontier service posts of plants quarantine in river and sea ports (on piers), railway stations, principal post offices and border crossings.

Comprehensive quarantine monitoring of organisms being imported to the RF territory and evaluation of consequences caused by their import results from the efficient work of quarantine inspections, biological (taxonomic) training grade of quarantine inspectors, availability of an advanced informational system and links with scientific institutions possessing specific information on entomology, botany, phytopathology, virusology, and agronomy (Zoological Institute RAS, MSU Zoological museum, All-Russia Scientific Research Institute of Phytopathology, etc.).

A weak point in the quarantine monitoring is an average low level of biological education of plants quarantine inspectors and lack of an informational system (GIS) and database on spreading of quarantine organisms both throughout Russia and the Earth.

Russian quarantine service is focused on only monitoring and protection of forestry and agriculture from a very limited number of invasive organisms (plants, pests, fungi, bacteria). With regard to the biological safety of wild ecosystems, flora and fauna, limited data on forest and agrarian ecosystems has been accumulated. No survey of genetic neoplasms is conducted.

To foster quarantine monitoring, the development and minimum support to the taxonomic research of organisms, aboriginal flora and fauna in terms of their biological pollution and genetic neoplasms (produced by biotechnology, resulting from gene drift and hybridization) are needed. The situation also calls for the creation of a coordinating informational center for the collection and processing of information from plants quarantine services, veterinary service and scientific institutions.

Monitoring of the status of commercially used fauna (the State Registration Service for Hunting Resources). Annual evaluation of the commercially used fauna resources is fulfilled by the RF Gosokhotuchet (the State Registration Service for Hunting Resources) under the Department of Protection and Rational Use of Hunting Resources within the RF Ministry of Agriculture and Food. Once in 5 years the registration results are generalized in special bulletins (Resources of principal species..., 1996). The bulletins contain data on the number of 18 game animal species in individual regions of Russia and dynamics of hunting lands. Monitoring of the game animal population status is being carried out in 69 Russian Federation subjects. Key census methods are as follows:

- censuring by snow tracks in winter;
- aerial counts of ungulates;
- autumn strip transect counts of forest and field game;
- census studies by game drive in snowless regions.

Systematic registration of the animal number started at the end of the 50-s. Currently the central link of the RF Gosokhotuchet processes 33 000- 35 000 registration cards of animal tracks every year (Annex 5.1.31). The total length of survey transects amounts to 320,000 km per year. Computer technologies are employed for calculating density of animal populations. Yet, collection, initial processing and communication of information still fail in the utilization of advanced technologies. The Global Environment Facility project Conservation of Biodiversity in Russia envisages financial support to the establishment of the national database and GIS on commercial mammals in 1998. Computer data processing, development of computer communication with data providers-participants of annual fauna registration will make evaluations more precise and valuable for hunting management.

Key indicators of biodiversity monitoring in Russia. The existing monitoring system of Russia is specific of an extremely sectoral approach and lack of clear coordination. The most complete data on the status of biodiversity, ecosystems and landscapes serving as habitats for plants and animals, and on country's biological resources are available in the annual State Report on the Status of Environment in the Russian Federation. It has been published since 1989 and contains information received from all ministries and sectoral state agencies, including those associated with biodiversity conservation and use of biological resources. Though a lot of biodiversity status indicators stay unused and are stored in sectoral archives. Below is given a list of biodiversity monitoring indicators and system of survey and control over its status employed in Russia (Table 18).

Table 18 List of key indicators for biodiversity monitoring in Russia and bodies responsible for its execution

Objects of monitoring	**Indicators**	**Form of presentation**	**Bodies of information control and collection**
Species richness and genetic diversity	Number of species in the country, region, including endemic	Taxonomic guidelines of national and regional levels	Russian Academy of Sciences, Ministry of Education (universities)
Rare and threatened species	Number of species in the country, region. Species classification by categories of threat (status)	RF Red Data Book, Red Data Books of RF subjects and regions; lists of rare species	SCEP, Russian Academy of Sciences:, Ministry of Education (universities)
Rare and threatened species in protected areas	Number of species. Density of animal populations. Number of species recorded in the Red Data Book. Representitaveness of Red Data Book species in protected areas	Special editions (e.g. Annex to the *State Report on the Environment Status)*	SCEP (for zapovedniks), Ministry of Culture (for natural heritage objects),, Russian Forestry Management (for national parks),, Russian Academy of Sciences
Animal and plant species in *in-situ* collections	Number of species. Number of species in the Red Data Book	Sectoral sources	Ministry of Agriculture, Ministry of Culture, Russian, Academy of Sciences
Game animals	Number of animals before hunting. Prey limit by animal species. Payment regulations. Penalties and fees. Dates, periods and means of hunting	Gosokhotuchet bulletins (data for 5 years), tables in the *State Report.. .*	Gosokhotuchet under Ministry of Agriculture
Fish resources	Actual capacity of water basins. Fishing limit by resource types. Penalties, payments. Dates, periods and means of fishing	Sectoral sources, annual reports and recommendations, tables in the *State Report.. .*	Cross-sectoral Ichthyological Commission, Ministry of Agriculture
Other types of	Actual reserve. Prey	Sectoral sources,	Russian Forestry

animals and products of their vital activity	and use limits. Penalties and payments	annual reports and recommendations	Management, Ministry of Agriculture:, SCEP
Plant resources - technical, food, fodder, and medicinal	Limit of use. Dates, periods and methods of use. Penalties and payments	Sectoral sources, reference coupes, forest taxation materials, tables in the *State Report...*	Russian Forestry Management, Ministry of Agriculture,, RF SCEP
Diversity of agricultural and domestic animals and plants	Number of sorts and breeds. Regionalization of sorts and breeds	State registers of cultural plant sorts and domestic animal breeds	Ministry of Agriculture
Plant and animal species - results of voluntary or involuntary introductions and invasion	Number of species by taxonomic pools. Number of threatened species among cultivated plant and animal forms	Sectoral sources	Rosgoskarantin, Veterinary Service under Ministry of Agriculture, Customs Committee,, SCEP

1.6. Biological safety in transfer, handling and use of genetically modified organisms

At present, biosafety in Russia is understood as «safe receiving, handling and transfer of genetically modified organisms (GMOs) and their fragments containing recombinant DNA». In a wider sense, the issue of biosafety is looked at as an action to prevent genetic pollution both in the ex-situ conservation of biodiversity (as a result of biotechnology, accidental or directed hybridization) and in the in-situ conservation (as a result of voluntary and involuntary introductions, invasion of alien organisms, spontaneous hybridization, etc.). This approach is in full agreement with the provisions of the Convention on Biological Diversity and opens good prospects for the harmonization of a developing national mechanism of biosafety.

Biotechnological aspects of biosafety. The first steps in the creation of a national biosafety mechanism dates back to mid- 1970s. After the Asilomar Conference it became evident that no biotechnological efforts could be carried out without legal regulations and norms in biosafety (safety measures). Currently there are no less than 40 legal acts and subordinate acts that regulate biosafety issues either directly or indirectly.

In 1996 the Federal Law On state control over gene engineering activities was adopted. It has become a milestone in the legislative mechanism of control in the filed of biosafety. In 1997 the Russian Federation Government established the Cross-Sectoral Commission on Gene Engineering Issues. Its main objective is to coordinate activities of ministries, state sectoral agencies, state scientific academic and university centers in the implementation of biosafety mechanisms.

Basic structural elements of Russian biosafety have not been equally elaborated so far and for the most part they has not been worked out. For example, there are lacking general principles of support to the biosafety system, copyright on created GMO, risk assessment mechanisms and techniques, etc.

2. Present-day socio-economic factors influencing biodiversity

Russia is now at a very dynamic phase of its development. Due to a transitional character of the social system, a lot of indicators and methods for collecting socio-economic information well-performing in developed countries are not exactly applicable here. The RF State Committee on Statistics has to define even baseline indicators, such as gross domestic product (GDP), corrected for the «shadow» sector by 20 - 25%.

We should also emphasize a low quality of official data on the status and use of living nature. Its collection is not only disrupted by crisis processes but also is methodically incorrect or labor-intensive. Data on fauna and flora objects is much less accurate than that on the status of industry and agriculture.

2.1. Population

Country's population is 147,5 million people. In a number of European regions, the population density exceeds 50 individuals per 1 sq km (in Moscow oblast it is over 200). As for the vast spaces of Siberia and European North, it is less than 1 individual per 1 km2. Moscow has the population of 9 000 thou and another 12 cities - over 1 000 thou, 22 more - over 500 000. These 35 largest cities are responsible for 27.7 % of the country's population. At average, one large city occupies a 500 x 1,000 km territory.

Though the development of Russia is of highly dynamic character, its demography will not feature any cardinal changes in coming 10 years. The total population of Russia, according to a very optimistic forecast of the RF State Committee on Statistics, will drop to 146,7 million (2005) and restore on the level of 1995 only by 2010. That is why a general growth of load on biodiversity resulting from a direct increase of population density is not expected for the coming decades in Russia.

The most critical consequences for diversity can be brought by a population migration flow from northern regions. During the crisis period, a cut in the mineral resources extraction has led to depopulation of settlements and towns on Chukotka, in the Magadan and Kamchatka oblasts. Here is observed a decrease in technogenic impacts (pollution, destruction of river valleys by drags and of vegetation by caterpillar tracks) along with hunting and fishing loads.

Coming decades may become indicative of a population flow increase to the south of Siberia from North Kazakhstan where growing dryness of arid areas is forecast. This migration is likely to involve problems in land and water use and, as a result, in the conservation of steppe and forest steppe biodiversity that is scarce for Russia. Rural-urban migrations can also cause serious follow-ups for living nature. This process has been resulting in the cultivated land reduction and successional reforestation of small-leaved woods in Nechernozemie (Non-Black Soil Region) for about thirty years. As soon

as the growth of goods and services occurs in cities where it is easier to find a job, the population flow from rural areas will increase again.

In densely populated areas of the black-soil center (Chernozemie), a young population outflow alone does not lead to a drastic drop of biodiversity exposure. In this region, a rate of plowed lands did not change much in the past and it may even grow in future. An advance in household production of foodstuffs has already led to an expansion of gardens' areas. In Nechernozemie, these processes were compensated by abandoning of plowed lands and, in Chernozemie, they resulted in the use of gully woods, roadside zones, unsuitable lands, areas under electricity lines, etc., i.e. led to a noticeable attack on last refugiums of steppe biota elements.

Statistics evidences that a moment of most acute poverty (1992-93) has passed together with threats for biodiversity associated with it. These threats partially originated from intensified poaching (forest harvesting, fishing, hunting). Most vividly those threats were revealed in a sharp drop of game livestock, hunting of which does not need any professional skills and therefore is accessible for population (e.g. elk in European Russia). Another example of this effect has become activation of forest harvesting of medicinal plants and wild flowers, mushrooms and berries for sale by the poorest part of population as an extra income source. Direct consequences of these harvesting kinds are not dangerous, yet, in the Siberia south, a growth of forest visiting by non-professional harvesters is associated with a rising number of fires around cities during a spring period of ramson harvesting.

2.2. Development of infrastructure

The European part of the former USSR was marked with a special attention focused on transport networks of republics adjacent to Russia in the south and west. The road infrastructure development here was governed by defense needs. At the same time, oblasts of Central Russia (Smolensk, Kaluga, Tambov oblasts, etc.) have a less developed transport infrastructure. Road length incremental rates were over 3.5 % in 1975 - 1985 and dropped to 1.3 % in 1992 - 1996.

A state of a road network between highly populated sites characteristic of industry concentration is generally satisfactory. Though main land-cultivating areas are suffering from an acute deficit of local roads. Forest-using regions feature a shortage or absence of paved road. This leads to the predomination of dense cuttings with the use of heavy off-road vehicles. Current degradation of roads, particularly those within special authority (military, forest transportation) taking place in remote and depressive regions will be progressing. A lot of ground roads in Nechernozemie will be getting overgrown with abandoning of plowed lands, remote felling areas, etc. Periods of spring slush will be indicative of a limited access to far lands, factor of nesting birds' and mating animals' disturbance, harvesting of ephemerals, etc.

Intensification of main roads' revamp is expected in the Russian Center and South. This will increase a load on nature resulting from both road widening and development of roadside infrastructure - gas filling stations, shops, cafes, motels, etc. In the steppe zone where roadside zones are about the only refugiums of steppe biota this can bring in rather hard consequences.

In tundra and taiga zones of Russia, rivers are used as main transportation ways. The intensive development of small water transport, starting from the 50s, has facilitated access to remote lands thus having concentrated population in larger settlements along rivers. As a result, a load on by-river ecosystems has grown and that in interfluve areas - dropped. Today, a decrease in visiting remote lands is dictated by rising prices on fuel.. Similar reasons have led to reduction of coast fleet and local air traffic which were used by poachers for getting to sea coasts and watersheds. At the same time, high prices have led to a drop in air fire management surveillance.

2.3. **Land possession and property rights**

Main agricultural areas of field-crop cultivating regions belong to joint stock associations (JSA), kolkhozs (collective farms) and sovkhozs (state farms). It is formally believed that their members are owners of individual land plots though actually the lands are not divided. For 1996, a share of lands in this possession made up 66.3 % of the total agricultural lands. Individual farmers owned 4.8 %. Small areas are occupied by backyard gardens of rural and small-city residents, gardens and orchards in collective possession (0.8 and 0.3 % of agricultural lands, respectively).

State reserve lands, those belonging to the defense sector, occupied by forests and zapovedniks, water basins and the like are considered to be in state or mixed ownership- that of the Federation and a Federation subject, or only in that of a Federation subject (Annex 5.1.4). Actually, these lands are in the possession of local administrations as their decision is critical in land allotment and identification of users' rights and responsibilities. Hence, it is local authorities that own biological resources within their area - woods, game, inland water fish, etc. Underground resources are also considered to be a state property. Yet, region administrations having authority in land allotment exercise partial management of underground resources. In tundra and taiga regions that have no valuable mineral resources or commercially usable forests, aboriginal communities or professional hunters virtually get back to a customary community-family system of land use even in places where it is not legally fixed. In case the Land Code permitted purchase-sale of land, it would affect the most part of population residing in the vicinity of large cities where a mass transfer of agricultural lands into garden-orchard plots, dachas and local production sites would start.

2.4. **Industry**

Russia is specific of a high level of technical equipment. It is partially connected with elevated power consumption by economy of such a northern country as Russia (6.3 %

across country and 38 % in some regions). Due to only a climate factor, the amount of work needed for the creation and operation of equipment of a comparable technical standard may be many-fold different in the north of Siberia and center of European Russia. On-permafrost building works rank first in this row. Building and all power-consuming industrial activities are accompanied by energy dispersion in the environment (including int h form of pollution and direct nature disruption) due to the critical efficiency factor for machinery and equipment in use. Here an energy equivalent can act as an integral characteristic for the anthropogenic load on ecosystems (Annex 5.1.5-5.1.6).

In the biodiversity context, Russian industry is characterized by two specific features. The first is an elevated (versus average global standard) energy environmental impact i:n manufacture of equivalent products. The second feature refers to the concentration of local exposures mostly in cities and areas close to industrial sites. These features govern the inability of industrial air emissions to produce significant impacts on biodiversity of terrestrial ecosystems in watersheds even in the region with a long history of assimilation (Annex 5.1.5-5.1.10). Anyhow, water ecosystems prove to be highly vulnerable as they are waste concentration sites affected by the totality of industrial sites of the whole watershed.

Production dynamics in the crisis period. Following the official statistics, a conclusion is usually made that recent years have been characterized by an extremely profound production decline in Russia. It should have told beneficially on the biodiversity conservation in towns and water basins located downstream. Nevertheless, some statistic data demonstrate a different pattern (Table 19).

Table 19 Production volume decline in the period of 1985 - 1995 by monetary and natural indicators

Parameters	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**
Production monetary indicators	**100**	**96.3**	**88.2**	**64.8**	**61.6**	**46.8**	**43.2**
Electric power consumption	100	98.8	95.5	87.5	80.9	70.5	67.3
Freight traffic amount	100	95.5	88.5	72.1	68.5	55.9	49.0
Freight turnover	100	95.2	88.2	75.9	67.2	57.6	56.6
Wastes (gas + dust)	100	98.1	88.0	75.8	67.6	57.0	55.7
Wastes (water discharge)	100	98.9	88.8	82.3	65.8	64.8	57.2
Production natural indicators	100	***97***	***90***	***79***	***70***	***61***	***58***

Judging from natural indicators, factual volume of work done in the country and, respectively, amount of products manufactured is higher than it follows from fiscal reports. Economists confirm that a considerable output portion falls with the shadow

sector. The shadow sector accounted for 34 % of the officially registered material production output of Russia in 1995.
Currently and in the nearest future, a production growth will occur mostly at the expense of small enterprises that consume water from municipal water facilities and discharge it to sewage which is normally unadjusted to industrial waste waters, or directly to natural water basins. It is significant that polluted waste water amounts constituted 82.7 % i:n 1996 versus 1992 and contaminated air emissions - merely 71.6 %. Mind that the latter **are** less diffusive and thus more feasibly registered. Reduction of medium enterprises will result in the growth of land allotment to building and forest clearings, small in area though high in number, especially in southern regions.

2.5. **Agriculture**

An agricultural assimilation rate of Russian regions is irregular. Across the country it is much lower than in most countries of the world. Plowed fields, orchards, etc. occupy 7.6 % of the territory, intensively used pastures and hay-fields - 4.6 % (Table 20). As it has been already marked, Nechernozemie is indicative of agricultural lands being overgrown with young woods. Unfortunately, data on cultivable lands overgrowing is lacking. As for pastures and hay fields, in 1990 - 1994, 3.8 million hectares of them were transferred to the category of tree-shrubbery lands. Yet, another 6.7 million hectares remained in the category of overgrown wild feedstock lands for 1 .01.1995. Main massifs of lands being overgrown with forest are located in the north and north-west of European Russia. Over 30% of wild feedstock lands - hay meadows and grazings - have been overgrown i:n Novgorod and Pskov oblasts.

Table 20 Distribution of the Russian Federation land fund according to land categories for January 1, 1997 (in thousand square km)

Land category	**1**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**Total**
Total area	6,070.1	381.7	182.4	297.6	8,255.8	193.9	1,085.3	17,097.6
Agricultural lands, total	1,84.3	248.9	11.6	3.9	37.9	0.3	72.2	2,216.0
incl. Cultivated	1,200.4	62.4	1.7	0.14	1.8	0.01	22.3	1,288.8
Forest areas	1,287.1	37.6	33.5	141.8	6,083.4	0.2	94.4	7,678.0
Shrubbery	131.6	11.5	4.2	4.9	-	0.2	30.1	182.4
Marshes	138.3	12.4	3.4	18.9	782.7	7.4	118.6	1,081.6
Underwater	193.8	7.9	8.4	15.1	128.7	185.0	181.5	720.3
Reindeer and horse grazings	2,529.8	0.3	1.8	12.8	598.3	-	125.5	3,268.6
Under buildings, roads	34.9	40.9	30.3	0.7	17.1	0.2	1.0	124.9
Disrupted lands	3.0	1.1	5.8	0.1	1.3	0.1	0.7	11.8
Other lands	541.1	21.2	83.6	99.5	606.6	0.8	461.4	1,814.1

Notes. Land categories: 1 - lands of agricultural enterprises, organizations and individuals; II - lands in the authority of municipal, towns and rural administrations; III - lands used for industrial, transport and other

non-agricultural purposes; IV - lands of the environmental purpose (zapovedniks, national parks, zakazniks, etc.); V - forest fund lands (forestry farms); VI - water fund lands; VII - state reserve lands.

According to state statistics agencies, pig stock has dropped to 19.5 millions, that of sheep and goat - to 23.3 millions by 1997. Total cattle livestock has reduced from 47.0 to 24.0 million animals in cattle breeding farms during 1991 - 1997. However, in private farms, official statistics has registered a growth from 9.9 to 11.8 millions. A real growtlh is obviously higher because farmers hide the most part of cattle livestock from registration. It is significant that feed costs per unit of cattle weight gain or milk yield in collective farms are constantly growing. This reflects an increase in the use of community-owned feedstock for private cattle. Note that if areas under cereals have reduced to 534 thou sq km in 1996 versus 619 thou sq km in 1992, so those under many-year grass (basic forest-zone forage cultures) grew from 1 300 thou sq km to 1 780 thou sq km. In central Nechernozemie, forest pasturing and forest meadow and roadside zone hay making have almost ceased due to a sharp drop of cattle livestock in collective farms and abandoning of some fields. Alternatively, in Chernozemie, large farms are in a relatively better state as a result of high crop yields. Though here the cost for land has gone up drastically. For self-supply of food, unsuitable lands, roadside zones, etc., are plowed up for gardens and almost all meadow and steppe sections are mowed for cattle feedstock. The same situation is with haying areas and forest grazings in the European north and Siberian south where a growth of private cattle stock has been marked and a certain shortage of non-forest areas exists.

The application of toxicants for grain treatment has stopped practically everywhere and pesticides and mineral fertilizers are falling out of use. In 1992, on the average in the country, agricultural enterprises purchased 44 kg of mineral fertilizers per 1 hectare of plowed land versus only 14 kg in 1996. This has resulted in a growth of the animals number in forest steppe and forest zones - typical dwellers of forest edges - *Lirurus tetrix, Perdix perdix, Capreolus capreolus,* etc. As farms has grown less in number, dung is more often brought out for sale and this has led to slowing down of eutrotication of small water pools thus favorably influencing biodiversity of their flora and fauna. Import-focusing allowed to cut down areas under rice (the most ecologically unsafe culture in Russia) from 286.5 thousand hectares in 1990 to 172 in 1996. This has produced a beneficial effect on the environmental situation in biodiversity-valuable Khanka lowlands and Cis-Caucasus (especially in the Kuban delta).

The existing economic situation in the agroindustrial complex has resulted in a drastic drop of sheep livestock - a basis for the economy of steppe and mountain-steppe communities of Russia. In the period of 1991 - 1995, sheep and goat livestock of agricultural enterprises fell down 2.3-fold (cattle livestock - 1.5-fold, pigs - 1.9). Although even official statistics showed that cow and pig livestock had grown for the same period and that of sheep and goats had reduced from 16.1 to 15.0 million animals. This is the reason for expecting an erosion decrease on grazings and recovery of nature diversity in very rare for Russia steppe and semiarid regions.

2.6. Forestry

Forest fund accounts for about 69 % of Russian lands. 78.8 % of dense forests are located in the Asian part and **21.5 %** - in European Russia and the Urals. The protection and rational use of the Russian forest fund provide the landscape and biological diversity conservation and sustainable use of the country's largest part. Average forest density of Russia being 44.7 %, it reaches 57 % within boreal forests.

According to the latest state forest fund registration, its area is 11.9 million square km. From among them, 11 .1 million square km are within state management, 0.16 million square km - in that of RF SCEP, 0.45 million square km are owned by agricultural enterprises and 0.1 million hectares fall within the jurisdiction of other ministries and state sectoral bodies.

By now, only 60 % of Russian forests has been studied in detail and managed properly. The rest (mainly low-value woods of Asian Russia) was studied only using distant-reading (aerial visual and space techniques) methods and falls out of proper management. In compliance with the RF Forest Code (1997), fund forests should be grouped in three categories.

The 1st category covers forests that have water-conserving, sanitary, protective and other functions along with forests of protected areas. Totally they occupy about 20 % of the forest total. Recent years have demonstrated a growth of this pool of forests resulting from the foundation of new protected areas.

Forests attributed to the 2nd category concentrate in regions specific of high population density and mature infrastructure. They have water-conserving, protective, recreational1 and other functions under the conditions of forest resource deficit. This group of forests requires certain restrictions in forest use. They occupy merely 6 % of the area.

The 3rd category unites productive woods of rich-in-forest regions. The key requirement to lumbering in this pool of forests should be the conservation of their ecological functions.

The data of the State Committee on Statistics evidences that 1996 timber outputs accounted for 100.8 million m3. A decline in lumbering varies by regions. In principal logging regions (Northern Region, Urals, West Siberia, East Siberia and Far East) legal cutting outputs dropped by over 50 % in 1991 - 1996 and by less than 50 % in other areas for the same period. Forest regions of Siberia feature abandoning of remote clearings and cutting carried out mainly along communications. Forestry statistics gives no accurate data on these changes. Though they are indirectly evidenced by a decrease in timber rafting, i.e. forest transporting from remote sites. In 1990 - 1994, railroad lumber freights demonstrated a 2.8 times drop, sea lumber cargoes reduced 3.3-fold, inland water cargoes - 2.9-fold and rafting accounted for as high as a 6.9 times decrease.

Western experts evaluate the amount of illegal cuttings as 40 % of the total output. Even more important are indicators of increasing cuttings in southern scarce-in-forest regions,. Analysis shows that sanitary, «leaving» and other (including clearings due to land allotment for building sites or garden plots) clearings are conducted in forest-deficit districts (Table 2 1).

Amounts of key-use wood cutting have drastically reduced here, yet those of sanitary and\or «other» wood cuttings have remained unchanged. The same pattern is also indicative of forest lands inside economic regions. For example, in the Central Region outputs of all kinds of wood felling have dropped and in the woodless Orel oblast sanitary cuttings have grown (123 %) along with the other kinds being preserved (100 %). A similar process is typical for the Volgograd oblast (108.5 and 350 %), Volga region, Orenburg oblast (167.6 and 160.8 %), Urals region, Altai Republic (167.6 and 160.8 %)I, West Siberia, Bouryat Republic (105.3 and 78.2 %), and East Siberia. These processes have resulted in a decrease of the reference felling area (in cubic m) with its development degree also dropping (woods are getting younger though their area is extending country-wide).

Table 2 1 Changes in wood cutting outputs in Russia for 199 1 - 1995

Economic region	**Wood cutting output of 1996 in % to that of 1991**		
	Key-use cuttings	**Sanitary clearings**	**Other cuttings**
North	42.8	72.4	22.0
North-West	62.4	82.5	86.6
Center	43.7	87.4	46.4
Volga-Vyatka	47.9	70.1	117.3
Central Chemozemie	5.8	121.0	148.2
Volga	43.4	65.00	155.7
North Caucasus	24.0	65.9	58.7
Urals	42.8	73.2	50.6
West Siberia	25.8	82.5	21.4
East Siberia	38.6	83.2	24.8
Far East	**39.4**	64.0	

Illegal cuttings and forest clearings in the guise of land allotting for other purposes is becoming a common practice. Moreover, Chemozemie and Siberia are getting indicative of forest cattle pasturing. Note that rural areas actually are lacking control over petty poaching. Most dangerous is the situation on the Caucasus. Regional conflicts intensify vulnerability of mountain forests and high energy costs lead to mass lumbering.

The key-use reference felling area (ratio of the factually cut wood amount to the reference felling area amount) accounted for 21.4 %, including coniferous - 26.8 %. Timber output

has been gradually decreasing since 1988. Simultaneously, a decline of forest-use violations has been also observed. For instance, in 1994, the amount of lumber abandoned in felling areas comprised 2.9 million m3 versus 1.4 million m3 in 1995 and about 1.0 million m3 in 1996. The most acute problems of forest use impact on biodiversity for European Russia forests are associated with the conservation of old-aged woods and their fragmentation in the course of dense cuttings and building of temporary and permanent roads.

A growth of fires and fresh burnt-out sites is going on (Table 22). Insufficient funding leads to the absence of air fire management patrols and to delays in fire spotting. Table 20 lists the data on very unfavorable dynamics of the fire situation in Russian forests. Both the number and scale of forest fires are growing. Annex 5.1.9-5.1 .10 evidences that the greatest areas of burnt-out sites are identified on oblasts' boundaries, i.e. in the most hard-to-reach districts. Comparing an average fire area of 0.27 km2 in 1992 with that in 1996, we will see that it grew up to 0.57 km2. In 1992, 10 km2 of the burnt-out area accounted for, on average, 16 thousand m3 timber versus 30 thousand m3 in 1996. Fire area and frequency vary considerably through years. Damage inflicted by fires amounted to about 30 billion US dollars (in prices for November 1996). The most fire-hazardous districts are concentrated in Middle and East Siberia, Yakutia, Transbaikalia and Far East which are specific of rich flora and fauna diversity.

Table 22

Fires in Russian forests in 1992 - 1996

Indicator	**1992**	**1994**	**1995**	**1996**
Number of fires (thousands)	25.8	20.3	26.0	32.8
Area of forests having been under fire (km^2)	66,915	5,203	3,516	18,535

A conclusion can be made that the most rapid growth of the fire number is indicative of productive mature forests with the largest lumber stock and high biodiversity level.

Reforestation was carried out on 11,097 sq km in 1996. On 8,045 sq km out of them, efforts assisting natural reforestation were undertaken and on 3,502 sq km - afforestation actions. Forest cultures planted on about 500 square km in various periods did not survive, including one-year species on 44 square km. In comparison with 1995, reforestation areas reduced by 3 440 sq km.

The total area of pest and forest disease concentration sites was 42 068 sq km (0.4 %) in 1996. The largest areas were marked in the Kemerovo, Omsk, Tyumen and Amur oblasts, Republic of Bashkortostan, Primorski and Krasnoyarsk krais. The largest pest reproduction concentrations in Russia are formed by Siberian silk worm (average area - 22 247 sq km for the last 17 years) and most popular forest diseases are caused by butt-rot fungus (average area - 767 sq km for the last 17 years). In 1996, forest-protection actions

were fulfilled on the area of 11,817 km2, including those by biological methods - on 7,696 km2 and by chemical methods - on 4 121 sq km. The International Forest Institute, Scientific Council on Forest Problems, RAS Center of Forest Ecology and Efficiency together with Rosleskhoz (Russian Forestry Management) held the 1995 All-Russia Conference Biological Diversity of Forest Ecosystems where the presentation of the Biological Diversity of Russian Forests draft program was made. Its goal was to create science and technology grounds for complex forest use with the conservation and recovery of its biodiversity as a condition for sustainable development of the country and its regions. In 1998, within the National Biodiversity Conservation Strategy, it is supposed to prepare the sectoral strategy for the Russian forest biodiversity conservation.

2.7. **Fishery**

Fishery spreads over almost the whole territory and in all water areas of Russia though its scale and techniques differ in different regions. Marine fishing is usually carried out by large fishing companies of various ownership forms. Potential catches of fish and other sea resources in the Russian exclusive economic zone are estimated as 4.1 - 4.7 million tons. Inland sea and freshwater basins yield, respectively, 250 and 200 thousand tons. The highest fishing outputs are characteristic of the Atlantic north-east and Pacific north-west.

Principal fishing objects of Far East seas are: walleye pollock, herring, cod, sole, saury, salmon species, etc. Pollock's catches are about 2 million tons (1 million tons of which are caught in the Okhotsk Sea). In the post-depression period, the restoration of several Far East herring shoals has been observed. Its catches account for 480,000 tons in the Okhotsk Sea and 100,000 tons in the Bering Sea near Kamchatka. Cod catches are relatively stable in this region - 170 - 180,000 tons and salmon catches vary through years within 130 - 205,000 tons. Far East seas are also rich in commercial sea invertebrates: crabs, shrimps, mollusks, echinoderms. Intensive fur seal and common seal hunting is also practiced in this region.

Key commercial fishing objects in the Atlantic north-east (Barents Sea) are: cod (90,000 tons), haddock (40,000 tons), sole, etc. After capelin fishing was prohibited, its number is getting restored. Commercial fishing objects of the Baltic Sea are Baltic herring, sprat ,cod and salmon. The use of principal commercial fish reserves of these seas is under control of International Fishery Boards. Russian quotas for Baltic fishery are as follows: Baltic herring - 32,000 tons, sprat - 55,000 tons, cod - 7,000 tons , salmon - 115 tons. The Baltic herring and sprat number is currently growing and salmon populations are maintained by artificial reproduction.

Principal commercial fishing objects of the Caspian Sea are 3 sprat species 82.3 % (840,000 tons) of which is made up by anchovy-like sprat. The Russian fishing quota comprises about 94,000 tons and is almost completely used. Recent years were specific of a rise in the Caspian Sea level. This had a positive effect on the reproduction of semimigratory (carp, bream, Caspian roach, etc.) and two-waters fish. Pike perch reserves

are reducing due to the transition of its main shoal to the eastern part (Kazakhstan) of the Volga delta.

Sturgeon species fishing output of 1996 was equal to 1,296 tons in the Lower Volga and Caspian Sea and totally with other countries - 1,662 tons. Sturgeon number and reserves of the Volga go down every year. For 1996, the absolute number of sturgeon species was 24.9 millions, including sturgeon - 12.8 millions, starred sturgeon - 5.5 millions, white sturgeon - 6.6 millions. The role of this fish artificial breeding in their reserve replenishing is not high. Annually, 45 - 52 million sturgeon-like fry is introduced, yet the number of young fish, e.g. in the Caspian north, has 5 - 6 times dropped versus 1975 - 1990. The above negative changes are associated with growing poaching and renewal of marine sturgeon fishing by new Caspian states - Kazakhstan, Azerbaidzhan, etc. To compensate a low reproduction rate of Caspian sturgeon, in 1997 Russia made a decision to cease commercial fishing in the Volga. However, to solve the problem it is still necessary to stop poaching and conclude an agreement on the sturgeon conservation with Caspian states.

Commercial fishing objects for the Azov Sea are sturgeon species, khamsa, sprats, pike perch, bream, and Black-Sea roach. Modern fishing of starred sturgeon and sturgeon exists owing to artificial breeding. Natural spawning of sturgeon species is actually excluded. Fishing limit for these species have been maintained at the level of 1,500 tons (1,200 tons for sturgeon and 300 tons for starred sturgeon) for the last years. Since the end of the 80s, the Azov Sea has been featuring mass reproduction of crested dog's-tail grass - active zooplankton consumer. This resulted in the feedstock disruption for a lot of fish species thus involving their reduction in number. For example, khamsa biomass currently accounts for 65,000 tons, sprat - 150,000 tons, pike perch - 43,000 tons, Black-Sea roach - 2,000 tons. The total catch of pike perch was 24,000 tons and that of Black:-Sea roach - 2,000 tons in 1996.

During several recent years Russian inland freshwater basins have been manifesting a tendency to the reduction of valuable commercial fish reserves (sturgeon, pike perch, carp) and buildup of low-value fish. Most of water basins are specific of uncoordinated commercial fishing, use of ecologically unsafe fishing gear, absence of catch and sale registration, and intensive poaching.

The main fishing output of Russian freshwater basins (up to 60 %) falls within large rivers (26,000 tons), lakes (38,000 tons) and man-made water basins (41 - 42,000 tons).

Most intensive fishing is typical for European Russia. For instance, large man-made water basins - Rybinskooe, Kuibyshevskoe, Saratovskoe, Volgogradskoe, Tsimlyanskoe - yield annually 13,6 - 13,800 tons of fish according to official statistics. Four large lakes - Ladoga, Onega, Pskovsko-Chudskoe, and Ilmen account for 7 - 8,000 tons. Biomass of catches is mainly constituted by pike perch and bream, and in northern lakes - whitefish and smelt.

In Asian Russia, maximum fish catches are attained in the Ob - Irtysh watershed (15 - 17,000 tons, this making up about 70 % of the total river fish catch in Russia). Commercial fishing objects are whitefish species (28 %), ide (14 %), low-value species (36 %), etc. Fishing outputs of sturgeon species (Siberian sturgeon, sterlet) are small - about 50 tons. Among water basins of East Siberia, the Yenisei River and Baikal Lake have the most developed fishery. Annual fishing output of the Baikal is 30,000 - 32,000 tons (65 - 73 % - Baikal cisco). Annual fishing output of the Yenisei is 17,000 - 18,000 tons. Invertebrates (crab species) may be attributed to an independent type of marine fishing practiced in Far East seas. According to data of the Federal State Border Service that is in charge of fishing control in Russian high seas, only 10 % of the export to Japan undergoes registration («shadow» export of seafood from Russia to this country reaches 2 billion US dollars per year). Fish and sea invertebrates are exported to South Korea and other Asian countries in similar amounts.

Fishing on large rivers, lakes and man-made water basins is focused, first of all, on individual productive and accessible high-value fish shoals. For example, salmon is a special fishing object in the European north rivers. Its fishing is practiced mostly by local communities (the Pomors) residing on commercially used rivers. Most of fishing falls within the «shadow» sector. For instance, official statistics states that in the European north salmon catches dropped from 658.7 tons in 1985 to 129.6 tons in 1995. According to expert evaluations, about 45 % of this fish outputs is accounted for by poaching.

Other fishing types fall out of the commercial pool though play a significant role in the life of countryTs population. Fishing ranks first or second in economic activities of aboriginal people of the North, Siberia and Far East. It is widespread over water basins of large Siberian rivers and the Pacific coast. Both customary and modern fishing gear are in use. Siberian north is specific of individual fishing conducted by all appropriate means, including sweep nets, standing nets, etc. It is an important part of food self-supply and monetary income for local dwellers. Focusing on the most valuable and multiple species to be easily caught in large amounts is noticeable. Individual fishing can dramatically undermine the number of some fish species in places (mainly around cities and on small rivers) where salmon's upstream migrations occur.

Non-professional fishing is typical for the European Russia center and Chernozemie. Nets and sweep nets are very rare in use here. Fishing mostly plays the role of a relaxation and sport activity. Non-professional fishing catches can be estimated only roughly. For example, population of Moscow and the Moscow oblast making up about 10 % of the Russia's total accounts for 14,000 ton fish in terms of a low fish productivity specific of these water basins. Sport fishing as a factor affecting water biodiversity is not this important so far and produces only local impacts.

Currently Russian fishery is surviving hard times. Monitoring of the commercial fish status and other resources, regulation of fishery and conservation of its reserves are minimal. This results from a drastic cut-down of funding for scientific research and

efforts addressing the conservation and reproduction of commercial water organisms as well as with the absence of a sectoral biodiversity conservation strategy.

At the same time, fishery is one of those sectors which pioneered getting out of the economic crisis: the marine fishing output had dropped to 3.5 million tons by 1994 (according to official statistics), however, in 1995 it grew up to 4.2 million tons, in 1996 - to 4.5 million tons and it is predicted to be 4.65 million tons in 1997. Though it is fishery that is most vulnerable in statistics since unregistered poaching outputs are still very high. According to the Russian Federal State Border Service, annual damage imposed by poaching is presently estimated as 4 billion US dollars.

The main objective of Russian fishery today is to study its raw material stock, monitor its status and provide grounds for its management to avoid absolutely any adverse impacts on biodiversity of water basins.

2.8. Hunting

Hunting is one of key fauna-use types in Russia. Russian hunting lands occupy 15 000 thousand square km (Annex 5.1.11). Russia is the world's hunting leader in species diversity and economic value of game. About 60 mammal species and 70 bird species - professional and non-professional hunting objects live on its territory. The highest economic value is attributed to wild ungulates, brown bear and 20 species of fur animals. Commercial hunting supplies population with meat, leather and fur materials and valuable medicinal protein product.

Russian system of game animals registration ranks among the world's best. Winter route registration designed by Russian experts has been utilized across the territory of Finland since 1989. This method is currently under testing in Canada. Russian Gosokhotuchet (State Service for Game Animals Registration) under the Department for Protection and Rational Use of Hunting Resources within the Ministry of Agriculture performs annual estimation of the key game species number in individual Federation subjects and across Russia. Though financing is insufficient, land registration efforts cover a large part of the country's territory. Recent years have marked an annual growth of land registration quantity and quality. In 1997, their amounts were the highest through the whole period (44.4 thousand registration routes with the total length of 436 thousand km; Annex 5.1.31).

Aerial counts of wild ungulates are conducted within fixed periods in a number of Russian regions. Yet, recent years have been indicative of a drop in this kind of registration due to rising costs for air transport and cut-down financing. Annual air registrations of saiga are performed in Kalmykia. A wide-scale air registration of wild reindeer was accomplished in 1997 on Chukotka.

Census studies of specific animal species with the use of procedures worked out by the Russian Gosokhotuchet is carried out in many regions. Almost in all administrative

divisions of the Russian Federation there was conducted registration of wolf by the method of mapping of its habitats in 1995 - 1996.

To enforce the Russian Federation Government Edict No 1342 of November 10, 1996 «On the order of state fauna monitoring)), a list of game species, resources of which are under federal control, was extended. In 1997 the Russian Gosokhotuchet estimated the number of the Tetaonidae family species in Russia. A procedure for the estimation of waterfowl was also developed. Monitoring over age-sex structure changes of the most valuable game populations is performed.

Data of the Russian Gosokhotuchet evidences that the 1992-l 995 reduction of some valuable game took place mainly in the center and south of European Russia. For the country as a whole, the same years feature not so noticeable reduction of game animals and it did not exceed the level of the 80s by the number of species. For example, total wild ungulate manifested only a 14 % reduction - from 3,626,000 in 199 1 to 3,133,000 in 1995. For comparison, cattle livestock reduced by 36 % during the same period in Russia..

According to the State Report «On the status of the environment in the Russian Federation in 1995», the game animals decrease was caused by unfavorable climatic conditions, general drop in productivity of natural plant feedstock and drying of wetlands vital for waterfowl.

Note that the reduction of game livestock in 1992 - 1995 did not exceed the frameworks of natural deviations of their abundance. This point of view was also proved by a simultaneous reduction of many valuable game animals in Finland and other Scandinavian countries.

Two recent years have altered the situation. The total livestock of fur and wild ungulate animals has been growing across Russia. For instance, the livestock of key wild ungulates has increased by 3 % from 3 129 000 in 1996 to 3 22 1 000 in 1997 (Table 23).

The growth of the game number under the conditions of a hard socio-economic situation in Russia has a few reasons. A positive effect was produced by improving weather-climatic conditions and feedstock for game animals. In addition, anti-poaching campaign has been fostered in Russia. There were fixed 47.5 thousand cases of hunting rules violation in 1996 on the RF territory. Wolf preying has increased: 13.0 thousand animals were killed in 1996 versus ! in 1991. For the first time during past 7 years, the number of wolves has shown a tendency to decline and amounted to 42.2 thousands for March 1, 1997 versus 45.0 thousands for March 1, 1996.

Another positive role in the stabilization and growth of wild ungulate livestock was played by a strategy of severe constraints on hunting quotas for these species in the period of adverse effects from nature factors. Wild ungulate hunt outputs have been getting more stable since 1996. In the Russian Federation, during a hunting season of 1996 - 1997, outputs of elk hunts were 22.0 thousand animals, of wild reindeer - 27.3 thousands, roe

deer - 21.4 thousands, saiga - 14.5 thousands, wild boar - 9.3 thousands, red deer and axis deer - 4.8 thousands. In the coming years, commercial hunting of wild ungulates will be increasing due to a current growth of their livestock.

Changes in socio-economic conditions involving a decrease of demand for furs have caused reduction of hunting outputs for many fur-bearing game species. Nevertheless, hunting outputs for sable were one-third higher in 1996 than in 1995 and constituted 98 thousand animals. This was accompanied by a growth of the sable number.

Waterfowl are a mass hunting object. Their total hunting output is around 9.0 million birds. This corresponds to about 10 % of the whole waterfowl reserve and does not exhaust their resources.

State zakazniks has benefited much to the conservation of game resources. Their principal objective is long-term reservation and protection of habitats of especially valuable game animals in order to enrich faunas of adjacent lands. In 1997, there were 1,064 hunting zakazniks with the total area of 52 500 thou sq km in the system of the Department for Protection and Rational Use of Hunting Resources within the RF Ministry of Agriculture. Most of hunting zakazniks, especially 56 republican ones, feature a higher density of protected animals population than that in adjacent areas. Regular natural introductions of animals to adjacent areas occur in zakazniks.

Table 23 The number of key game species in the Russian Federation according to the data of Russian Gosokhotuchet (1996 - 1997)

Animal species	**Number, thousands**		**Changes in the animals number in 1997 versus 1996, %**
	1996	**1997**	
Wild boar (*Sus scrofa*)*	167.4	170.3	+1.7
Roe deer (*Capreoluss capreolus*)*	662.0	655.9	-0.9
Musk deer (*Moschuss moschiferus*) *	**153.2**	**154.0**	+0.5
Elk *(Alces alces)* *	**621.5**	**606.1**	**-2.5**
Red deer *(Cervus elephus)**	*152.2*	*152.0*	+1.2
Axis deer (C. *Nippon)**	*9.0*	*9.6*	+6.7
Reindeer (*Rangifer tarandus)*	1,169.3	1,203.0	+2.9
Saiga *(Saiga tatarica)*	*196.1*	*270.4*	+37.7
Squirrel *(Sciurus vulgaris)**	10,139.2	10,201.3	+5.5
Beaver (*Castor fiber)* *	*218.5*	*232.5*	+6.4
Otter *(Lutra lutra)* *	53/7	*53.9*	+0.4
Blue hare *(Lepus timidus)**	*4.847.9*	*4.876.0*	+0.6

European hare *(Lepus europaeus)* *	785.8	835.5	+6.3
Siberian weasel *(Mustella sibirica)**	379.2	380.4	+0.2
Corsac fox (*Vulpes corsac*)*	22.6	24.3	+7.5
Martens *(Martes sp. sp.)* *	147.0	148.6	+1.1
Fox *(Vulpes vulpes)**	420.2	453.8	+8.0
Lynx (*Felis lynx*)*	29.7	28.7	-3.4
Sable *(Martes zibellina)***	886.0	997.6	+12.6
Brown bear (Ursus arctos)***	110.1	115.4	+4.8
Wolf (Canis lupus)*	45.0	42.2	-6.2
Capercailzie *(Tetrao urogallus)**	2,311.0	2,816.1	+21.9
Hazel hen *(Bonasia bonasia)**	6,217.7	6,112.6	*-1.7*
Blackcock *(Lyrurus tetrix)**	4,254.6	4,980.3	+17.1
Roatlos *(Perdix perdix)* *	2,933.6	2,992.8	+2.0
Pheasant *(Phasianus colchicus)**	97.6	112.6	+15.4
Total ungulates	3,128.7	3.221.3	+3.0
Total fur-bearing	17.929.8	18.732.6	+4.5
Birds (*Galliformes)*	15,814.8	17,014.4	+7.6

*- the number for March 1; **- the number for October 1; ***- the number for the second quarter.

The program for ox re-acclimatization in the Far North regions is going on in Russia. Two large ox populations were formed in the Taimyr peninsula north-east and on the Vrangel island. Introductions of these animals into the wild were performed in the Yamal-Nenets Area and Sakha Republic (Yakutia) in 1996 - 1997.

Scientific support to the Russian hunting management also features a certain progress: there were accomplished research efforts in population biology, game microevolution and ecology, studied reasons for variations in the number of elk, wild boar, blue hare and other game animals, made science-grounded and corroborating forecasts for the changes in their number, developed methods for standardization of game hunting. They serve as the basis for annual recommendations in identifying quotas for game hunting.

Thus, despite all difficulties, a number of positive trends in the Russian hunting management are currently observed: livestock of most game animals is growing; regulatory-legislative base is advancing; State Hunting Supervision is being consolidated; amounts of efforts on the game registration are increasing.

These circumstances and favorable nature-climate forecasts for the coming future are creating prerequisites for expanding amounts and scope of services and increasing productivity of hunting.

Since 1994, state control over the hunting resources status and hunting management has been with the Department for Hunting within the RF Ministry of Agriculture. It accomplishes, on an annual basis, check-ups of activities of all organizations involved in the game protection and hunting management in the Russian Federation.

There are specific problems and challenges in the present-day hunting management of Russia. For instance, most of Russian hunting lands (57 %) are within the authority of hunting-management organizations and businesses which do not meet requirements of hunting land protection. They thus violate Article 40 of the Federal law «On fauna)). Only 16 % of illegal hunting cases registered in the Russian territory fall with users. Analysis on their hunting managing activities shows that a lot of them cannot provide financing of actions on their own territory (Annex 5.1.32).

Serious problems exist in the registration of large populations of wild ungulates in tundra and semidesert zones where the most credible data can be collected only by means of aviation. For instance, due to the lack of money for aircraft rent, air registration of the largest in Russia Taimyr population of reindeer consisting roughly of 600,000 animals has not been conducted since 1990.

Gosokhotnadzor (State Hunting Supervision) personnel are killed or injured by poachers every year. There were 6 of them killed in 1995 and 22 got injured in 1996. Yet, funds for state insurance of these personnel have not been so far allocated though they are provided for by the Federal law «On state protection of judges, officials, law-protecting and controlling bodies)).

A system of state hunting management has undergone changes. In compliance with the RSFSR Council of Ministers Edict No 279 of August 3, 1990, RSFSR Glavokhota was introduced into the structure of the newly formed RSFSR Ministry of Agriculture and Food. The Russian Federation Government Edict No 593 of June 23, 1993 initiated the establishment of the Department for Protection and Rational Use of Hunting Resources within this Ministry. It exercises state game resource controlling and managing functions. The Federal law «On fauna)) (Article 12) states that state control and management bodies shall not be engaged in economic activities relative to the use of hunting resources. That is why former state economic sites of the RSFSR Glavokhota were withdrawn from under the Department for Hunting. These sites have been transformed to joint stock companies and have become subordinate to Russian Federation subjects.

A lot of hunting management problems arise from absolutely insufficient funding. According to the data of the RF State Committee on Statistics, the 1996 budget of wild animal registration efforts was as low as 6 billion rubles totally across the Russian Federation, wild animal protection expenses constituted 13.5 billion rubles and those for biotechnology efforts - 14.1 billion rubles. Total budget from various funding sources covering wild animals protection, registration and reproduction costs for the whole

Russian Federation was 106.2 billion rubles in 1996. It accounts to about one-third of the 1990 budget in comparable prices.

State budget financing of hunting management bodies under the Department for Protection and Rational Use of Hunting Resources within the RF Ministry of Agriculture is evidently insufficient. Only 10 % of the needed sum was allocated for target programs focused on the game resource protection, reproduction and regulation. Funding of hunting science also experiences serious difficulties.

According to the data of the RF State Committee on Statistics, hunting management regular staff consists of 27,409 people for the end of 1996. If compared with 1990, it was much more and equal to 47,479 (Annex 5.1.11-5.1.12).

Game animals are mobile, they are specific of season migrations and populate new areas in a very fast manner. To provide science-grounded management, it is necessary to collect simultaneously registration data from vast areas using unified procedures. This is one of the proofs for functioning of a centralized game resource monitoring system - State Registration Service for Russian Game Resources. It enables to recruit high-qualification specialists for quality evaluation and further processing of initial materials and receive rapidly data on the game resource status from all over Russia. In addition, individual efforts on the evaluation of animal number (e.g. calculation of conversion factors for the winter route registration) can be accomplished only on the centralized basis. Availability of unified data from neighboring regions facilitates registration quality control and allows to evaluate the status of game populations even though their populations may have habitats on territories of several Federation subjects.

The migration mobility of game animals and structure of their populations govern a necessity of a step-by-step transition to management of specific populations. Since populations often dwell within several Federation subjects, priority in control over their status and rational use is placed on federal hunting management bodies. The Taimyr population of wild reindeer (about 600,000 animals) may be taken as an example: In summer it lives in the Taimyr Autonomous Area and in winter - in Evenkia. To guarantee rational use of this population and meet interests of both Taimyr and Evenki Autonomous Areas, federal bodies are responsible for fixing science-substantiated quotas for wild reindeer hunting.

In compliance with the CBD ratified by Russia, it is necessary to give up a practice of making arbitrary changes in the age-sex structure of game populations and to improve methods of their hunting to conserve natural parameters of populations. The Federal law «On fauna)) provides for the payment for their use among other key principles of state control in the field of fauna objects' protection and sustainable use. It is reasonable to extend a list of hunting permits which require payment. This will bring an extra inflow to Federal and regional budgets and additional funds to the efforts on game resource protection, registration and reproduction.

Top-priority actions aimed at the development of hunting are detailed in the draft Federal Target Program «Protection, Monitoring and Rational Use of Russian Hunting Resources)). It focuses on the following key areas:

1. Improvement of the game protection. Expansion of a hunting zakazniks' network. Protection of game environment.
2. Keeping state registration, cadaster and monitoring of game animals using unified procedures across the country. Development of the RF Gosokhotuchet. Generation of all-Russia regular registration routes. Designing and application of geoinformational technologies for the resource status evaluation.
3. Rational use of game resources. Transition to a non-exhausting use of specific game populations. Implementation of resource-saving methods for game hunting.
4. Improvement of conditions for game species reproduction. Implementation of programs for settling game animals and birds. Control over the wolf population number.
5. Scientific support to hunting management. Development of a general theory for game number dynamics as a necessary basis for upgrading protection methods and rational use of their resources. Research on migrations of game animals, structure of their populations and their artificial breeding. Analysis of consequences from changes in game habitual environment. Investigations in the field of hunting management economics.

Approval and implementation of the Federal Target Program ((Protection, Monitoring and Rational Use of Russian Hunting Resources)) will assist in improving management of Russian Federation hunting.

An issue, very important for hunting regions, is the use of so called «misty traps)). In these regions, customary hunt was conducted by quite «humanistic» methods - falling down log-traps killed an animal almost instantly. In the 30s, when a system of dividing hunting lands into sections fixed with a family-hunters, large catching devices were getting replaced by metal traps. A fast requirement of hunters with new traps is hardly possible under crisis conditions. To return to customary traps, it is necessary to revive a system of long-term hunting land use by individual hunters, including aboriginal families for whorn hunting is the key form of economy.

2.9. **Customary nature use**

Picking up mushrooms and berries is among favorite recreation activities of many Russian urban and rural residents as well as a long-history tradition. In rural areas (especially forest ones), forest harvesting is an important feature of economy and part of a yearly work cycle. Both individuals and harvesting agencies harvest several kinds of berries, nuts (including *Pinus sibirica),* wild onion species (*Allium sp.sp.),* bracken (*Pteridium aquilinum*) and a lot of herbs and plant raw material usable in medicine.

Official statistics on forest harvesting outputs is actually lacking. The data available for the Moscow oblast show that, e.g. in 1987, 170 000 tons of mushrooms and about 25,000 tons of berries were harvested there. As the population is very high in this area (about

15.3 million), the oblast is specific of particularly high harvesting outputs though they may give an idea of forest harvesting scales in Russia.

The Russian Federation population features a lot of national and confessional varieties representing a broad scope of cultural traditions that govern specifics of their attitude toward nature (Annex 5.1.13-5.1.14). Note that the Russians having settled all over the territory of modem Russia took up readily ways of life inherent to indigenous communities. Annex 5.1.14 demonstrates distribution of population pools with various types of economic culture concerning biological resource use. Figures placed in the maps mark nationalities or detached communities described in this section. Total population comprising all pools of small nationalities is over 1,646.500. From among them, 797,700 reside in towns and 849,200 - in rural areas. Most of them live in rural areas of the Khabarovsk and Primorski krais, Sakhalin and Murmansk oblasts, Yamal-Nenets and Khanty-Mansi Autonomous Areas. 283 thou sq km of Russian lands belong to community-tribal homesteads with 17 1 thou sq km being their deer pastures and forests.

Far-range deer breeding of the tundra is specific of Nenets communities (1) and a part of Komi-Zyryans (20 in the European and West Siberian north and of a majority of Chuckhees (3) on Chukotka. Close to them are northern communities of Yakuts (4), Koryaks (5), Kereks (6) and Saams (7) though they are less mobile. Far-range deer breeding got in practice with Russian aboriginal people only in the 18th century. Its characteristic feature is wide-range season migrations around the tundra-northern taiga interface.

Obviously, the most part of the modem tundra south (particularly on the Yamal peninsula) has become woodless as a result of deer breeders' cutting out larch on the northern taiga boundary. Yet, they are extremely cautious with fire that often destroys valuable deer grazings. They are also active in chasing and killing wild reindeer and wolves by all appropriate means and carry out regular shooting of some predatory birds without breaking their nests, Aboriginal hunters practice hunting of all kinds of game, including those falling out of the hunting pool: snowy owl (*Nyctea scandica)* and rough-legged buzzard (*Buteo lagopus*). Reindeer hunters' children constantly destroy birds' nests. Multiple sledge- and gun-dogs also present a negative factor.

Far-range deer breeding is responsible for a lower number of geese in the West Siberian north if compared with Taimyr where deer breeding is underdeveloped. Density of reindeer breeders' population is not high and therefore a cautious attitude to grazings outweighs adverse impact on tundra biodiversity.

Sea animal hunting is specific of Eskimos (8), coast Chuckchees (9) and Aleuts of the Commander Islands (10). These indigenous communities have a long history of sea animal hunting though the outputs are not high and they do not dramatically affect biodiversity. The main land adverse impact factor is widely used sledge-dogs. In the European north, sea animal hunting used to be characteristic of Pomors (11) -

representatives of Russian communities in the region. Though now they have re-focused on fishing.

Deer hunt characterizes economic activities of Iganasans (12) and Entses (13) in Taimyr tundras, Evenks (14) and Evens (15) in Middle and East Siberia and Far East, part of Khanty (16) and Mansi (17) in West Siberian taiga, and some other native population pools of Siberia (Selkups 18, Dolgans - 19, Tofalars - 20) and Far East (Yukagirs - 21, Negidaltses - 22, Oroks - 23, Chuvantses - 24). This is ancient culture preserved from Neolithic times. It is specific of a prudent attitude towards both lands and game. A customary dependence of Khanty and MansiTs life on the deer forces them to burn out areas for renewal of lichen grazings (once in 30 years on the West Siberian Lowlands south and once in 50 years - in its north). This practice does not exist eastward from the Yenisei (Annex 5.1.14).

Fishing is practiced by low-population aboriginal communities and population pools: part of Khanty (16) in West Siberia, Chulymtses (25), Kets (26) on the Yenisei, some small native communities dwelling on the Amur (Ulches - 27), in Sikhote-Alin (Udegeis - 28), on Kamchatka (Itelmens - 29 and Kamchadals - 30) and Sakhalin (Nivkhs - 31). Isolated groups of Russian communities also specialize in fishing - Lena (32) and Ob (33) old-timers, Indigirka dwellers (34) and Ust-Yenisei selduks (35). As their residential areas are local and specialization is narrow, their influence on biodiversity is minor.

Northern local nature use-based economy is indicative of Russian communities formed in the course of Siberia assimilation. It is specific of Pomors, including Kanin (36) and Mezen (37) groups, Chaldons , Kolymchans (38), Markovs (39) and many other isolated communities of old-believers living in taiga. Their transport mainly consist of boats and snow-going vehicles, and in the Siberia south - horses. They live on commercial hunting combined with season fishing and lumber harvesting. Their household is based on cattle breeding and vegetable growing. The same type may be attributed to Teleuts (40) and Oroches (41). Their impact on biodiversity is similar to that of deer hunters.

Cattle breeding of alass plains in taiga is characteristic of the Yakuts (42) and it has been developing since the 1 lth century. Its distinctive feature is adaptability to the alass landscape and use of horses adapted to these conditions. The Yakuts widely use meadows for hay making and grazings. To form them, they often drain off lakes under which permafrost is laid deeper than in the surrounding landscape.

Far-range cattle breeding of plain steppes is practiced by some rather low-in-number native people of Cis-Caucasus, Kalmyks, Nogaitses, Bashkirs, Kazakhs, Bouryats, and Khakases. Their culture is based on the craft of managing herds' movement as natural feeding lands get exhausted. During socialism, opportunities and culture of grazing transitional use depending on the moisture level and grass density of a steppe section were limited. This resulted from land being fixed with collective farms, artificially high cattle livestock and allotment of a part of customary grazings to industrial sites, irrigation and cultivation.

Steppe cattle breeders are active hunters, though the Bouryats and Kalmyks having adopted Buddhism became less engaged in hunting. Hunting periods are normally not observed in places located far from settlements as, living on a meat-milk ration, local residents avoid excessive slaughter of cattle. They burn out dry reed debris to restore soft grass and open paths to the water. They keep up traditions of customary protection of some birds (ruddy sheldrake *Tadorna ferruginea*) and cults of holly areas (usually in interfluve areas). 105 countries.
Mountain cattle breeding is a normal practice with actually all nationalities of the North Caucasus and in Siberia - with the Shortses (43), Altai and Tuva dwellers. The Tuvintses-Todjintses (44) form a transitional type to deer hunters. Mountain breeders of the West and Middle Caucasus do not perform far-range cattle driving and store feedstock for winter. In Siberia and East Caucasus, cattle breeders practice vertical migrations betwee-n summer and winter grazings. They are less active in hunting than plain cattle breeders as, changing grazing, they are less keen on local nature specifics. The Caucasian communities keep up customs of protecting predatory birds - owls, eagles, and peregrines. Siberian cattle breeders have a negative look at forest and replace it by pastures.

Mountain land cultivation of the East Caucasus is characteristic of man-made slope terracing. Western regions are typical for small plots on slopes used for gardens. Mountain farmers have the same traditions in relation to nature as mountain cattle breeders. This is expressed in the customary conservation of all water sources.

Land cultivation combined with forest harvesting is typical for Russian peasants of forest regions and Finno-Ugric people - Izhors (48), Vodyas (46), Vepses (47) and multiple Karels (48) and Main Volga nationalities. This type of nature use is specific of a great role of hunt and lumber harvesting in the life of rural population. Finno-Ugric people, to a higher extent that the Russians, have preserved pagan customs in conserving holly sites - natural cult reserves. The Caucasian Ossetins have a similar type of economic activities and nature protection traditions. Most of Russian taiga peasants have a similar way of life - land cultivation in summer, hunting in winter, though cult reserves are rare.

The key type of customary economy for Russian rural population - plowed farming - is not discussed in the present report.

2.10. **Key** elements of economic policy

Management of the biodiversity status can be performed both within targeted environmental actions and by optimization of socio-economic development areas, conditions for which either benefit or hamper circulation of economic activity forms producing a direct impact on living nature objects. A condition for the implementation of this biodiversity conservation strategy is analysis on the interaction of living nature with macroeconomics and social processes. On the macroeconomics level, such research was accomplished by a team of Russian experts consisting of economists and ecologists. A

generalized view on the findings of the expert evaluation for biodiversity object status changes in various areas of socio-economic development is given in a special ((policy-biodiversity)) matrix on the color inset (Annex 5.1.15).

Current economic situation in Russia impedes the implementation of the biodiversity conservation-focused policy. In the recent years, the Government has adopted a number of acts directly addressing this problem (Annex 5.1 .15). At the same time, their implementation lacks appropriate funding.

Key features of the state policy in the biodiversity conservation will be governed, for many years ahead, by provisions of future Land and Taxation Codes. The Land Code will fix environmental constraints on the land plots' turnover. The Taxation Code is to identify level and statute of the environmental tax inflow. The highest prospects in the living nature conservation are associated with a consecutive growth of the role of direct rent-pool taxation up to values exceeding 30 - 35 % of the tax base.

2.11. Fulfillment of International Biological Diversity Conservation Obligations by Russia

In compliance with the Presidential Decree «On the Russian Federation state strategy for environmental protection and sustainable development)) of February 1994 No 236, biological diversity conservation has become a key area in Russia's actions aimed at the progress of international cooperation in conservation, protection and restoration of global ecosystems.

The Russian Federation federal law On international treaties of the Russian Federation emphasizes that international treaties of the Russian Federation along with globally recognized principles and norms of international law are an integral part of its legal system in concord with the Russian Federation Constitution. According to the law, under the above treaties are supposed their various types and names - a treaty, a convention, a protocol, etc. and different levels of action - inter-state (with foreign states and international organizations), cross-sectoral (on behalf of the Russian Federation Government) and cross-sectoral (on behalf of federal executive power bodies).

Russia participates in several dozens of treaties on biological diversity conservation and sustainable use. Their larger part covers water biological resources and concerns specific issues regulating fishery and sea law. Since it is not feasible to discuss all of them in full scope, below are given only those that envelop a wide range of objects under regulation and pertain to inter-state and inter-governmental treaties. Data on the international cooperation in protected area issues, particularly on the Convention Concerning the Protection of the World Cultural and Natural Heritage, are presented in the other section.

Convention on Biological Diversity. Russia ratified the Convention in February 1995, thus actually manifesting the continuation and intensification of its existing activities in biodiversity conservation and sustainable use.

In full understanding of a cross-sectoral and changeable character of the issue of compliance with obligations under the Convention, on July 1, 1995, the Russian Federation Government issued a special resolution to establish the Cross-Sector-al Commission for Biological Diversity Conservation. The Commission consists of deputy ministers (top managers) of concerned federal executive power bodies and representatives of the Russian Academy of Sciences. Thus the management system has been created as the first step in this work. The key issue of the Convention - generation of national biodiversity strategy - should come next. The Commission held a number of meetings where other top-priority measures to facilitate the fulfillment of the Convention obligations by ministries and sectoral management bodies were discussed.

To fulfill the Convention, in Europe was developed and approved the Pan-European Landscape and Biological Diversity Strategy and the action plan for its implementation. Scope of the Strategy includes the overall territory of Russia.

Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar). The USSR joined the Convention in 1975. After the USSR breakdown, only three wetlands with the Ramsar status has remained in Russia. The Russian Federation Government Act of 1994 has expanded the List of wetlands of international importance. Now there are 35 wetlands of this kind, including the 3 identified earlier, and they are located in 21 Russian Federation subjects. Yet, in terms of the vast territory of Russia, the approved list is far from being complete.

A large amount of efforts is being carried out on the Ramsar wetlands such as, necessary descriptions of the wetlands and cartographic materials, organization of research and its conducting, and monitoring. Individual statutes on each wetland are planned to be prepared. Finally, as provided for by the Convention, a management plan will be developed for each wetland. The final phase of this work is of particular significance since the status of wetlands of international importance, once declared, does not bring changes to traditional land-use in this area and the wetlands should not be necessarily managed under a zapovednik or zakaznik. Therefore the management plan is to become a system of long-term actions addressed to the wetlands conservation.

Convention on International Trade in Endangered Species of Fauna and Flora. Russia, being a legal successor of the USSR, has been a Party of the Convention since 1976. In 1994 the Russian Federation Government adopted a special resolution to confirm that in Russia CITES administrative body functions would stay with the Ministry on Environmental Protection and Natural Resources (currently the Russian Federation Committee on Environmental Protection (RF SCEP)). RF SCEP in cooperation with other stakeholders from among federal executive power bodies prepared a draft project of the Rules for Import and Export of CITES Specimens. A joint-action plan for federal authorities (environmental, customs, law enforcement, quarantine and communication agencies) to take internal measures targeted at enhancing control over preying, trade and customs clearing of CITES specimens was elaborated. Similar plans were generated in

many Russian Federation subjects. Russia revised clauses to the CITES lists-annexes made by the **USSR.** Most of them were canceled, this being important for Russia's full-fledged participation in the Convention and protection of these species. Efficiency of the internal regulatory legal base with regard to fauna and flora species recorded in the Russian Federation Red Data Book is increasing. (The Russian Federation Government adopted three acts concerning these issues.) Since 1994 there have been introduced taxes for calculating sums of penalties for damage inflicted by illegal preying and destruction of fauna and flora and water biological resources. Note that Russia serves as a CITES permits' distributor for the CIS countries until they decide on joining the Convention. Special international workshops were held for this purpose. To lend efficient assistance to customs and quarantine agencies in control over CITES objects' import and export, a reference book Guidelines for CITES specimens was translated into Russian with financial support of Germany.

Joint efforts of RF SCEP, law enforcement, customs and quarantine agencies allowed to thwart a numerous attempts of illegal importing of rare and exotic animals from South East Asia, Africa and South America for their sale on the territory of Russia (Table 24).

Table 24

A number of attempts were also foiled to export rare animals, biological raw materials and their derivatives from the RF territory.

Animal pools	**Number of specimens confiscated at the customs' of** Moscow **international airports in the periods:**		
	18.11.95 - 31.12.96	**01.01.97 - 15.10.97**	**Total**
Pal-rots	**432**	**464**	**896**
Monkeys	**20**	**132**	**152**
Lemuroids	**49**	**28**	**77**
Reptilians	**4,721**	**8,957**	**13,578**
Other pools of animals	-	46	46

Currently a large scientific and organizational effort has been initiated to consolidate control over fishing and export of sturgeon-like fish and their products as a follow-up to the introduction of sturgeon species into CITES Annex II.

UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage. The USSR joined the Convention in 1988, and in 1990 first cultural heritage objects were nominated, namely, Moscow Kremlin and Red Square, historical center of St. Petersburg with palace-and-park ensembles of its vicinity, Pogost Kizhi and later - Solovki monastery, ancient town Suzdal and cultural monuments of Vladimir oblast, and Troitsko-Sergiev lavra (Russian Orthodox Church center) in Sergiev-Posad (Moscow oblast).

In 1995, the UNESCO introduced 32 thousand km2 of the Komi Republic virgin taiga, including the Pechoro-Ilychsky zapovednik and national park Yugyd Va, into the World Heritage List. It was the first natural heritage nomination in Russia and convention's pioneering in the field of wild nature conservation. This action rescued the old-age forest from cutting out and stopped a gold-extraction project in the national park Yugyd Va. Swiss Government allocated several millions of Swiss francs for this area protection and tourism advance.

Another 2 natural objects of Russia entered the UNESCO List in 1996. The first is Baikal Lake. It incorporates: 1. the Lake Baikal water area with Olkhon Island and smaller islands (about 3 1,500 km2); 2. natural environment of the Baikal (shore protective zone:) 70 - 80-km wide that comprises small watersheds - little-changed mountain and taiga landscapes of ridges Barguzinsky, Primorsky, and Khamar-Daban along with the large delta of Selenga river; this zone also houses known protected areas - zapovedniks Barguzin (3,740 km2), Baikal (1,650 km2) and Baikal-Lena (6,590 km2), national parks Pribaikalsky (Baikal Region) (4,180 km2) and Zabaikalsky (Transbaikalia) (2,460 km2), and zakazniks Frolokhinsky and Kabansky; 3. individual especially valuable natural sections located far from the lake shore though being very important for Baikal Region biodiversity conservation.

The determination of dimensions and configuration of the Baikal section as a world natural heritage object was based on the approach providing conservation of the watershed that supplies the lake with clean water inflow. Conservation of mountain watersheds will enable to restore a regime and quality of small river flows. However, there still exists a danger of the lake ecosystem's degradation and recreation quality loss due to the effect of remaining industrial objects and polluted waters of the Selenga and Barguzin rivers.

The second new Russian object of World Natural Heritage is Volcanoes of Kamchatka (over 30 000 sq km). It has a cluster structure and unites valuable ecological parts of the Kamchatka peninsula. The most well-known of them is Kronotsky zapovednik (11 420 sq km) situated on the eastern coast of the peninsula. Here mountain-tundra and mountain-forest landscapes with *Pinus pumila* debris, *Betula ermandi* forests and a coastal belt with seal habitats have been conserved for more than 60 years. The zapovednik houses a unique geological monument Valley of Geysers with a picturesque chain of extinct volcanoes, waterfalls, geysers, and thermal springs. In addition, the nomination Volcanoes of Kamchatka incorporates 3 national parks established in 1995 - Yuzhno-Kamchatsky (South Kamchatka) (8 600 sq km), Bystrinsky (14 000 sq km) and Nalychevsky (2 650 sq km). The acquisition of the international status allowed to prevent expansion of forest cutting and gold extraction in unique landscapes of the peninsula.

The Altai mountains and Karelia forests and lakes are considered promising for broadening the World Natural and Cultural Heritage network on the Russian territory.

A brief overview of Russia's participation in only four Conventions demonstrates a large area of country's activities for nature protection on both national and international levels. Nevertheless, the above brief overview does not cover an overall scope of actions in this field and should be looked at as an example. For instance, a number of important biodiversity conservation issues has been solved in the course of fulfilling obligations under the Convention on Whaling which the former USSR joined in 1946. Advances i:n international relations of Russia concerning biodiversity conservation are associated with its becoming a Party to the Bern Convention (Convention on the Conservation of European Wildlife and Natural Habitats) and Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals). The former suggests that each Convention Party would undertake measures to generate national policy targeted at the conservation of wild flora and fauna and their habitats focusing its attention on vulnerable species, first of all, endemic and threatened ones. The Bonn Convention pertains to the conservation of migratory species with the unfavorable viability status. On the face of it, there are no obstacles for Russia to ratify the above Conventions along with those mentioned before,

However, regional distinctions of countries should be taken into consideration. European Union countries have comparatively few wild nature locations and the status of a whole range of species, which are common or even abundant in Russia, is unfavorable. We should also mention distinctions in the status of fishery and hunting structure and management. They are often incompatible and it is not feasible to apply the same standards to judge what is better or worse as there is a historically established system of management and its breakage may not be justified from a socio-economic standpoint. Anyhow, it does not mean that Russia should not endeavor to participate in these Conventions though it seems an issue of the future for the country with transient economy.

International obligations of Russia, especially those envisaged by the Convention Concerning the Protection of World Cultural and Natural Heritage, are dicussed in Section 1.3.3.

From a standpoint of raising international cooperation efficiency in biodiversity conservation, it seems urgent that Russia should join both the Bern Convention (Convention on the Conservation of European Wildlife and Natural Habitats) and Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals). A burning character of Russia signing the Bern Convention is also dictated by its membership in the European Council and participation in the Pan-European Landscape and Biological Diversity Strategy (the Convention is a baseline mechanism of the Strategy).

The Bonn Convention is specific of a framework character and it provides for the conclusion of independent agreements on the conservation and restricted use of individual animal populations, species and pools. Besides, a country may participate in the agreements without being a Party to the Convention. At present Russia is involved

only in the Memorandum on Mutual Understanding Concerning Measures on the Conservation of the Crane (*Grus leucogeranus*).

Russia is seeking to participate in these Conventions and Agreements under the Bonn Convention although it is challengeable for the country with transient economy. Above all, each Convention or Agreement suggests that its Party should increase sharply financial costs for biodiversity conservation. This relates not only to fees (once they are provided for by a Convention or Agreement) but also to internal funding associated witlh biodiversity conservation, management of biological resources use and conservation, and changes in the regulatory and legislative base.

Among the other active agreements signed by Russia, we should point out the Agreement on the Protection of the Polar Bear and bilateral Agreements on the Protection of Migratory Birds and their Habitats concluded with Korea, Korean people's Democratic Republic, India, Japan, and the USA. These Agreements have a framework character and do not involve large financial costs. Yet, this does not affect their efficiency as they facilitate the coordination of different countries' actions aimed at protection and management of common animal species. Moreover, bilateral Agreements on the Protection of Migratory Birds and their Habitats may be considered as alternatives to the Bonn Convention and more appropriate for the countries lacking large financial resources or for those not having joined it for some other reasons.

Russia is a Party to the International Convention on the Control over Whaling. The grounds for it has become the Russian Federation Government Act of 11.12.1992 No 967 On participation of the Russian Federation in the International Convention on the Control over Whaling which provided for the appointment of a commissioner from an environmental agency and confirmed prohibition of industrial whaling.

Active cooperation of countries within the CIS has been currently initiated. It is carried out primarily through the Inter-State Environment Council (IEC). In line with the IEC's decision, two agreements are open for signing - on the protection of migratory birds and their habitats and on the CIS Red Data Book. Russia is a Party to the above agreements.

We should also note bilateral partnership in biodiversity issues with the Netherlands, the USA, Canada, Denmark, Germany, Finland, Norway, Poland, China, etc.

Among multiple international governmental organizations-partners of Russia in biological diversity conservation there are UN Environment Program (UNEP), United Nations Educational, Scientific and Cultural Organization (UNESCO), European Council, UN European Economy Commission (UN EEC), etc.

Cooperation with international non-governmental organizations engaged in various biodiversity conservation issues is no less important for Russia. It is involved in joint efforts with NGOs such as, World Conservation Union (IUCN), World Wide Fund for Nature (WWF), and NGOs addressing specific areas, for example International Wetlands

Organization, TRAFFIC, and Tiger Trust. The above organizations are assisting Russia in the implementation of a whole range of projects on its territory, in particular for European Russia forests, wetland inventory, protection of *Haliaeetus pelagicus, Bison bonasus, Panthera tigris,* and others.

Activities under the Program for the Conservation of Arctic Flora and Fauna (CAFF) can illustrate Russia's share in the implementation of international programs. It is one of the four programs within the Arctic Region Environmental Protection Strategy ratified by Canada, Denmark, Greenland, Finland, Iceland, Norway, Russia, Sweden and the United States of America. CAFF work plans comprise preparation of actions on the conservation of species and habitats and use of indigenous people expertise for this purpose. Russia is the program's focal point in the development of a science-based circumpolar network of protected areas and flora conservation. The program assists in keeping high efficiency of research efforts, information exchange, environmental performance management and rational use of Arctic resources.

3. Economic and financial mechanisms of biodiversity conservation

3.1. Economic evaluation of biological diversity

Presently the development of biodiversity conservation economics is at its beginning both in the world and in Russia. In this connection, materials prepared in Russia within the inception phase of the GEF grant Biological Diversity Conservation in Russia (1994 - 1995) are worth attention. A number of economic recommendations on biodiversity conservation was elaborated in the course of the unfinished experimental effort for 12 pilot protected areas carried out by RF SCEP and its regional agencies in 1993 - 1995.

Transient nature of Russian economy aggravates dramatically the issue of biodiversity conservation along with the ecological situation as a whole. The economy has already lost its centralized planned character though has not acquired the market status. This lends uniqueness and extra challenges to the current situation in Russia when the use of world-wide accepted economic practices, mechanisms and tools is dramatically hampered. Russian transient economy reflects clearly negative consequences for biodiversity resulting from inefficient state management under the process of market formation, including the following: - understated cost for biological resources; - uncertainty in the rights of land and resources property; - underestimation of external factors; - open access to biological resources for all population pools; - lack of clear understanding of biodiversity as public benefit, etc.

Russian priority areas in the development of biodiversity conservation economics are the following: - economic evaluation of biodiversity and biological resources; - analysis of key economic reasons for biodiversity reduction; - macroeconomics policy, evaluation of the effect of current economic reforms on biodiversity conservation; - economic mechanism of incentives for biodiversity conservation (payments for environment pollution, taxation, environmental funds, environmental insurance, etc.); - evaluation of biodiversity conservation investment efficiency, investment criteria; - correlation and economic evaluation of development options for areas in terms of biodiversity value. All the above priority areas are underdeveloped in Russia. Among them, a top-priority issue is designing and testing of biodiversity economic evaluation methods. Currently determination of biodiversity value is facing problems due to deficient data on quality, quantity and diversity of biological resources. Adequate data on benefits from biodiversity conservation, goods and services based on it have been also unavailable so far. Of special note is the lack of the land market in Russia which is a key natural resource.

A concept of total economic value (cost) seems promising for determining biodiversity value. Along with direct use, indirect use and option values, it enables to estimate rather finc aesthetic and ethic values as well as non-use cost. The latter is especially important for biodiversity evaluation. Table 25 lists basic components of biodiversity total economic value.

Table 25 Total economic value (cost) of biodiversity

Categories	Direct use cost		Indirect use cost	Option cost (potential value)	Non-use cost (social value)
	Extraction types of use	Non-extraction types of use			
General	Livelihood and commercial use, medicines, recreation sites, habitats	Recreation, education, research, transport	Substance cycles, climate control, watershed conservation, sanitary function	Potential direct and indirect types of use	Ethics, culture, heritage, national property
Ecosystems (e.g. wetlands)	Fuel, water biological resources, agrosystems	Ornithological observations, aquatic sports, non-professional fishing	Anti-flood actions, bank consolidation, bird wintering sites conservation, etc.	Potential goods and services	Migratory species observation, conservation through limited access
Species (e.g. tree species)	Timber, fuel, fruit, fodder, medicines, building materials, technical raw materials	Breeding, research in pharmaceutics, chemistry and biochemistry	Carbon accumulation, nitrogen retain, anti-erosion actions, animal habitats	Renewable forest resources and services in future	Conservation of forests as recreation sites, for ritual purposes, etc.
Genetic diversity (e.g. cultivated plant sorts)	Foodstuffs	Plant breeding	Evolution value	Prospects in plant breeding	Genofund conservation

It is also necessary to develop more feasible approaches to biodiversity economic evaluation, particularly those on the basis of expenses (replacement cost approach, etc.), rent and opportunity cost. These approaches are widely employed in world practice.

In Russia there are examples of biological resources evaluation based on the above approaches with the use of the following methods:

- total economic value (cost) of biodiversity (Pereslavl state natural and historical national park, biological resources of Moscow oblast, the Chikoi river watershed in Chita oblast, forest resources of Vologda oblast). Table 26 contains the figures of total economic cost calculated for Moscow oblast biological resources; - biodiversity restoration costs (rare animal species, hunting animals of Moscow oblast, national parks). Table 3 gives costs for hunting animal population restoration; - expense approach (protected areas, rare

animal species); - evaluation based on damage to biodiversity (Siberian fauna in the vicinity of building grounds of Katun and Turukhansk hydroelectric power plants, Surgut oil-refining complex); - rent approach (Caucasian zapovedniks, hunting forests of Moscow oblast).

Table 26 Total economic value (cost) of Moscow oblast biological resources (Biodiversity Economics, 1995)

Category	**Type of resource**	**Economic value (cost), US dollars**
Direct use cost	Sustainable hunting products Sustainable fishing products Forest products (berries, mushrooms, nuts)	234,000,000
Indirect use cost	E.g. remedial recreation effect	114,700,000
Livelihood cost	Loss of revenue in case recreation is chosen	173,400,000
Total		about 500,000,000

Of special note are efforts on indirect use cost-based evaluation of biological resources within the concept of total economic value. Determination of this cost is challengeable not only for Russia but also for the world community. Three results are identifiable: indirect use cost evaluation through CO2 and water controlling functions (Pereslavl national park), through CO2 and carbon credit (Vologda oblast) and through remedial recreation effect (Moscow oblast).

Advances in the efforts on determination of indirect forest-use cost through CO2 and carbon credit may be important for Russia. The efforts are planned within the implementation of the World Bank (WBRD) Framework Program in the forest sector (Forest Loan) having started since mid-1997. The Program provides for the implementation of Framework Principles of Wood Harvesting and Working which could assist Russia in fulfilling international obligations under the Convention on Biological Diversity and the UN Framework Convention on Climate Change. Russia possesses 22 % of global forest resources and 15 % of global carbon sink. The implementation of th.e above international conventions would allow this country to link up to an international transfer mechanism of mutual allowances in carbon balance. Functioning of this mechanism is hampered without determination of indirect use cost and evaluation of carbon credit.

Table 27 Cost of hunting animal population restoration in Moscow oblast

Hunting animal species	**Number, thousands specimens**	**Value factor**	**Restoration cost, US dollars**
Otter	**0.4**	.9	**135,000**

Squirrel	270	0.07	8578,000
Marten	4.5	1.42	998,400
Beaver	1.9	2.0	675,000
Ermine	12.5	0.25	488,300
Lynx	0.04	3.35	488,300
Blue hare	295.5	0.12	5,540,600
European hare	47.9	0.16	1,197,900
Fox	12.6	1.08	425,200
Mink	2.9	1.0	453,100
Wolf	0.2	0.7	675,000
Raccoon-dog	2.9	1.78	978,800
Pole cat	3.1	0.5	242,200
Muskrat	14.4	0.11	247,500
Mole	2,246	0.007	2,538,000
Elk	13.5	1.0	7,031,000
Wild boar	23	0.27	3,234,400
Roe deer	3.7	0.7	134,900
Capercailzie	6.5	1.05	71,000
Blackcock	41.9	0.48	209,500
Hazel grouse	81.3	0.24	203,100
Marsh and field fowl game	60.9	0.2	14,400
Goose	2.0	1.0	20,800
Duck	339.5	0.6	2,121,900
Woodcock	21.4	0.12	26,800
Dove	42.1	0.2	87700
Total	34,35 1,700		

An important phase in economic evaluation of biodiversity in Russia is the work on registration and socio-economic assessment of biological resources coordinated by the Department of Economy and Finances under the RF Ministry of Natural Resources. This research effort was carried out by specialists of ministries and sectoral agencies, scientific research institutions and, specifically, Harvard Institute for International Development in compliance with the RF Government Act (1993) on conducting the experiment on registration improvement and socio-economic evaluation of natural resources basing on preparation of complex cadasters of natural resources to be used as grounds for management decision-making (Registration and Socio-Economic Evaluation of Natural Resources. Collected Analytical and Regulatory-Methodical Materials. RF Ministry of Natural Resources, Department of Economy and Finances. M.:SEMC, RF Ministry of Nature, 1996).

Economic evaluation of biodiversity in Russia is necessary for solving a lot of significant problems such as:

- making efficient economic decisions;
- identifying priorities for investments to protected areas;
- adequate definition of priority economic indicators for country's development.

To make an economic decision it is necessary to determine economic efficiency and compare costs and benefits. Once biodiversity value is lacking or understated, benefits from biodiversity conservation become apriori underestimated. As a result, if the options are compared, the option that takes into account true biodiversity losses is inferior to traditional decisions which can yield readily assessable benefits. Under Russian conditions, this tendency is vividly seen in decision making practice in favor of the fuel and energy complex as well as forestry and agrarian sectors.

Biodiversity evaluation is important for determining efficiency of investments to protected areas due to the following reasons: it is a compulsory step of project review, a basis for distributing limited material resources, a criterion for ranking biodiversity conservation-focused investment efforts, and a critical condition for receiving funding.

A considerable problem lies with the choice of the state economic policy based on standard economic indicators such as, gross internal product (GIP), gross national product (GNP), etc. As environment degradation and biodiversity reduction do not affect these indicators and therefore do not cause their decrease, the state is free to pursue anti-sustainable policy. This problem is especially pressing for Russia owing to a great environmental and biodiversity damage along with depletion of natural resources caused by multiple accidents, wear and tear of equipment and labor-consuming technologies. For example, about 35,000 accidents per year happen on oil pipelines. Depreciation of equipment, including cleaning facilities, achieves 80 - 90 % in basic industries and transport. Continuing operation of such equipment leads to a drastic increase of accidents and ecological disasters. Hence, here is also needed adequate evaluation of biodiversity to be included into national green accounting.

Russian biodiversity depletion is affected by a number of factors that pertain to different spheres, levels and have different scales of impact:

- macroeconomics policy as a whole leading to the extensive use of natural resources;
- unbalanced investment policy resulting in disproportion between resource-operating, processing (reprocessing) and infrastructural sectors;
- inefficient sectoral policy (fuel and energy complex, agriculture, forestry);
- inadequate legislation;
- uncertain rights of property on natural resources;
- lack of ecologically balanced long-term strategy and incomplete evaluation of sustainable development potentialities;
- underestimation of biodiversity conservation economic value;
- on regional and local levels - underestimation of biodiversity conservation indirect effect (both economic and social) and global benefits;

- economic crisis and unsustainable economy impede implementation of long-term projects, including those targeted at biodiversity conservation;
- resource-focused export; - existence of an operative incentive in the form of high and rapid profit from intensive exploitation and/or sale of natural resources (oil, gas, wood, ores, etc.), this being an anti-incentive for biodiversity conservation, etc.

Economic measures that influence biodiversity conservation may fall in two categories:
- macroeconomics measures;
- efforts specifically focused on biodiversity conservation.

Implementation of balanced macroeconomics policy is of top-priority for biodiversity conservation.

In Russia, biodiversity conservation is characteristic of a need for expanding protected areas, limiting economic activities in adjacent areas, etc. This approach does not seem to be most attractive from either environment or economy standpoint. A wish to conserve nature inside nature does not bring the best result in all cases.

Russian current macroeconomics policy fosters a tendency to technogenic and resource-intensive development. This finds reflection, first of all, in deterioration, or gaining weight, of the economic structure in terms of environment: growing specific weight of resource-consuming sectors in production and primary-economics investments.

It is believed that under the decline in industry the ecological situation should tend to improve due to a drop in production, decrease in consumption of many natural resources and reduction of emissions and pollution. Yet, specific indicators for natural resources consumption and pollution per unit of end product have grown.

This situation is extremely dangerous for the country's future. Currently formation of a future economic system model is underway to be evolving in the next century. Should this embryo of the Russian economic future bear anti-ecological symptomsin its genes, a sharp build-up of environment and biodiversity degradation could be expected once economic growth begins.

In this connection, the following important macro-level trends of environmental-economic transformations beneficial for biodiversity conservation can be identified for Russia in the framework of total economics:
- resource-saving restructuring of economy;
- generation of a system of environmental taxes, credits, subsidies, trade tariffs and duties;
- clear identification and reforming of property rights for natural resources; demonopolization;
- improvement of privatization vehicles in terms of the environmental factor (account of the past environmental damage, obligations for conducting rehabilitation efforts, environmental insurance, etc.);

- re-focusing of investment policy towards ecologically balanced priorities in economic activities, etc.

Most of economic measures specifically focused on biodiversity conservation can be undertaken within the work on the improvement of the economic mechanism being formed in Russia. Among its key components are the following:

- payments for environmental pollution;
- economic incentives based on taxation and financing-crediting policy;
- environmental funds;
- environmental insurance;
- environmental programs.

A core element in economic stimulation of biodiversity conservation is taxation and financing-crediting policy. The following approaches may be used for stimulating biodiversity conservation:

- tax relief for biodiversity conservation performance;
- tax exemption for biodiversity conservation-targeted funds;
- introduction of special taxes (environmental taxes, excises) on products manufacture of which produces adverse impact on biodiversity;
- subsidies, refundings, privileged credits, etc. for biodiversity conservation performance;
- accelerated depreciation of fixed assets used for biodiversity conservation performance.

At present environmental funds are actually the only operative element in the structure of distributing financial resources for environmental purposes. However, these resources are absolutely insufficient, particularly after environmental funds having been deprived of the non-budget target status and consolidated in the budget. Nevertheless, these funds could play a certain role in biodiversity conservation projects, including those financed by the Global Environment Facility:

- the funds could become extra sponsors for biodiversity conservation projects;
- the funds could be among the elements of the management structure for the projects implementation.

Environmental insurance for inflicting damage on biodiversity contributes to resolving two problems: to recover up to 45 % loss incurred by recipients from environment pollution and to create an additional source of biodiversity conservation financing.

A number of recommendations on biodiversity conservation was made in the course of the economic experiment on protected areas carried out by RF SCEP and Russian Forestry Management assisted by their regional agencies in 1993 - 1995. The experiment was aimed at the consolidation of the system of zapovedniks and other protected areas and their higher ranking in environmental status, generation and testing of complex scientific-organizational, financial-economic and ecological education efforts on

strengthening the financial base of protected areas, budget funding of which is insufficient under new economic conditions.

Twelve protected areas were involved in the experiment: Valdai national park (Novgorod oblast), Voronezh biosphere zapovednik (Voronezh oblast), Vodlozersk national park (Republic of Karelia), zapovednik Kivach (Republic of Karelia), Kandalaksha zapovednik (Murmansk oblast), Kostomuksha zapovednik (Republic of Karelia), Lapland zapovednik (Murmansk oblast), Oka zapovednik (Ryazan oblast), Pereslavl natural and historical national park (Yaroslavl oblast), national park Meshchera (Vladimir oblast), Teberda zapovednik (Republic of Karachaevo-Cherkessia), and Central Forest zapovednik (Tver oblast). Unfortunately, the experiment was not completed though certain economic mechanisms for protected areas functioning were proposed.

Russia is currently lacking sustainable scientific structures or teams of specialists in biodiversity conservation economics. There are independent teams of specialists working at Economy and Geography Departments of the Moscow State University, in the Institute of Market RAS, Institute of Geography RAS, Higher School of Economics, Scientific and Educational-Consultative Center and economic divisions of RF SCEP and RF Ministry of Natural Resources, and Harvard Institute for International Development. It would be reasonable to unite their efforts under the GEF project Biodiversity Conservation.

To proceed with the work on biodiversity conservation economics in Russia it would be expedient to establish coordination with the World Bank Ecological Department where large experience in this pool of issues has been accumulated.

3.2. **Current Expenses on Biodiversity Conservation**

In the Russian Federation, no regular efforts on the evaluation of biodiversity conservation funding amounts and sources are carried out. No indicators have been so far accepted to judge if these or those funds could be assigned to biodiversity conservation costs. Actually any expenditures aimed at nature protection and sustainable development of the country and regions may be looked at as such. That is why state statistics structures and even specialized agencies have no efficient mechanisms for singling out the money allotted to biodiversity conservation from the whole bulk of environmental expenditures. At best, the information on funding of individual incentives can be found available. For example, the annual state report On the Russian Federation environmental status (1996) contains the data on the state financing of capital assets for the guard and reproduction of wild animals, birds, sea mammals, setup of zapovedniks and other protected areas. Yet, there are no appropriate tools that would facilitate separating the part of funds intended for biodiversity out of such expense items as protection and use of forest and water resources, fish stock, etc. Unfortunately, state budget makers (state financing constitutes 50% of the total) employ methods that do not infer any information on the biodiversity conservation funding and hence main donors do not demand this information.

Recently an attempt to introduce a complex evaluation of target finances for biodiversity conservation has been made in the Russian Federation. This evaluation can serve a basis for concluding on the average financing rate of nature protection in Russia estimated as $ 45 - 50,000,000 (here and after a dollar equivalent is used as, despite lagging behind the inflation level, the dollar cost changes allow to demonstrate vividly a financing rate of environmental actions).

These studies and individual expert evaluations bring us to the conclusion on the insufficient financing being approximately 2 - 4 times less than the required minimum.

The most disastrous situation in financing has been created in such fields, as support to protected areas, informational technologies, ecological education, efforts on rare and extinguishing species protection, monitoring of the biodiversity status, etc.

Below are given three levels of biodiversity conservation expenses worked out in terms of various approaches to calculations. The most probable values can be secured only under regular monitoring of financing conducted by a special division of the RF SCEP. A one-time evaluation will not give a true vision of the biological conservation funding status.

In 1996, the Global Environment Facility 5-year Project on Biodiversity Conservation in the Russian Federation with the total cost of $ 20,000,000 has been launched. The project suggests special investigations on the identification of financing priorities and level of biodiversity conservation efforts and creation of a specialized Information-Analytical Center that, among its goals, sets an objective of the annual evaluation and forecast of the investment level and directions. By the end of 2000, the systematized information on financing will have become available for all concerned persons and structures and first of all to those who are responsible for biodiversity conservation policy making.

Current expenses on biodiversity conservation. The initial material being insufficient, only preliminary evaluations and methods for their making are given. The proposed materials can serve a basis for the elaboration of a set of methods to evaluate biodiversity conservation financing levels. A part of the data enables to get a general idea of funding sources and amounts and may be of use in planning efforts on attracting investments. To have a more vivid picture of financing amounts, most of the data are given in US dollars basing on the following average annual rates: 1994 - 2,000 rubles per $ 1; 1995 - 4,548 rubles per $ 1; 1996 - 5,192 rubles per $ 1.

Methods for general evaluation. In estimating funds used for biodiversity conservation in Russia, most challengeable is the identification of this money sources and the part of funding that is directly allotted to biodiversity conservation. This is associated with the absence of a strict registration of finances provided by state structures for this purpose, including those flowing from specialized environmental and natural resources agencies. To illustrate the number of funding sources, below is tabulated a list of expense items of the Russian Federal budget for 1996 (table 28). This list is far from being complete and

comprises the items under which direct or indirect actions facilitating biodiversity conservation can be financed.

Table 28. Items of the 1996 Russian Federal Budget. Average rate of US dollar = 5,192.

No	Name of the item	Amount (mln. rub.)	Amount (thous. $)
1.	Expenses pertaining to the implementation of international treaties on liquidation, reduction and limitation of weapons	**3,324,099.60**	**640,234.90**
2.	Expenses pertaining to the implementation of other inter-state agreements	**1,597,123.40**	**307,612.37**
3.	International cultural, scientific and informational links	**196,735.10**	**37,891.97**
4.	Development of perspective technologies and priority areas of science and technology progress	**8,129,342.30**	**1,565,743.89**
5.	Reproduction of the mineral raw material base	**3,087,900.00**	**594,741.91**
6.	Fishery	**86,481.10**	**16,656.61**
7.	Other incentives in agriculture	**36,857.60**	**7,098.92**
8.	Environment and natural resources protection, hydrometeorology, cartography and geodesy	**2,130,754.10**	**410,391.78**
	8.1. Water resources	91,723.10	17,666.24
	8.2. Forest resources	1,269,53 1.20	244,516.80
	8.3. Environmental protection	51,913.10	9,998.67
9.	Program for the liquidation of the Chernobyl APP accident effect	**2,477,356.30**	**477,148.75**
10.	Program for the liquidation of the nuclear tests effect in Chelyabinsk oblast	**85,390.70**	**16,446.59**
11.	Program for the liquidation of the nuclear tests effect at the Semipalatinsk test site	**73,738.50**	**14,202.33**
12.	Other accident and disaster effect liquidation programs	**11,292.40**	**2,174.96**
13.	Prevention of emergency situations and elimination of their effect	**3,150,588.20**	**606,815.91**
14.	Education	**15,229,660.10**	**2,933,293.55**
	14.1. Preschool education	473,362.10	91,171.44
	14.2. Primary and general secondary education	379,801.80	73,151.35
	14.3. Vocational training	3,279,3 14.50	63 1,609.11
	14.4. High school special education	1,951,217.30	375,812.27
	14.5. Retraining and qualification upgrading	355,819.90	68,532.35
	14.6. Higher education	8,718,729.40	1,679,262.21
	14.7. Other educational	71,415.10	13,754.83

	establishments and expenses		
15.	Mass media	**2,412,779.60**	**464,711.02**
	15.1. Television and radio	2,140,000.00	412,172.57
	15.2. Periodicals and publishing houses	185,973.10	35,819.16
	15.3. Other mass media kinds	86,806.50	16,719.28
16.	Sanitation and epidemiology supervision	**1,112,072.30**	**214,189.58**
17.	Federal programs for the regions development	**2,475,350.60**	**476,762.44**
18.	Russian Federation Federal Ecological Foundation	**59,800.00**	**11,517.72**
	18.1. Environmental performance subsidies	17,600.00	3,38983
	18.2. Capital investments to fixed funds for environmental protection	40,300.00	7,76 1.94
19.	Basic research and support to science and technology progress	**11,565,309.00**	**2,227,524.85**
	Total	**59,549,668**	**14,844,708**

The above articles are rather conventional, yet, even summing over figures of the items that are most close to biodiversity conservation (8.1., 8.2., 8.3., 18) will yield less than 473 billion rubles (excluding 1 trillion for Forest Resources), i.e. 0.75 % of the total. An assumption may be made that indirect costs having effect on biodiversity conservation will be no less than this sum. Other funding sources such as local and regional budgets, international agencies, foreign investments, domestic and foreign foundations, commercial investments, public and non-commercial organizations, etc. were not considered here.

Methods for evaluation of target funds. In evaluating biodiversity costs, a more simple definition of expenses is employed most often: they imply target funding allotted to flora and fauna conservation, protected areas, scientific research efforts directly associated with nature protection, monitoring of biodiversity conservation, and ecological education (including propaganda over television and other mass media). Even under such a narrow consideration of expense articles, the evaluation of their size is challengeable. Actually this kind of work was carried out in Russia only once - in the process of the Preparation Phase to the GEF Biodiversity Conservation Project. The results obtained are listed in Table 29.

Table 29. Biodiversity conservation financing in 1994. Average rate of US dollar = 2,000.

No	Source	Amount (thous. $)
1.	Federal budget (including Federal Ecological Foundation expenses)	24,827
1.1	Ministry of Nature (for zapovedniks)	6,888
1.2	Ministry of Nature (for central apparatus)	100
1.3.	Ministry of Nature (for local bodies)	4,802
1.4	Russian Forestry Management	10,643
1.5	Federal Ecological Foundation	600
1.6	Federal Program (Ecological Security of Russia)	1,385
1.7	Federal Program (Biological Diversity)	385
1.8	Federal programs of the Russian Fundamental Research Foundation	24
2.	**Federation subjects**	**2,078**
3.	**Russian non-governmental** organizations	**320**
	Total Russian sources	27,225
4.	**International agencies**	**2,201**
4.1	World Bank	1,395
4.2	European Union	230
4.3	Ramsar Convention Secretariat	50
4.4	World Wildlife Fund	500
4.5	TRAFFIC	26
5.	**Foreign governments**	**8,050**
5.1	USA	4,440
5.2	Germany	1,300
5.3	Canada	1,120
5.4	Netherlands	330
5.5	Finland	250
5.6	Norway	200
5.7	Denmark	185
5.8	Great Britain	125
5.9	Sweden	100
6.	**Key non-governmental private donors**	**1,385**
6.1	MacArthurs Foundation	680
6.2	Mutual Understanding Support Fund	260
6.3	Viden Foundation	245
6.4	Alton Johnes Fund	200
7.	**Others**	**820**
	Total foreign sources	**12,456**
	Total	**39,681**

This work was done in terms of the results of financial investments for 1994. After that no similar studies have been undertaken in Russia since no order was made.

Unfortunately, GEF experts have not taken into account a lot of funding sources, for instance, quite a large amount of finances gained by some environmental structures as a result of their own activities (see p...7 in Table 30). These very assets are often more effective in biodiversity conservation as they have no connection with a multi-step system of the money donor-recipient pathway. Specifically, most of the money allocated to biodiversity conservation in Russia by the US government in 1994 was used by US organizations on salaries of their employees and consultants, high-cost travels, management costs, etc. Besides, in Russian experts' opinion, about 50 % of highly-paid American specialists proved professionally inadequate for solving Russian biodiversity conservation problems.

In addition, there was almost no work performed relative to the identification of priority areas for Russian investments in the same way as it was done for foreign sources (Fig. 1). This selective approach has roots in a failing information supply from ministries and state sectoral agencies.

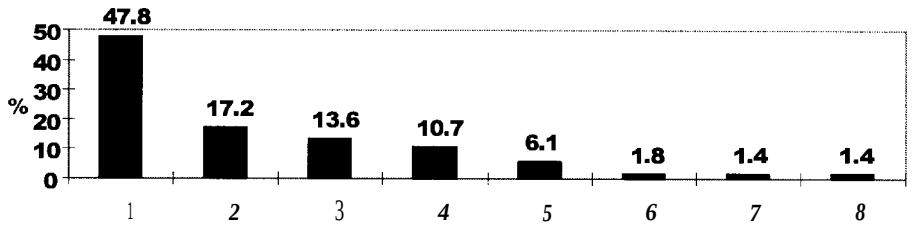

Fig. 1. Disbursement of foreign investments for 1994 - 1997 across spheres of activities. 1 - environmental performance and infrastructure; 2 - natural resources use; 3 - PA financing; 4 - research; 5 - land use; 6 - PA planning; 7 - communications; 8 - ecoeducation.

The same pattern is observed in defining regional distribution of investments (Fig. 2). Virtually, taking into consideration territorial ties of the USA, one of the key donors, with the Far East Region, it is impossible to conclude on the insufficient financing of other regions basing on the below chart.

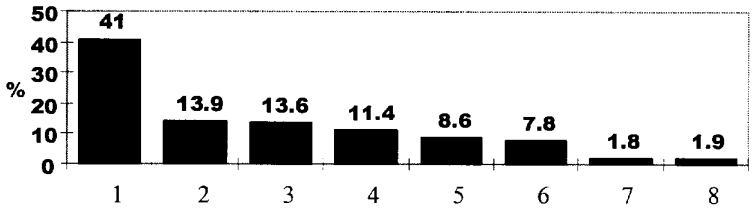

Fig. 2. Cross-regional disbursement of foreign investments for 1994 - 1997. 1 - Far East; 2 - North (incl. Arctic region); 3 - Baikal; 4 - European Russia; 5 - Russia as a whole; 6 - North-West; 7 - Siberia; 8 - Others.

During this period, the structure of funding biodiversity conservation research has undergone a substantial change. In 1997, no funds were actually allotted for the SCEP program "Ecological Security of Russia" although finances to the amount of more than 6 billion rubles were provided for relevant scientific projects carried out by institutions of the Ministry of Science and RAS. These projects included the subprogram "Biodiversity" (5.001 mln rubles), priority genetic studies (500 mln rubles), comparative studies of mountain and lowland waterbodies (15 mln rubles), forest genofund survey (30 mln rubles), oceanographic exploration (100 mln rubles), investigation of cultured plants (100 mln rubles) and forest diversity (50 mln rubles), ecological transect for the estimation of outcomes of global climate changes (50 mln rubles).

In terms of rather slow changes in the disbursement system of ministries and sectoral agencies budgets, a per cent ratio of the total financing amount provided by specialized ministries (Ministry of Nature, Russian Forestry Management) and finances allotted by these bodies to biodiversity conservation may be presumed as unchanged in 1996 versus 1994. This presumption gave grounds for the calculation of biodiversity conservation target funds assigned by these bodies in 1995 - 1996 (Fig. 3).

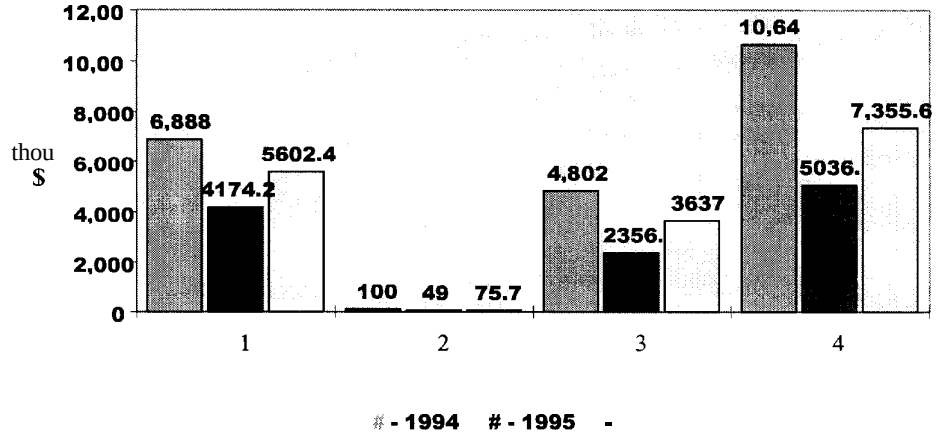

Fig. 3. Evaluation of the federal biodiversity conservation financing in 1994 - 1996. 1 - Ministry of Nature (for zapovedniks); 2 - Ministry of Nature (for central apparatus); 3 - Ministry of Nature (for local bodies); 4 - Russian Forestry Management.

This gap results from a sharp rise in the US dollar exchange rate for the 3 years (over 2.5 times)*, although if consider the exchange rate falling behind inflation the picture becomes even more discouraging. In fact, the biodiversity conservation target financing was cut over all state financing items. In 1997, the total financing, in absolute values, is likely to fall down to the level of 1994.

Methods for partial evaluation of key donors and recipients. According to the GEF experts' evaluation findings, to facilitate rough analysis of the financing amount, a number of key donors and recipients can be singled out and regular (annual) questionnaire-assisted surveys of their opinions conducted. Dynamics of financing amounts defined on the basis of questionnaires reflects a general status of biodiversity conservation performance. Yet, even this kind of relatively low-cost studies has not been carried out since 1994.

As an example of such evaluation, data on one of the key recipients - Russian state zapovedniks for 1995 - 1996 and one of the donors - World Wildlife Fund (WWF) for 1994 -1995 - 1996 is discussed herein (Fig 4).

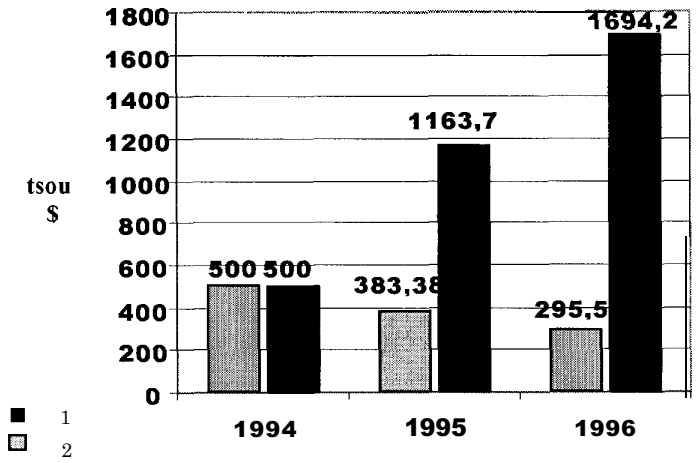

Fig. 4. Biodiversity conservation financing by World Wildlife Fund. 1 - Total; 2 - Including that for zapovedniks.

The World Wildlife Fund is among the key foreign non-governmental donors that finance biodiversity conservation in Russia. The goal of the WWF is to preserve nature and ecology on Earth through the conservation of the genetic, species and ecosystem diversity, support to the sustainable use of renewable natural resources at present and in

future, propaganda of activities on rational resource and energy use, and environment pollution abatement.

For the last years (since 1994) the World Wildlife Fund has been influencing considerably biodiversity conservation activities in Russia. During the first years of its work in this country, the WWF had focused on the system of nature reserves providing about 5 % financing of zapovedniks. The next projects addressed a complex approach to all biodiversity conservation aspects in regions (with zapovedniks as their part), target funds for rare and extinguishing species conservation (including zapovedniks as places of their habitat and reproduction; e.g. project for Ussurian Tiger conservation), all-Russia projects pertaining to the ecological education, legal support, generation of financing vehicles, etc (table 30).

A conclusion can be made on a switchover in the donors' policy from patching state budget funding to the issues that influence state policy in biodiversity conservation.

Table 30. Financing of RF state zapovedniks in 1995 - 1996. Exchange rates of $: 1995 = 4,548, 1996 = 5,192.

No	Source	1995 ($ thous.)	1996 ($ thous.)
1.	**Federal budget**	**4,737.54**	**6,697.84**
1.1	Operational costs	4,128.10	5,435.03
1.2	**Scientific research conducted** by the SCEP	46.11	167.45
1.3	Federal science and technology programs	126.43	2.00
1.4.	RFRF	19.13	10.36
1.5	FEF Federal inter-allowance	417.77	1809.32
2	**Regional budget**	**635.77**	**333.74**
3	**Local budget**	**111.08**	**105.66**
4	**Non-budgetary sources**	**914.58**	**968.74**
4.1	Regional ecological fund	644.28	706.68
4.2	Local ecological fund	100.40	85.96
4.3	Other non-budgetary funds	169.90	176.10
5	**Foreign sources**	**613.96**	**705.55**
5.1	World Wildlife Fund	383.38	295.53
5.2	MacArthurs Foundation	49.23	45.42
5.3	Other	181.35	364.60
6	**Russian non-governmental organizations**	**261.30**	**1210.44**
6.1	Banks	64.20	50.52
6.2	Industrial enterprises	45.54	95.24
6.3	Transport facilities	4.62	8.47
6.4	Other commercial structures	100.59	40.89
6.5	Non-commercial entities	45.25	5.05
6.6	Individuals	1.10	10.27
7	**Self-gained assets**	**492.33**	**738.17**
7.1	**Penalties and court-awarded sums plus** confiscated assets	**43.07**	**113.39**
7.2	Work with visitors	55.27	188.89
7.3	Other activities	393.98	435.90
	Total	**7.766.56**	**9.760.15**

As seen from Table 30 and Fig. 5, the bulk financing (about 50 %) is provided by the Federal budget. Zapovedniks request federal funding in the approximate amount of $ 19,000,000. They compensate deficient finances by revenues from their own activities and local sponsor support. Thus, a state economic decline facilitates indirectly strengthening of the role as regional environmental centers which engage local authorities, commercial structures managers and local population in tackling nature protection problems.

On the other hand, deficient federal financing of zapovedniks (below 30 % of that required) has led to a one-third reduction of full-time personnel in zapovedniks (including security service). As for funds on maintaining economic infrastructure, including motor

transport and water vehicles, aviation rent and others, they are actually not allocated. Zapovedniks have considerable utilities fee indebtedness, suffer a drastic deficiency in equipment, transport, fuel and lubricants. This petrifies the work of all divisions and, first of all, security service. The lack of required finances does not allow to equip inspection service for the state zapovedniks guard with modern communication means, viewing devices, high-quality tabular guns, uniforms, field and special gear and outfits.

Research departments in all Russian zapovedniks are surviving not only an acute shortage of advanced technical facilities, devices and computers but also have no money to cover travel expenses and purchase of special literature. This state of affairs minimizes research efficiency.

Deficient budget allocations cast doubt on a further existence of rare animal species breeding sites created in a number of zapovedniks to preserve genofund of unique domestic fauna: European bison, extinguishing stork species, predatory birds and many others.

The efficiency of protected sea area and coastline zone guarding in 11 Arctic and Far East zapovedniks has been reduced to zero for lack of adequate sea vessels.

All the above puts the system of state zapovedniks on the brink of financial disaster.

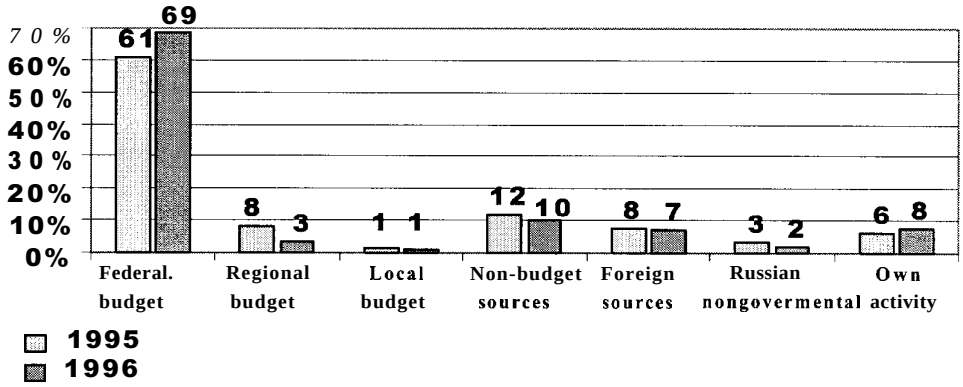

Fig. 5. Amount and sources of the RF state zapovedniks financing in 1995 - 1996. 1 Federal budget; 2- regional budget; 3 - local budget; 4 - non-budgetary sources; 5 foreign sources; 6 - Russian sources; 7 - self-gained assets.

Conclusions. The above materials enable to make a conventional evaluation of a general level of target financing amounting to about $ 45 - 50 mln. per year. A minimum level of biodiversity conservation funding in Russia requires $ 100 mln., i.e. 586 - 600 billion rubles annually. Under budget deficit conditions and lack of biodiversity conservation priorities in the state environmental policy, donors, their allocations being remunerated by various tax benefits, and a more correctly focused activity of local ecological foundations may become a real source of such funding.

* In compliance with the laws on Federal budget for 1994 and 1995, 98,622.8 mln. rubles in 1994 and 110,058.8 mln. rubles in 1995 were allotted to the Russian Federation Ministry on Environmental Protection and Natural Resources (presently - RF State Committee on Environmental Protection). 707,597.1 mln./1994 and 761,467.4/1995 mln. rubles were assigned to the Russian Forestry Management.

4. Available potentialities for the implementation of the requirements under Convention on Biological Diversity

4.1. Organizational potential

Russia is a federal state. The Russian Federation Constitution defines generally a scope of competence for authorities of the Russian Federation and Russian Federation subjects. The Constitution also states the division of state ownership for natural resources between the Federation and Federation subjects.

The Decree of the Russian Federation President of 16.12.1993 No 2144 "On federal natural resources" identified natural resources that should be attributed to the federal pool. Subsequent legal acts specified the notion of federal ownership and ownership of Russian Federation subjects for a number of natural resources. In particular, it was specifically defined for water objects and forests and partially for land and mineral resources, resources of territorial waters, continental shelf and economic zone of the Russian Federation, and protected areas. The federal law "On fauna" has not fixed a clear division of ownership. Issues of fauna possession, use and management pertain to the joint jurisdiction of the Russian Federation and Russian Federation subjects.

At the federal level, executive power is exercised by the Russian Federation President, Russian Federation Government and federal executive power bodies (ministries, state committees, federal services, etc.) with their authority being defined by the Russian Federation Government.

At the level of a Federation subject, executive power is exercised by the Administration (Government) of a Russian Federation subject. There are 89 Federation subjects in Russia.

Currently a system of federal executive authorities has been restructured in compliance with the Russian Federation President's Decree of 14.08.96 No 1176 "On the system of federal executive power bodies".

According to the decree, the Russian Federation State Committee on Environmental Protection (RF SCEP) has become a federal executive power body authorized with the implementation of state policy in the field of environmental protection, ecological security, conservation of biological diversity, multi-sectoral coordination and functional regulation thereof, state environmental control, state ecological expertise and

management of protected areas within its jurisdiction. The Russian Federation Government committed the Russian Federation Ministry of Natural Resources (RF MNR) to pursue state policy in the field of research, reproduction, use and protection of all kinds of natural resources utilized in the country's economy, to coordinate activities of other federal authorities in this sphere and to carry our management of the state fund of mineral resources as well as use and protection of the water fund.

From among the other federal executive authorities with a direct relationship to biodiversity, the following should be indicated:
- the Russian Federation Ministry of Agriculture and Food (RF *Minselkhozprod*) which, in addition to agricultural issues, executes state control, protection and management of fauna objects attributed to hunting and fishing objects;
- the Russian Federation Forestry Service (*Rosleskhoz*) which is a federal executive body in charge of forest protection, use and reproduction.

The above federal executive bodies have territorial (pool) bodies in Russian Federation subjects.

Matters of science and technology, including biotechnology, pertain to the competence of the Russian Federation Ministry of Science and Technology (RF *Minnauka*).

The fulfillment of Russian Federation's obligations within the Convention on Biological Diversity is in the authority of the RF SCEP.

In understanding of the fact that the fulfillment of obligations within the Convention on Biological Diversity is a big cross-sectoral issue, the Russian Federation Government adopted the Edict of 01.07.95 No 669 "On measures aimed at the implementation of the Convention on Biological Diversity" which established the Cross-Sectoral Commission for Biological Diversity Conservation that includes top managers of concerned ministries and state sectoral bodies and RAS.

The Commission is not a federal executive power body. It was created as a coordinating agency to assure consistent actions of interested executive authorities in achieving certain objectives.

Along with the above Commission, independent matters of biodiversity conservation and sustainable use are considered by other coordinating and consultative agencies established by the Russian Federation Government, specifically the Governmental Commission for environmental protection and nature use, Cross-sectoral Commission for gene engineering, and others.

The Cross-Sectoral Commission for Biodiversity Conservation distributed responsibilities for the fulfillment of the Convention's obligations among relative ministries and sectoral agencies according to their functions.

Of special note is a functional relation of the RF SCEP with the GEF/World Bank project "Conservation of Biological Diversity" being implemented on its territory. Although direct management of the project is accomplished by a special team of managers, its general administration stays with responsible staff of the RF SCEP.

By now, a wide network of national non-governmental organizations has been set up in Russia. Of prime attention among them are scientific societies, specific activities of which are directly addressed to scientific aspects of environmental protection. They are: the oldest in Russia Moscow Society of Naturalists (MSN), All-Russia Botanical Society, Menzibir Ornithological Society, Russian Herpetological Society, Russian Hydrobiological Society, Russian Entomological Society, Russian Geographic Society, Russian Union of Bird Conservation, etc.

Another type of public organizations is presented by the Russian Association of Hunters and Fishers (*Rosokhotrybolovsoyuz)* founded in 1958. It incorporates about 47 thousand local organizations with 3 million members. In its use and management there are 220 million hectares of hunting and fishing areas where conservation, recovery and rational use of fauna resources are fulfilled. The Association's hunting-fishing areas are guarded by the 8.5 thousand staff of game managers. Rosokhotrybolovsoyuz carries out public activities addressed to public awareness, propaganda, sport, etc. through over 5.5 thousand of specialized units, teams of lectures and correspondents, clubs, etc.

Finally, during 1993 - 95 the growth of public activity in Russia gave birth to numerous environmental NGOs and foundations.

A special position belongs to the All-Russia Society of Nature Protection (ARSEP - *VOOP*) which used to be the most popular official environmental NGO in the former USSR. Despite a current tendency for reduction of the number of VOOP members and scope of its activities, it remains one of the largest public associations with 4 million members united in 30 thousand local organizations. The society is engaged in school and pre-school environmental education, public ecological expertise, public control of nature protection and law-making.

The Socio-Ecological Union (SEU - *SoES)* represents a powerful ecological movement and is a voluntary association of local and regional ecological groups and associations, including international ones, with various legal status.

The Union, along with other objectives, develops and implements programs and projects focused on biodiversity conservation. The Union is the founder of the sole non-governmental national park *Muravievsky* (Amur oblast) which is a test site for non-traditional ways of environment-safe management and where the conservation of the park's most valuable sections is carried out.

The Russian Ecological Union was pioneered by an outstanding scientist-ecologist N.F. Reimers. The Union focuses its attention on expert-analytical, informational and public awareness, educational and publishing issues.

It is a difficult task to characterize all NGOs associated with biodiversity as they are more than 60 in number. Many of them are at the inception phase. This matter is discussed in a special research (Ecological organizations of Russia (guide), M. Center of Wild Nature Protection, 1996).

Russian NGOs play an important role in law-making and management. A number of NGOs delegate their members to the High Ecological Council under the State Duma Committee on Ecology. The Chairman of the RF SCEP heads the Consultative Council formed by leaders of key public organizations. Well-known international NGOs involved in the implementation of biodiversity conservation projects set up their offices in Russia: the World Conservation Union (IUCN), World Wide Fund for Nature (WWF), Wetlands International.

A network of private business organizations directly concerned with conservation and sustainable use of biodiversity has been so far poorly developed. Russia has organizations involved in ecological business mostly in the field of technology or consulting and tourist services, including hunting and fishing tours, science and technology information, and legal advising.

4.2. **Scientific and Technological Potential**

Though Russia is currently undergoing economic challenges, especially in education and science, this country is traditionally distinguished with a high maturity level of science and long-established infrastructure that provides concentration of intellectual, material and financial resources if a complex approach to science and technology issues is required.

This infrastructure incorporates the following components:

1. A network of basic research institutes (Russian Academy of Sciences (RAS), Russian Academy of Agricultural Sciences, Russian Academy of Medical Sciences, etc.) and sectoral scientific research institutes (of SCEP, Ministry of Agriculture, Russian Forestry Management (Rosleskhoz) and others).
2. Supply of scientific research personnel in the form of a network of higher education establishments (HEEs), including state universities, agriculture and veterinary academies, medical and pedagogical schools. HEEs are engaged not only in training of specialists (zoologists, botanists, microbiologists, soil scientists, ecologists, etc.) but also in scientific research.
3. A system of protected areas, first of all, zapovedniks which are also scientific research centers.

4. A network of databases and banks for specialized information to analyze and forecast biodiversity and ecological security status, including data banks of samples, i.e. various collections (museums, zoos, botanic gardens, breeding centers, etc.), cryobanks, gene banks, seed banks, etc.

5. 5. Publishing of scientific journals, proceedings, monographs.

A precise quantitative estimate of specialists involved in biodiversity studies is hardly feasible as setting a limit to data collecting is a real challenge. However, the following fact can give a certain idea of it. The edition «Who is Who: Biodiversity». Russia and Adjacent Countries (1997) specifies that Russian scientists were awarded 4 102 scholarships for biodiversity studies and worked in 53 Russian Federation subjects. It should be also marked that a lot of researchers from the Academies did not participate in the competition yielding the vacancies to less-honored scientists.

Scientific research efforts on biodiversity are carried out primarily through a complex of state science and technology programs of different levels: from federal target specialized programs to federal target regional programs, including federal target regional watershed and federal target regional local management programs. Their list is given below.

A List of Russian Science and Technology Programs on Biodiversity

Federal target programs.

Federal target complex programs.

Federal target science and technology program Research and Development in Civil Science and Technology Areas of Top Priority, 1996 - 2000 (customer - RF Ministry of Science).

Federal target specialized programs.

Federal target program for state support to state natural zapovedniks and national parks, 2000 (customer - RF SCEP, Rosleskhoz).

Federal target program Protection of the Russian Federation Territory from Import and Propagation of Especially Hazardous Infectious Human, Flora and Fauna Diseases as well as of Toxicants, 1997 (customer - RF Ministry of Public Health, co-executor - RF Ministry of Agriculture).

Federal target regional programs.

Federal target watershed program Complex Federal Program on Sustainable Protection of the Baikal and Rational Use of its Watershed Natural Resources (Baikal)(customer - Government of the Buryatia Republic, Irkutsk and Chita oblasts administrations, coordinator - RF SCEP).

Federal target program Environment Improvement on the Volga River and its Tributaries, Recovery and Degradation Prevention of the Volga Watershed Natural Complexes (Volga's Revival), 2010 (customer - RF Committee for Water (Roskomvod)).

Federal target regional local management programs. Federal target programs Socio-Ecological Rehabilitation of the Samara Oblast Territory and Public Health Protection 1997 - 2010, (customer - RF SCEP).

Federal target programs on natural resources.

Federal target program Monitoring of the Russian Federation Lands (customer - Russian Committee for Land (Roskomzem)).

Federal program on the development of the Russian Federation Fishery (Fish), 2000 (customer - RF Ministry of Agriculture).

Federal program Reforestation in Russia (customer - Rosleskhoz).

Federal program Development of Federal-Level Resorts (customer - RF Committee for Sport and Tourism (RF CST), RF Ministry of Public Health).

Federal program Development of Tourism in the Russian Federation (customer - RF CST).

In addition, research on biodiversity conservation are carried out in the framework of scientific programs of RF Ministry of Agriculture, Rosleskhoz, and international programs.

Among these programs, mainly FTSTP Research and Development in Civil Science and Technology Areas of Top Priority is most closely related to biodiversity issues. Under this program, 7 subprograms are implemented: 1. Biological Diversity. 2. Priority Genetics Areas. 3. Russian Forest. 4. Novel Methods of Bioengineering. 5. Perspective Agricultural Production Processes. 6. Global Environment and Climate Changes. 7. Complex Studies on Oceans and Seas, Arctic and Antarctic Regions. Annual financing of one program is about 1.6 - 6.9 billion rubles.

Subprogram Biological Diversity incorporates 8 areas and 22 projects.The Severtsev Institute of Ecology and Evolution Problems RAS (Moscow) is the leading organization in this program. In addition, research teams and individual researchers from 28 scientific research institutes RAS (from Moscow to Vladivostok), Lomonosov Moscow State University, St. Petersburg University, Moscow State Pedagogical University, State Science and Research Institute for Genetics and Selection of Industrial Microorganisms, and RF SCEP, Rosleskhoz and RF Ministry of agriculture sectoral scientific research institutes are engaged in its development.

The subprogram first-phase findings were put in the basis of recommendations on biodiversity conservation and sustainable use for the whole Russian Federation.

Outside the framework of state science and technology programs, the biodiversity research is conducted exactly in line with sectoral house programs.

RAS provides basic funding of Academy scientific research institutes and programs in fundamental research.

For example, within the RAS system, the program Problems of General Biology and Ecology, Rational Use of Biological Resources is being implemented. This effort involves leading scientific institutes (18), among them: Botanical Institute (St. Petersburg), Zoological Institute (St. Petersburg), Institute of Ecology and Evolution Problems (Moscow), Institute of Forest and Timber (Krasnoyarsk), Institute of Biological Problems of the North (Magadan), Institute of Biology-and-Soil and Animals Ecology (Novosibirsk), Siberian Botanic Gardens (Novosibirsk), Polar-Alpine Botanic Gardens, Institute of Forest Science (Moscow), Center for Forest Ecology and Efficiency (Moscow).

A comparatively large amount of biodiversity studies is being carried out by sectoral institutes. The main load of applied studies on biodiversity conservation lies with All-Russia Scientific Research Institute of Nature Protection (Moscow). Central SRI of Hunting Management under the RF Ministry of Agriculture retains its positions in the research of commercial fauna. Its well-financed and specialists-equipped efforts concern annual hunting fauna registration.

Activities of scientific divisions of state zapovedniks fall within sectoral science. These divisions existed in 76 zapovedniks (out of 95). Their scientific personnel comprised 464 employees (at average 6 specialists for 1 zapovednik, from 18 to 1-2). In 1996, 9 Doctors of Sc. and 138 Candidates of Sc. worked in Russian zapovedniks. For example, the Astrakhan zapovednik's staff had 10 specialists with scientific degrees, Oka zapovednik - 8, Caucasus and Central . . . zapovedniks - 7 in each, Voronezh, Kandalaksha, Prioksko-Terrasni (Oka-Bench), Severo-Osetinski (North Osetia) zapovedniks - 6 in each. For the year of 1996, scientific monographs and bulletins were published in 14 Russian zapovedniks; 12 zapovedniks published papers in international journals, 22 - in Russian journals. A notable contribution into the biodiversity conservation research is being made by university science (biology and geography departments) and higher schools that specialize in environmental protection, agriculture and forestry.

Self-financing focus of science, despite its disadvantages, has produced a certain positive effect. It forced a number of applied science institutes to gain ability for finding funding sources in industry and business. For example, a part of biodiversity studies within the

WHO are done by companies and corporations engaged in oil and gas prospecting and extraction.

During the recent years, a growing financial support to the preservation and increase of the Russian science and technology potential in biodiversity has been provided by foreign governmental and non-governmental organizations and foundations on either bilateral or multilateral basis.

4.3.National Environmental Legislation

In the Russian Federation, the regulatory legal base on biodiversity conservation is being created by means of:

- development and adoption of federal laws and laws of Russian Federation subjects that determine a state regulation system of activities addresses to protected natural areas as well as legislative acts on environmental protection, protection and use of flora and fauna objects;

- development and confirmation of regulatory legal acts of executive power bodies in the Russian Federation and Russian Federation subjects targeted at the realization of principal provisions of the above laws;

- development of regulatory documents of specific state agencies authorized for environmental protection and other areas associated with nature sites and for governing actions on biological diversity conservation (Annex 5.2.1).

National legislation on biodiversity conservation is maturing with due regard to international treaties and conventions in which the Russian Federation is involved.

The RSFSR Law On environmental protection adopted in 1991 is a baseline complex legal act in environmental protection. This law introduced officially a system of standards for the quality of environment, environmental impact of economic and other activities as well as the status of protected areas and requirements to activities within them. The system presented in the law was designed for the improvement of environment quality, protection of its biotic component and preservation of genofund. Among core provisions of the legal act is the introduction of environmental requirements to the disposition, building, reconstruction and commissioning of economic or other sites that are able to produce environmental impact. These requirements are to ensure elaboration of a set of efforts to reduce negative environmental exposure at as such early stages as planning and development of economic or other sites.

Obligatory state ecological expertise of intended activities, including those associated with the use of flora and fauna or any impact on them was also stated in Federal Laws On ecological expertise and On fauna adopted in 1995.

Federal Law On fauna is a guiding document in the system of regulatory and legal acts to control activities on environmental protection and use of fauna objects and their habitats.

For advancement of this law, the Russian Federation Government issued a number of edicts to bring details to its provisions. These edicts concern requirements to the prevention of death of fauna objects under production conditions; list of hunting objects'; rules, periods and techniques for killing wounded animals; zoological collections; fauna monitoring and cadaster, and a whole range of other provisions.

The Russian Federation Government pays close attention to rare and extinguishing fauna and flora species. The Russian Federation Government adopted edicts to define terms and order for the creation of Russian Federation Red Data Book (List of Threatened Species) with the status of a state document and identified a procedure for the potential use of rare and endangered species. For the sake of conserving unique fauna and flora of the Far East, the Russian Federation Government drafted a number of specific actions focused primarily on the conservation of such a unique animal as Amur Tiger.

A lot of Russian Federation subjects launched efforts on the creation of the Red Data Book in accordance with the above edict.

Federal Law On protected areas of 1995, which defined protected areas as national wealth objects, is of vital importance for biodiversity conservation. This law has enacted a system of these territories: state natural biosphere preserves (zapovedniks), national parks, natural parks, state natural reserves (zakazniks), nature monuments, dendrological parks and botanic gardens, rehabilitation remedial localities and resorts as well as a detailed regime of their use, procedure of their organization and management and liability for violation of the protected area regime.

The President of the Russian Federation issued Decree No 1032 of October 10, 1995 that approved the Federal Target Program for state support to state natural zapovedniks and national parks for the period up to 2000. The Program envisages not only measures focused on the consolidation of existing protected natural areas but also efforts on setting up of 36 new state zapovedniks and 28 national parks.

Legal relations in protection, use and reproduction of forest resources are under control of. the Russian Federation Forest Code of 1997. This law identified a complex of actions on the protection and use of forest fund, trees, bushes and other forest vegetation and stated a system of especially valuable forests in forest tundra, forest and forest steppe zones.

To advance forest legislation, the Federal Forest Service of Russia has developed a package of materials on forestry management that comprises over 70 instructions, rules, guidances, including rules for major clearings in various parts of the country, sanitary cuttings, leaving cuttings, etc. The Federal Forest Service approved in the established

order and has been implementing the Federal Target Programs Forest Fire Management and Reforestation.

New Russian legislation in the field of environmental protection, natural resources protection and use is characteristic of a complex approach to the regulation of requirements in the use of natural complexes and their elements. The Federal Law On the Russian Federation continental shelf adopted in 1995 secured a complex approach to sea environment protection that focuses on the prevention, reveal and curtail of violations of international norms and standards as well as Russian Federation laws and regulations on marine life resources protection. With the purpose of marine flora and fauna conservation, this law stated requirements to the investigation, protection and utilization of continental shelf life resources, order of issuing licenses on hydrobionts trade, and rights and duties of initiators to economic or other activities on the creation of artificial islands, installations and facilities for the preservation of sea environment and habitats of sea life organisms.

Incentives for biodiversity conservation were stated in the Russian Federation Water Code of 1995 that lists requirements to the protection of water organism habitats from pollution, contamination and depletion, including under hydraulic works building and operation conditions.

Most of regulatory and methodical documents declaring requirements for work procedures on fishery water pools were developed prior to 1990 and do not correspond to current conditions defined in the Water Code on hydrobionts protection. Due to that, specific state bodies authorized for water objects protection and state fishery agencies are planning to develop methodical documents on hydrobiological analysis of small rivers quality, requirements to the construction of hydraulic works, regulations for the use of water storage basins , etc.

Creation of a national biosafety mechanism found its reflection in the Federal Law On state control over gene engineering activities adopted in 1996.

Regulatory legal acts that control legal relations in various activities are of great importance for solving problems in biodiversity conservation and sustainable use.

The Federal Act On land use of 1996 governs relations arising in the process of melioration efforts on lands intended for agriculture. Federal Laws On principles of tourist activities (1995), On industrial safety of hazardous production sites (1997), and On safety of hydraulic works (1997) can add to this pool of acts.

In Russia there was also realized one of the key elements of environmental policy implementation - licensing of individual activities in environmental protection (Russian Federation Government Edict No 168 of 26.02.1996).

To govern activities in fishing management, the Russian Federation Government confirmed Statute on licensing of industrial fishing and fish breeding and Statute on licensing of activities in management of sport and non-professional fishing of valuable fish, water fauna and flora species.

Environmental performance, including biological conservation, should be based on the comprehensive and detailed information on its status.

The Russian Federation Government Edict of November 24, 1993 enacted a decision on the establishment of a Unified State Ecological Monitoring System with such components, as flora and fauna monitoring, creation and functioning of environmental data systems and operation of a mass database on environment, natural resources and their use. This edict also defined authorities for specific environmental protection state agencies in monitoring over individual components of nature and natural complexes and for management of relevant databases. This edict was followed up by new state standards (GOSTs) on metrology support to the control over the quality of environment.

Standardization in technology and technical means applied in environmentally affective agricultural, industrial and other sectors of economy is no less significant for the preservation of flora and fauna habitats. To enforce RSFSR laws On standardization and On certification, there were launched programs on the revision of active standards. These programs are being carried out by RF State Committee on Standardization and Certification in agreement with RF State Committee on Environmental Protection (SCEP). In particular, a new GOST Petroleum products, exhausted. General technical conditions to define requirements for the accumulation of exhausted petroleum products and prohibition of operations with exhausted petroleum products under a threat of environmental pollution is currently under way of approval. The development of domestic standards is fulfilled in compliance with IS0 and IEC international standards.

A role of public in controlling environmental performance, particularly in a mechanism of decision- making by executive authorities regarding those sites and activities that are able to produce a negative impact on environment and biota conservation, is under framework regulation. The Law On non-governmental organizations states, in a general form, the right of NGOs to have a say in the process of decision-making of state power bodies and local self-government authorities. Rights of NGOs in decision- making are partially determined in the RSFSR Law On environmental protection and Federal Law On ecological expertise, which specifically envisages holding public discussions of pre-plan, pre-design and design decisions on planned activities as well as public expertise of these materials.

Hunting and fishing are governed by special legal subordinate acts, the key one being Rules for management of relevant activities on the level of the Federation or RF subjects.

An efficient mechanism in solving biodiversity conservation problems is compliance with laws. To strengthen liability for violations of environmental laws by civilians or officials,

the RSFSR Code of Administrative Law Violations (RSFSR CoAL) and Russian Federation Criminal Code (RF CC) were amended with articles on liability for ecological law violations. The RSFSR CoAL incorporates 45 articles on administrative law violations in environmental protection, including those for annihilation of rare and threatened animals or other actions that would result in death, reduction in number or habitat disturbance of such animals; violations of rules for protecting animals habitats; violations of the order of the fauna use; illegal import of animals and plants; violations of hunting and fishing rules and destruction of fauna useful for forest; violation of transportation, storage and use rules for flora protective means that bring damage to fauna; violation of anti-fire safety rules in forests, etc. The RF CC contains a separate section on liability for ecological crimes that comprises 17 article, including liability for destruction of critical habitats of the microorganisms listed in the Russian Federation Red Data Book; violations of protected areas and natural sites regime; for destruction and damage of forests; violations of continental shelf and exclusive economic zone legislation; illegal catching of water animals and collecting of water plants; violations of fish reserve protection rules, etc.

As a whole, currently the Russian Federation regulatory and legal base on biodiversity conservation and sustainable use can be defined as being intensively generated and basically coinciding with requirements of the Convention on Biological Diversity.

4.4. Informational technology potential

State policy in the field of informational support to actions on biodiversity conservation is based on provisions of the RSFSR Law On environmental protection, Russian Federatio-n laws On information, informatization and information protection, On participation in the international information exchange and other regulatory legal acts. The Decree of the Russian Federation President No 334 of April 3, 1995 initiated a state informational-telecommunication system to integrate information resources of top state power bodies, ministries and state sectoral agencies, Russian Federation subjects, and other stakeholders. The system provides for the use of information on biodiversity.

The above system of informational support to measures on biodiversity conservation is extremely important since state institutions have accumulated mass data on the issues of wild nature conservation. The information is stored both in paper (reports, published and unpublished sectoral bulletins) and electronic forms (computer databases, GIS annexes, etc.). However their use is hampered by the lack of uniform requirements to the data structure, format and description standards. Under current conditions, one of the main actions in biodiversity conservation management is the generation of a rapid free access to the information accumulated in state institutions. This is being done in the absence of an integral electronic network, legal frameworks for data bases as intellectual product (problem of copyright) and well-adjusted communication between information providers and users.

Previously, most of international and national programs associated with biodiversity conservation were focused exclusively on data generation and storage, creation of databases and advancement of geoinformational systems (ARC/INFO, IDRISI, SURFER., etc.). At present in Russia rich information resources are accumulated at both federal and regional levels. They are available in bibliographic, cartographic and statistic materials, often in the electronic form. During many decades zapovedniks and national parks have been collecting detailed information on dynamics of natural processes in ecosystems and biodiversity status on their territories. Huge data files and very poor use of modem GIS technologies narrows dramatically the information application in the field of nature protection and biodiversity conservation. As a rule, information on biodiversity conservation is accumulated in various environmental agencies, scientific organizations and private archives of independent researchers. This places limits to the information access and very often leads to its multiple duplication while switching over from one program to another thus resulting in the priority of the accessioning process which involves a noticeable cost buildup of the research. Moreover, the informational technologies in environmental protection and biodiversity conservation are currently being developed toward a search of mechanisms to provide a rapid access to information. Among these efforts is the creation of the national Biodiversity Data Network which will also pave the way for a more efficient participation of Russia in international programs and its higher influence on international politics of the PanEuropean Biodiversity Strategy. The rapid access to information resources through the data network will stimulate the application of advanced informational techniques to the environmental practice, allow to keep track of information gaps in biodiversity conservation and assist in successive implementation and coordination of national programs and their designing. The Biodiversity Data Network will increase public awareness and extend involvement of professionals thus estimating available intellectual resources.

Meanwhile, a discrete character of information sources, its affiliation with different agencies and lack of legal rights for software and intellectual property degrade drastically the quality of information and constrict a scope of its application in management. Placing biodiversity data exclusively in the scientific domain disregarding legislative, political, social and economic information can result in voluntarism and falsification, lack of credible control and impossibility to fulfill expert evaluation in decision making. In addition, needs of potential information users, especially decision-makers, have not been identified so far. Fast character of decision-making in biodiversity conservation and actual nonexistence of a modem informational-analytical base in management bodies will potentially assign priority to the creation of the information network for generating national biodiversity strategy as a long-term action program focused on the forecast of the country's development in political, social, legal, technological and scientific areas.

Informational support issues are within the authority of the Russian Federation president's Committee for politics and information. According to the Russian Federation Government Act No 226 of 28.02.96, 226 national databases, including those pertaining to biodiversity conservation, are subject to obligatory state account and registration.

State management in the field of biodiversity conservation is exercised by the Russian Federation State Committee on Environmental Protection which committed information support functions to a number of organizations, e.g. Federal Center of Geoecological Systems, Scientific Research Center Ekobezopasnost (Ecological Security), Center for Research and Methodology, State Center of Ecological Programs, Informational-Technical Center, All-Russia Scientific Research Institute of Nature Protection and Nature Reserves Management, State Institute of Applied Ecology, and Center of International Projects. The Integral State Ecological Monitoring System is being created within the RF State Committee on Environmental Protection. Its goal is to provide collection, storage, processing and rapid access to the information associated with environmental protection (the RF Government Edict No 1229 of 24.11.93). Since the beginning of 1995, the RF SCEP Informational-Analytical System has been being upgraded. The RF SCEP Informational-Technical Center was set up and started its work to provide accumulation, pre-processing and analysis of the information supplied by administrative authorities and state institutions.

Mass science and technology data on various subject matters of biodiversity conservation are accumulated in scientific research organizations of the Russian Academy of Sciences and universities. Yet, this information is not properly filed, rapid-access mechanisms are not adjusted and, actually, biodiversity information concentrated within the RAS and universities remains disdained by relative state authorities. The Russian Academy of Sciences has specialized information-focused units - Geoinformational Center within the Pushchino SC RAS, SC of Geological Technology and Geoecology, Scientific Geoinformational Center, Center for International Cooperation in Environmental Issues, Noosphere Ecological Institute, Institute of Geoecology, etc. Generalization of bibliographic information, including that on biodiversity conservation, is carried out by the All-Russia Institute of Science and Technology Information of the RF Ministry of Education and by the RAS.

The last years have been featuring a vigorous development of non-governmental organizations that collaborate intensively with a lot of both state and non-governmental environmental organizations. According to the INTERNET data, today there are registered over 800 environmental NGOs having established contacts with international environmental organizations: Taiga Rescue Network, ISAR, Nature Conservation, World Conservation Monitoring Center, WWF, etc. The most active are the Socio-Ecological Union and Biodiversity Conservation Center, Biodiversity Conservation Laboratory and other units of the Ecological Center Dront (Dodo) in Nizhni Novgorod which provide informational, methodical, consultative and financial support to environmental initiatives.

Enormous undemanded information resources are in private possession of specialists in biodiversity conservation. Currently an attempt is being made to register data Providers and Users in the former USSR countries («Who Is Who»: Biodiversity. M.: KMK Scientific Press, 1997). However, the volume and subjects of available biodiversity

information, existing databases, materials of reports and statistics, etc. have not been yet identified.

Finally, of special note is a wide network of public and specialized (scientific, sectoral) libraries (totally over 50,000 on the territory of Russia) and museums of natural science (21) where published and most important unpublished data on the status of individual biodiversity elements as well as data on plant and animal collections are stored. Particular attention should be paid to catalogues of libraries and museums which keep biodiversity information having been accumulated in the
course of decades and centuries.