4. Socio-economic Mechanisms for Realization of the Strategy

4.1. Principles of Application of Socio-Economic Mechanisms to Biodiversity Conservation

Conservation of biodiversity should be considered as a government and society priority. It must be included in the system of socio-economic relations as a most valuable component of the national wealth and a necessary condition of national and international security.

The Strategy of Biodiversity Conservation should be co-ordinated with the strategy of the transition of Russia to sustainable development and with the strategies of development of other spheres of the country's life: economy, law, social insurance, culture, education, ecological policy, etc. The aims of biodiversity conservation should be considered in programs, plans, and forecasts for all spheres of life and at all levels of state government.

Biodiversity conservation implies integration of norms and principles of nature protection into organization of economy and the system of rules of conduct accepted by all social groups as an element of national culture. Successful conservation of biodiversity is only possible based on developing a clear consensus of all government and public institutions and private companies that may be considered to express interests of different groups of the population. Such concensus is reached via a series of politcical, economic, organizational, legal, educational, and propagandistic activities.

The general approach to biodiversity conservation and the ultimate goal of the Strategy provide a basis for identifying principles of the application of socio-economic mechanisms available for the purpose. The may be described as follows.

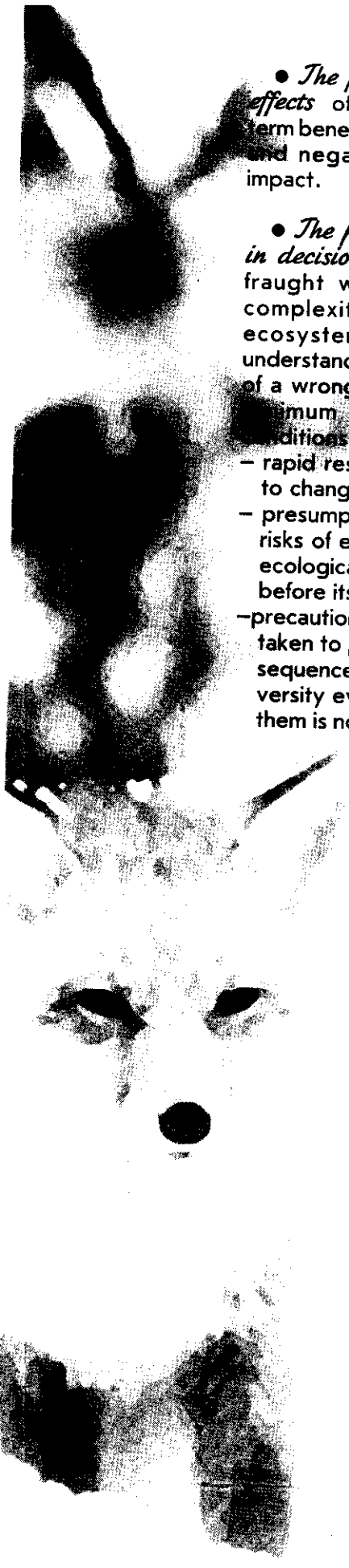
- *The principle of broad action*. Socio-economic mechanisms of realisation of the Strategy should regulate the activity of all governmental, commercial and public structures as far as it directly or indirectly influences the condition of biodiversity.

- *The principle of pertnership*. Success of Strategy implementation depends on efficient partnership. A broad circle of partners well aware of their role in conservation of biodiversity and actively participating in attaining its goals are recruited from non-traditional actors, such as mass media, small business sector, armed forces, frontier guards, resource-extracting and processing companies, non-governmental organizations, religious confessions, etc

- *The principle of openness and free access to information* on the condition of biodiversity and relevant risk factors is crucial for the success of conservation and sustainable use of biodiversity. Promoting public awareness of biodiversity and problems of its conservation greatly enhances the operational efficacy of all socio-economic mechanisms available for the purpose.

- *The principle of broad participation of of a lay public and non-governmental organizations* in ecological decision-making and in the development of an efficient system of coordinated public and government management of natural resources.

- *The principle of optimisation of relationships between natural and socio-economic subsystems*, based on the understanding that a sustainable existence of one is impossible if the other is unsafe. Concrete decisions must take into account both the interests of people and the requirements of biodiversity conservation.



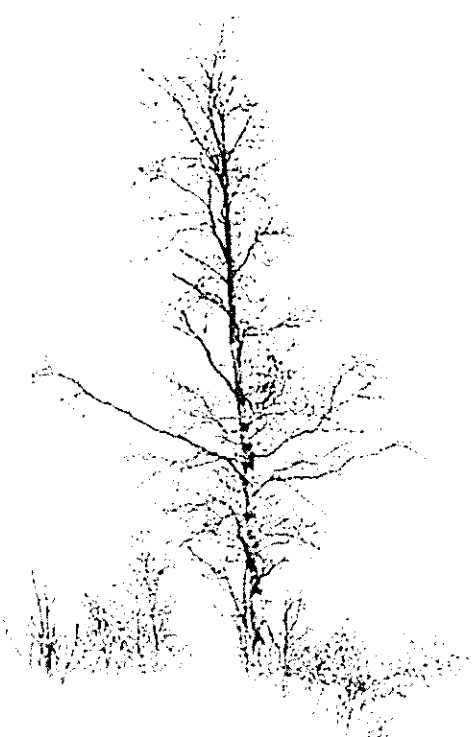
• *The principle of account of delayed effects* of decisions, including both long-term benefits from biodiversity conservation and negative consequences of human impact.

• *The principle of minimization of risk in decision-making*. Making decisions is fraught with high risks owing to the complexity and instability of socio-ecosystems and the absence of clear understanding of their functioning. The risk of a wrong decision can be reduced to a minimum by observing the following conditions:

- rapid response of the managing system to changes in biodiversity;
- presumption of potential environmental risks of economic activities implying that ecological safety of a project be tested before its implementation is initiated;
- precautions or special measures should be taken to prevent potential negative consequences of economic activity for biodiversity even if a causal relation between them is not immediately apparent.

• *The principle of broadening of the scope of application of the known and approved socio-economic mechanisms*, improving their efficiency to facilitate implementation of the strategy and attaining its ultimate goal. Totally new mechanisms may be used only if a desired aim cannot be achieved by the existing methods or en they prove inefficient.

• *The principle of account of normalized characteristics of the environment and rates enforced for particular impacts* exerted by economic and other activities. This principle is employed to formulate administrative mechanisms to realize a system of prohibitory rules and limitations, economic mechanisms to regulate economic interests of various sectors (taxation) and mixed mechanisms (licensing, certification).



4.2. Legal Mechanisms

Improvement of legal mechanisms should be in the first place aimed at introducing biological principles of biodiversity conservation into the law sphere with regard for socio-economic conditions of their realization.

Legal mechanisms pertinent to biodiversity conservation include three elements: legislation, its practical application, and law-enforcement. Generally speaking, the current situation in Russia is characterized by fairly well-developed legislation and poor implementation of the existing laws.

Legislation

A basis for modern Russian legislation is provided by the Constitution of the Russian Federation. There is a well-developed system of legislative institutions, rules, and prescriptions concerened with biodiversity conservation. The law On the Conservation of the Environment is of crucial importance. Also pertaining to biodiversity conservation are the laws On the animal world, On Specially Protected Natural Territories, On Ecological Expertise, On Mineral Resources, Water and Forest Codes. There are a number of presidential and government degrees and by-laws on conservation and use of natural resources and the environment. Russia is a member of many international conventions on conservation and sustainable use of biodiversity and its components, protection of marine and air basins.

On the whole, Russia has rather a large body of laws regulating biodiversity use and conservation. However, many of them are frame documents laying emphasis on natural resources and have to be realized through the introduction of additional legislative acts. Hence, controversies and conflicting situations dictating the necessity of changes, amendments, and further target-oriented work of making new laws in the areas covered by the Convention on Biological Diversity.

Systemic consideration of basic requirements for biodiversity conservation as one of the most important strategic resources of the country is very important in the period of reforms and development of the Russian legislation.

Development and improvement of legislation

- Systematization and improvement of the enacted laws on the use of nature resources and environmental protection. Extension of the existing legislation on the protection and sustainable use of biodiversity along the following lines:

– Adoption of the new edition of the basic law On the Conservation of the Environment to meet present-day socio-economic conditions and needs of biodiversity conservation.

– Adoption of the completed Land Code ensuring biodiversity conservation in the land sale-and-purchase process and subsequent land use; it is necessary to maximally broaden and clearly specify ecologically-slanted charges and public land servitude (right by which a piece of land owned by one is subject to a specified use by another), co-ordinate articles of the Land Code concerning protected lands with those of the law On Specially Protected Natural Territories.

– Modification of the Water and Forest Codes with a view to creating an up-to-date system of state control over the exploitation of land and water areas by owners and users designed to improve nature conservation in general and biodiversity in particular.

- Modification of tax legislation in order to increase collection of rental payments for the use of natural resources and offer tax incentives to encourage their sustainable use.

- Inclusion of biodiversity issues in protocols of ecological expertise.

- Development of methods for the estimation of the loss of specific resources in connection with damages inflicted on natural complexes and ecosystems in general.

- Further legally enforced separation of property in natural resources between the federal government, regional and municipal authorities, differentiation of their ensuing rights and commitments with a view to facilitating the resolution of disputable issues concerning separable (migrating) natural objects.

- Adjustment of legislation concerning administrative infringements of the law including the levy of heavier fines for the damage to biodiversity, optimization of mechanisms for bringing juridical persons to administrative account, creation of strict legal grounds for the on-site confiscation of tools and products of illegal nature use.

- Further development of traditional legislating actions. Adoption of laws on the protection and use of plants, game animals, fish, and soil; on trade and commerce in rare and endangered animal and plant species; on the prevention of penetration of alien species into the country; on the status of old forest stands and wetlands of international importance.

- Development of legislation bearing in mind the ecosystem approach and biological principles of biodiversity conservation.

- Development of legislation to regulate access to genetic resources and sharing benefits from their use with that in mind that Russia may be both an exporter and importer of genetic resources. A use of genetically engineered organisms should be guided by the Russian law (1995) on genetic-engineering techniques and the Cartagena Protocol on biosafety (2000) that regulates international transport of such organisms.

- Improvement of legal framework for the protection of public ecological rights including the development of various forms of public participation in making ecologically important decision, legally bounding practice of public hearings on environmental projects; rules concerning the liability for the concealment of vital ecological information.

- Development of legislation ensuring conservation of natural systems and traditional methods of nature use by indigenous peoples.

Practical Application of Legislation

This function rests on federal and regional bodies of executive and legislative power and organs of local self-government.

The existing legislation needs to be analysed with respect to laws concerning biodiversity conservation; relevant reviews and comments on their practical application should be conveyed to specialists through publication with special reference to the danger of law infringement and misdeeds in this sphere for state economy and population.

Specially authorised state agencies for conservation, monitoring, and management of natural resources, ecological expertise, environmental protection and other government bodies (customs, procuracy, internal affairs and security agencies) as well as organizations directly responsible for biodiversity conservation act inefficiently and actually in an uncoordinated manner. Coordination of their activities is needed to prevent and suppress illegal or abusive use of biodiversity.

Law application can be promoted by training and education of the personnel in law and biodiversity conservation; allocation and efficient use of funds to drastically raise the level of their technical equipment; adoption and publication of

relevant by-laws and their enforcement; increasing personal responsibility as stipilated by the labour legislation of the Russian Federation.

Law-enforcement

To-day, the low level of law-enforcement is a burning legal problem. Nature protection suffers more seriously than other spheres from the inadequate law-enforcement because it is far from being a major priority of law-enforcement bodies.

They are now confronted with a task of building up a system of organizational, technical, economic, and ideological measures which must ensure inevitable responsibility for any violation of ecological legislation or damage inflicted on living nature. To enhance the efficiency of law-enforcement, it is very important to raise the level of ecological and legal education of the population and especially that of officials and specialists making environmentally important decisions.

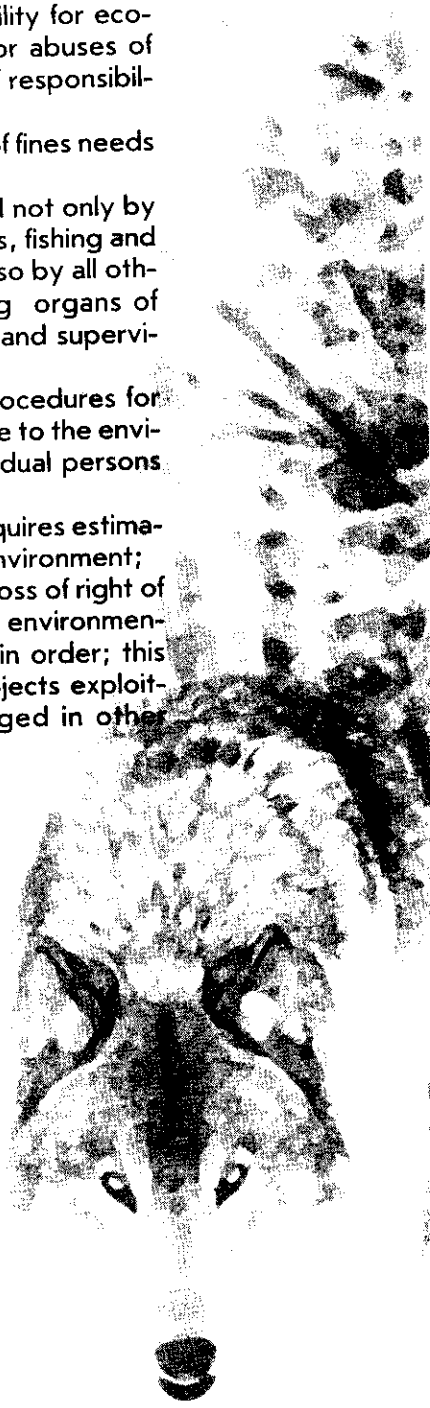
Law-enforcement with special emphasis on biodiversity conservation must follow two main lines.

● Control and supervision of nature protection by specialized agencies, law-enforcement organs (militia, procuracy), and other government bodies. More efficient crime control as regards abusive exploitation of biodiversity is urgently needed. Priority must be given to monitoring activities of enterprises directly exploiting biological resources (forests, fish stock and other aquatic bioresources, game animals) or engaged in activities that pose a risk for the environment (agriculture, building, mineral extraction, etc). The following measures are needed to ensure effective control of these activities:

- equipment of controlling and supervising organs with necessary technical tools and methods for the detection and collecting evidence of an illegal action injurious to biodiversity;
- rapid retrieval of information from monitoring facilities suggesting potential direct or indirect threat to biodiversity;
- general improvement of state control and supervision, correction and adjustment of relevant technical documentation (methods, standards, regulations, norms, etc.).

● Bringing to account of the perpetrator or perpetrators and imposing punishment by administrative commissions, inspections or courts. Improvement of court practices as regards cases, suits, and complaints of citizens and non-governmental organizations, elaboration of legislative strategies pertinent to the infringement of law on conservation and use of biodiversity, more efficient putting into effect court orders concerning environment-related cases to ensure inevitable legal responsibility for ecologically significant violations or abuses of the law. The following forms of responsibility are distinguished:

- administrative – the system of fines needs improvement;
- disciplinary – to be imposed not only by nature conservation agencies, fishing and hunting inspectorates but also by all other relevant bodies including organs of state environmental control and supervision;
- civil – improvement of procedures for bringing actions for a damage to the environment in a court by individual persons and public organizations;
- penal – when the lawsuit requires estimation of real danger to the environment;
- ecologo-legal – when the loss of right of nature use and cessation of environmentally unfriendly actions are in order; this form is applicable to all subjects exploiting bioresources or engaged in other economic activities.



4.3. Economic Mechanisms

Transition from the current economic paradigm considering economy and environmental conservation as separate activities to the integrated eco-economic approach viewing nature and economy as two interacting components of a socio-ecosystem is crucial for the progression of the country to the ecologically friendly sustainable stage of its development.

This integrated eco-economic approach dictates the necessity to consider economic mechanisms of nature conservation at two levels:

- macroeconomic level at which national economy is regarded as an entity (with due regard for international economic links) and characterized by aggregated economic and eco-economic indices;
- level of special eco-economic mechanisms designed to ensure conservation of living nature.

Macroeconomic level

The following key strategies are crucial for biodiversity conservation.

● "Ecologization" of structural transformation of economy and reorientation of export-import policy:

- decrease in the proportion of resource-oriented activities in the national economy; increase in high-technology processing and manufacturing industries oriented to yield a finished product;
- decrease in the proportion of resource and energy-consuming industries; increase in high-technology science-consuming industries; development of energy and resource-saving technologies; decrease in the consumption of natural resources per unit of production;
- replacement of technologies and industries affecting biodiversity by ecologically friendly ones;
- altered export structure, decrease in the export of virtually unprocessed raw materials and increase in the export of high-technology products.

Restructuring of national economy in favour of highly-technological resource-saving production is a strategic goal for the further development of the Russian society. It is the only way to modernize the country's economy and ensure its transition to the modern post-industrial society, to make Russian goods quality-competitive on the world market, and guarantee well-being of the population.

A build-up of a new economic system is underway in Russia. Right now, it is very important to establish a basis for future highly-technological resource saving economy. Were the current trends reversed, it would be very difficult to curb a new rise of resource-oriented "dirty"economy and neutralize its catastrophic effect on the environment.

Investment policy oriented towards the priority development of highly- technological resource-saving economy and the attraction of investors is indispensable for the successful restructuring of Russian economy. Consistent ecological policy and implicit fulfillment of the commitments under international agreements, including the Convention on Biological Diversity, by the Russian government is considered by the international community as a guarantte of foreign funds invested in the country and a move towards civilized legal business as opposed to ecologically unfriendly activities.

● Formation of ecologically-oriented national accounts, incorporation of biodiversity in macroeconomic parameters of the country (including, and gross national product) and the system of international mutual accounts. Ecologically-orientated accounts are intended to ensure

- estimation of the biodiversity increment to loss ratio which reflects dynamic trends in the nature constituent of the national wealth; estimation of quality changes of natural objects experiencing effect of anthropogenic pressure and effectiveness of nature conservation measures;
- estimation of ecological variables indicative of the trends in the country's development and its stability in macroeconomic parameters;
- comparison of alternative ways of the country's development in terms of effec-

tiveness taking into consideration their potential environmental impacts;
- orientation of the economy towards a rise in the finished product output required by consumers rather than to an enlargement of the volume of resources used and raw materials extracted which should be minimized;
- estimation of the loss of natural resources and damage to the environment (leading to resource depletion and environmental degradation) in compliance with the recommendations of the UN Statistical Commission;
- estimation of net domestic product (computed from gross domestic product after allowance is made for the consumption of capital used in the process of production) and its dynamics which most adequately reflects the country's development including its socio-economic and natural components

● Reform of the taxation system to ensure transition from the current essentially indirect taxation (based on product output estimates without regard for the use of natural resources used in the process of production) to direct taxation of such use (taking into account the amount of natural resources involved in production). A significant rise in the collection rate of taxes on exploitation of natural resources without a change of the total income:
- raising taxes on the use of nature resources and decreasing them in high-technology sectors oriented towards finished product output;
- raising tax and amortization rates for ecologically harmful works and technologies; granting tax privileges and "soft" amortization schemes for resource-saving and ecologically safe technologies; estimation of the influence of various technologies on biodiversity;
- differential taxation of ecologically harmful works with regard for their potential effects on biodiversity;
- raising payments for the use of natural resources including biodiversity, permissible and heavier pollution, disposal of waste matter and other materials having injurious impact on the natural environment and biodiversity;
- tax benefits to enterprises and organizations which re-invest profit in the implementation of measures for conservation and recovery of biodiversity, produce equipment and develop technologies for nature protection, provide ecological services, and practice advertising with an ecological slant;
- assurance of target-oriented distribution and use of revenue brought in by taxation of the exploitation of natural resources for the purpose of nature-conservation.

Transition to direct nature-resource taxation has many advantages. It promotes salvation of resources, conservation of natural environment, and tax collection because makes it impossible to hide the object of taxation. Also, it helps to accumulate real funds for conservation and restoration of natural resources and reconcile commercial and environmental interests by stimulating all owners to rationally use resources.

This reform should be performed gradually in order to give tax-payers an opportunity to adapt themselves to new conditions of taxation. At the initial stages of the taxation reform, the total revenue must remain at the previous level.

● Creation of a nation-wide system of economic evaluation of biodiversity as a part of the national wealth. Adequate assessment of all functions of natural systems, from the most important environment-forming one to productive, informational, cultural, aesthetic, and others. It must be paralleled by the improvement of legislative and methodical basis, broad estimation of the total economic importance (value) of natural systems and their environment-forming function, costs of alternative methods of nature use and rehabilitation, prevented damage, rent, and other variables.

Elaboration of a system of economic evaluation of genetic resources

Economic evaluation of biodiversity adequate to its importance for the sustainable development will allow to improve the system of tax rating and collection with due regard for the real value of boiresources, such as land, forests, water, commercially hunted animals, etc.

● Eaboration and coordination of mechanisms of international cooperation in environmental protection. Incorporation of the value of living nature in the estimates of national wealth and macro-economic parameters would reflect its key role in biospheric processes and conservation of global biodiversity. These estimates should be regard-

ed as a real contribution of Russia to the conservation and restoration of the global environment when it comes to settling balances among countries in international transactions.

● Elaboration of economic mechanisms of access to genetic resources and calculation of their cost. Expenses of such an access should be differentiated dependening on the further use of the genetic material, either non-commercial (in research, education, health care) or commercial (selling to biotechnological companies for manufacture of commercial products).

Special eco-economic mechanisms

Eco-economic regulation is effected by mechanisms of stimulation (tax incentives to users of natural resources participating in their conservation and/or employing resource-saving technologies, inclusion of relevant expenses in tax payment, etc.) and compulsion (administrative constraints, fines and penalties). The efficiency and expedience of application of economic stimuli depend on the state of the natural environment, extent of human pressure, regional conditions and economic characteristics. The present-day difficult economic situation of Russia makes it necessary to give preference to limiting, prohibitory, and fiscal measures for biodiversity conservation which do not however exclude the elaboration and application of purely economic measures whenever they may give maximum effect.

Main areas of application of special eco-economic mechanisms include:

● Modification of the system of payments and penalties for an excessive or illegal impact on the environment; fines paid not only for a direct damage to the environment but also for its aftereffects. Elaboration of a system of target-oriented distribution of revenue brought in by penalties and its use to recover those objects of biodiversity which suffered from the harm.

● Introduction of standards for ecologically-grounded management of enterprises taking into consideration the needs of biodiversity conservation.

● Organization of goal-oriented innovation funds for the development of resource-saving and environmentally friendly industrial and agricultural technologies. Establishment of ecologically-oriented innovation programs and funds includes substantiation of their functions and financial sources as well as elaboration of economic incentives to ensure their realization. Such ecological programs and projects should be implemented with due regard for expenditures on resource-saving and environmentally friendly technolgies involved. Such an approach facilitates the choice of the most attractive investment schemes

● Promotion of the market for ecologically pure products, technologies, and equipment; extension of ecological safety requirements to the industry as a main instrument of market competition. This puprpose is reached with the aid of economic, administrative, legislative, and propagandistic measures, as follows:

- improvement of the national accounting system as recommended by the UN Statistical Commission to ensure accurate estimation of environmental losses and depletion of natural resources;
- prohibition of export and import of ecologically dangerous commodities and technologies;
- advertising ecologically pure products and ecologically safe technologies; beneficial tariffs for advertising production of ecologically friendly enterprises and distribution of advertisments with an ecological slant;
- shaping the ecologically attractive face of Russian business taking advantage of its involvement in conservation of biodiversity;
- development of mechanisms for selling quotas on permissible environmental impacts to stimulate the development of ecologically friendly technologies and thus prevent excessive pressure on the environment at the level of sale-and-purchase transactions.

● Incorporation of requirements for biodiversity conservation in privatization programs. This implies the establishment of an ecological privatization fund accumulated in the form of investments paid back to support ecologically relevant projects, amorti-

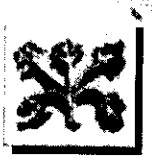
zation payments, and profit reinvested by industrial enterprises and companies for further use in nature conservation programs.

● Development of the system of ecological insurance with regard for the risks to biodiversity. This system should
- ensure maximum compensation for the harm to living nature resulting from catastrophes and other unpredictable consequences of economic activity;
- perform controlling functions including permanent ecological audit;
- ensure establishment of special funds by insurance companies for funding nature conservation actvities and development of ecologically safe technologies.

● Promotion of ecological certification and licensing taking into account parameters of biodiversity.

● Incorporation of requirements for biodiversity conservation into the system of basic principles of economic organization and activity in sectors exploiting natural resources, such as forestry, commercial hunting, fishery, and creation of conditions ensuring their sustainable use.

● Support (state protectionism) of Russian producers practicing traditional economic activities adapted to specific natural and socio-economic conditions of a given region. This measure pursues two goals:
- to adjust industrial and related activities to local natural and socio-economic conditions;
- to support traditional subsistence economies facilitating protection of biodiversity.



4.4. Improvement of the Management System for Exploitation and Conservation of Biodiversity

Main lines of work

● Orientation of the state management system towards biodiversity as a strategically most important component of the national wealth and security. The temporal scale and structure of the system of state regulation in all spheres of the country's life must ensure consideration of long-term returns of the conservation and sustainable use of biodiversity which exceed an immediate profit from its over-exploitation or realization of economic projects that destroy nature. Also important is the establishment of a system the for strategic ecological assessment of the most general decisions on the further development of the country.

● Structural correction of the management system for the conservation and sustainable use of biodiversity. The following aims are distinguished:
- Establishment of specialized state nature protection bodies at all levels of government management.
- Creation of ecological departments in large companies regardless of the form of ownership.
- Improvement of the federal environmental protection service with a view to more efficient conservation of biodiversity.
- Establishment of Ecological Council to be constituted by members of the President's administration, representatives of ministries and agencies, large nature resource companies, Russian Academy of Sciences, universities, and non-governmental organizations involved in preparing political decisions and recommendations on environmental protection and sustainable use of natural resources.

● Encouragement of the joint management of biodiversity by government agencies and general public. Participation of the public and non-governmental organizations in decision-making on biodiversity conservation. Promotion of public control over activities of state institutions and commercial companies influencing biodiversity. Support by the local population is an indispensable precondition for the successful implementation of any nature conservation project. Public participation in making ecologically significant decisions is very important because it has serious repercussions on the development of ecological culture. Equally important for the success of biodiversity conservation is the involvement of indigenous minorities with their experience in traditional methods of nature use and management. This aspect of the development of management system is in line with the strategy of democratization and promotion of human rights.

● Clear differentiation of tasks, competence, and functions between executive and legislative powers, commercial companies, social and political organizations for the purpose of efficient conservation of biodiversity. Co-ordination of their activities.

● Correction of aims and procedures of decision-making:
- use maximum available information about biodiversity state and threats for it;
- estimation of correspondence of decisions to the aim of the Strategy;
- account of the specificity of natural biosystems;
- operative reaction of the system of decision-making in case of rapid changes in the condition of biodiversity and social-economic processes influencing it;
- control of implementation of decisions.

This task should be accomplished at federal, inter-regional, regional, and local levels.

● The management process must involve:
- a system for monitoring biodiversity and socio-economic activities influencing it; the system must be able to actively participate in decision-making;
- a system ensuring an immediate decision

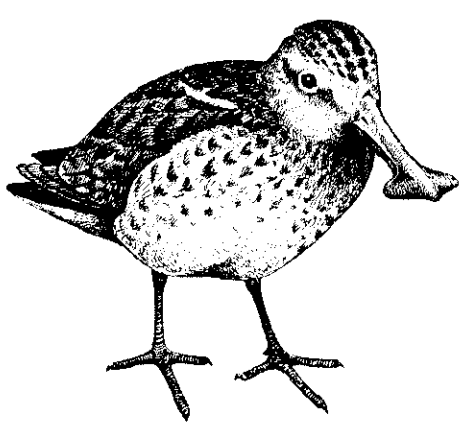
on the use and/or protection of biodiversity in emergency situations; to be efficeint, such a system must use a set of criteria for the identification of priority actions and ecological expertise;
- mechanisms obliging all interested actors to base their work on the principles of conservation and sustainable use of biodiversity, employ resource-saving technologies, rapidly respond to a changing situation, and obey orders of decision-makers.
- independent control organs supervising activities of biodiversity users.

● Territorial management must be organized with regard for the location of natural comminities. Boundaries of large natural systems (river and lake basins, mountain massifs, etc.) do not always coincide with the boundaries of administrative units. This discrepancy and the resulting discoordination of activities should be compensated by concerted actions of management systems at different levels, inter-regional co-ordination, and establishment of coordinating territoral centres.

● Elaboration and realization of regional and ecoregional Action Plans for the conservation and sustainable use of biodiversity co-ordinated with the programs of socio-economic development of these territories.

● Incorporation of requirements for biodiversity conservation in territorial planning schemes, elucidation of the spatial population and ecosystem structure.

● More extensive partnership is needed in the framework of management systems for the conservation and use of biodiversity to ensure involvement of non-governmental organizations, private companies, and non-traditional actors representing government bodies. Integration of a wide circle of partners into target-oriented activities pertinent to biodiversity conservation.



4.5. Formation of Public Consciousness. Education and Propaganda

Main objectives

● Formation of public ecological culture and elaboration of an ecological imperative for all groups of the society, introduction of norms and principles of biodiversity conservation into decision-making practices at all levels of management, organization of production processes, and everyday public life.

● Formation of responsible and active attitude of all citizens towards biodiversity conservation, attraction of a broader public to ecologically significant decision-making, monitoring biodiversity, and realization of environmental projects. Raising prestige of professions and occupations involved in nature conservation.

● Formation of humanistic attitudes towards living nature, development of ecological ethics.

● Promotion of public education and awareness, formation of systemic views on the role of living nature in the maintenance of biospheric equilibrium. Raising awareness of polcy-makers. Public education and popularization of methods for rational nature use and biodiversity-friendly technologies.

Main lines of work

● Propaganda of biodiversity conservation in mass media, at public forums and campaigns, through advertising with an ecological slant.

● Ecological and biological public education; distribution of environmental and biological knowledge; popularization of environmentally friendly methods of nature use.

● Promoting public awareness of the current state of biodiversity and potential risks.

● Support of public initiatives on biodiversity conservation, rising and promoting ecological movements.

● Encouragement of arts and literature depicting the beauty of living nature and its diversity, love and care of nature; popularization of folk culture and traditions having implications for nature conservation.

● Religious education with emphasis on nature conservation.

Specificity of the work with different groups of people

For organization of effective work on the formation of public consciousness, it is necessary to consider characteristics of various groups of people.

– Children. The future of ecological culture depends on how today's children are brought up. Children lack an established system of notions and stereotype behaviour, but they are highly susceptible to a variety of influences. The most important vehicles for infusing children with appropriate ideas are games, books, and films.

– Young people constitute another group very important for the formation of future ecological culture; they are readily open to new ideas. The principal form of work with this group is biological education with special reference to the role of biodiversity in the maintenance of biospheric processes. Members of this group are strongly influenced by the behaviour and attitudes of star performers in show business and leading figures of youth culture, by video, audio, and print advertisements. Main methods of work are biological education and raising awareness of the importance of biodiversity in biospheric processes.

– The main part of the population – middle-aged and elder subjects involved in different professions. Their attitudes towards nature and its protection predominate in public opinion. Many of them are disposed to social conformism and do not readily absorb new ideas. They choose to believe what they are told by experts, officials, and mass media about the importance of biodiversity for the health and well-being.

– The most active and prosperous fraction of the population (politicians, businessmen, high officials, intellectuals, popular performers and athlets) play a key role in the formation of public opinion. These people make decisions of paramount importance for the fate of biodiversity. The group is distinguished by widely varying opinions. They need to be convinced of the advantages (poitical or economic) offered by biodiversity conservation.

– The clergy and their flock may be carriers of moral and ethical views consistent with the cause of nature conservation; members of this group do not readily change their opinion which is largely formed by spiritual guides and preachers.

– Indigenous peoples and other minorities. Morals and ethics of indigenous peoples and other minorities are firmly anchored to their subsistence actvities. The main task is to support and encourage their traditional views and practices beneficial for the environment and biodiversity.

Formation of public consciousness with respect to natue conservation should be based on the universal concept of integration of Nature, Society and Economy, sustainable development, and the impossibility of human survival without regard for the environmental health. Evidently, different aspects of this concept are likely to find understanding in different social, psychological and age groups.

Pragmatic aspect: living nature constitutes a basis of healthy environment, a source of material welfare and vital resources; the safety and well-being of each family depend on the the quality of the environment. This aspect applies to the overwhelming majority of medium-aged and elder people of various social status.

Patriotic aspect: Russia is a great power whose world role is determined, apart from other considerations, by conservation of the largest massif of natural ecosystems which support normal functioning of the biosphere; biodiversity is a most valuable constituent of the national wealth (at the regional level, it is a component of the unique local environment, traditional life style and culture of aboriginal minorities). This aspect is of importance for subjects expressing fervent patriotic sentiments.

Economic aspect: nature conservation is a source of additional income, better quality and increased competitive ability of consumer goods, attractive ecological image of a company. This aspect is important for businessmen of different status.

Aspect of prestige: conservation of nature is a matter of good form, a token of prestigious and respectable way of life. This aspect is important for the most active and prosperous fraction of the population.

Aspect of fashion: nature conservation is fashionable because popular actors, athlets, and leading figures of youth culture patronize and encourage it. Many youngsters would follow their example.

Moral and ethical aspect: living creatures share the right to live with man; animals and plants suffer from humans. This aspect finds understanding in children, emotional and religious persons.

Rational/systemic aspect: living nature is a subsystem of biosphere; the biosphere exists as long as nature does; the greater impact on the living nature the lower the status of the whole system. This aspect is important for subjects of rationalists disposition, students, teachers, and intellectuals.

Aesthetic aspect: nature is beautiful, it gives pleasure and enjoyment.

Religious aspect: nature must be protected as a God's sacred creation. Most religious doctrines admit the value of nature as an evidence of God's wisdom. This aspect applies to religious people.

Such a work requires close partnership of all actors involved in the formation of public consciousness, such as mass media, political parties, non-governmental organizations, advertising agencies, show-business, scientific, cultural, educational, and religious institutions.

Implementation of the Strategy at the federal and regional levels should be supported by special promotion programms.

Nature conservation is one of the few ideas that consolidate rather than split the society; it provides a basis for the unification of different social and corporative groups.

4.6. Scientific Research

- *Inventory of biodiversity*
  - Development of taxonomic studies: elaboration of new methods of systematics; creation of catalogues, keys, federal and regional floristic and faunistic compendiums, cadastres of plant and animal world; continuation of serial monographic publications on the Russian fauna and flora; support and development of scientific biological collections.
  - Development of approaches and methods for estimation of sub-population genetic diversity and its geographic distribution.
  - Development of methods and approaches for the inventory of ecosystem diversity in Russia at regional and federal levels.
  - Informational support of taxonomic and inventory studies, creation of computerized databases.
  - Development of methods for the classification, typing, and mapping of components of biodiversity.
- *Biodiversity evolution studies*
  - Studies on general mechanisms of biodiversity evolution.
  - Studies of the evolution of biodiversity at the territory of Russia.
  - Study and prognostication of anthropogenic evolution of populations and communities of organisms.
- *Studies on current dynamics of biodiversity*
  - Basic studies of current trends in biodiversity and identification of factors promoting a decrease in biodiversity at the genetic, species and ecosystem levels.
  - Elucidation of mechanisms of action of natural and anthropogenic factors on biodiversity dynamics in various environments, climatic zones, and natural landscape complexes; priority studies of ecosystems exposed to the heaviest hropogenic pressure.
  - Analysis of influence of alien species on biodiversity and role of invasions in biodiversity dynamics.
  - Elaboration of short-term and long-term forecasts of biodiversity dynamics.
  - Studies on cyclic processes especially successions. Estimation of the ability of ecosystems for self-recovery.
- *Studies of general structural and functional patterns of biodiversity*
  - Studies on the relationship between the diversity and stability of biosystems; elucidation of ecosystem stability mechanisms and elaboration of criteria for the estimation of stability; determination of stability limits at different levels of biosystem organization.
  - Studies on the relationship between the diversity and productivity of biosystems and their environment-forming function.
  - Ecological studies pertaining to the identification and protection of key species for the maintenance of functional potential of different types of communities and ecosystems.
- *Development of the scientific and methodological basis for biodiversity monitoring*
  - Elaboration of the national system of criteria for the identification of priority objects of biodiversity conservation and estimation of their condition.
  - Elaboration of the conceptual basis for biodiversity monitoring at genetic, taxonomic, and ecosystem levels.
  - Development of methods and schemes for the organization of biodiversity monitoring in various environments (seas, oceans, fresh waterbodies, soil, terrestrial ecosystems, parasitic and symbiotic systems).
  - Development of remote sensing techniques for biodiversity monitoring.
  - Development of methods for express indication.
  - Development of methods for the estimation of well-being of organisms in natural populations.
- *Development of the scientific and methodological basis for protection of rare and threatened species and unique communities*
  - Identification of rare and endangered species and threatened communities; extensive studies of their biological and ecological features.
  - Estimation of risks to threatened populations, species and communities.
  - Elaboration of the scientific basis for conservation of rare species, scientific sup-

port of programmes for conservation and use of rare species, scientific support of the Red Data Book.
- Elaboration of the scientific basis and technologies for reproduction and ex situ maintenance of selected species of wild plants and animals, threatened breeds of domestic animals and plant varieties.
- Elaboration of the scientific basis for conservation of the most vulnerable biomes and ecosystems

● *Elaboration of the scientific basis for sustainable use of biodiversity*
- Elaboration of the scientific basis for rating, quota setting, and regulation (in terms of amount, time, regions, and objects) of the use of selected components of biodiversity especially migratory ones.
- Elaboration of the scientific basis for the replacement of the extensive use of biological resource by their intensive use to ensure sustainable development of biodiversity.
- Development of a complex approach to the sustainable use of natural ecosystems (forests, water bodies, wetland, soils, etc.).
- Elaboration of schemes for the sustainable use of selected species and ecosystems.
- Elaboration of the scientific basis for territorial planning of biodiversity conservation including the development of a network of specially protected natural territories and conservation of biodiversity outside these territories.
- Elaboration of the scientific basis for conservation of agrocenoses and urban areas.

● *Elaboration of the scientific basis for restoration of biodiversity*
- Elaboration of the scientific basis for rehabilitation of disturbed natural ecosystems.
- Development of technologies for restoration of selected populations and multispecies communities in land and water areas undergoing degradation.
- Development of technologies for the recultivation of natural ecosystems and creation of their analogs on technogenically disturbed lands.

● *Elaboration of scientifically-based legislative mechanisms of biodiversity conservation*
- Elaboration of the scientific basis for the incorporation of ecosystem approach and principles of biodiversity conservation in legislation.
- Elaboration of the scientific basis for legislation on standards, licensing, certification, rating, and audit.
- Elaboration of the scientific basis for legislation on the access to genetic resources.

● *Elaboration of scientifically-based economic mechanisms of biodiversity conservation*
- Development of methods for economic estimation of biodiversity with regard for its environment-forming function, improvement of methods for the economic evaluation of damage to living nature taking into account its delayed effects.
- Development of inter-related macroeconomic and special economic instruments (taxation of the use of natural resources, creation of ecologically-oriented national accounts, promotion of the market of ecologically pure products, environmentally friendly technologies, and equipment, etc..
- Identification of areas and conditions for the efficient application of ancillary economic methods (optimization of the complex of economic and administrative methods).

● *Elaboration of the scientific basis for the formation of public consciousness and education*
- Development of methods for monitoring ecological aspects of public consciousness.
- Sociological analysis of relationships between ecological consciousness (with reference to biodiversity conservation) and characteristics of different social groups, activities of political parties, associations, religious confessions, and non-governmental organizations.
- Elaboration of principles of work with various social and age groups as regards ecological education and propaganda of biodiversity conservation.
- Correction of methods of ecological and biological education at various levels with special reference to biodiversity conservation.
- Publication of an inter-disciplinary encyclopaedic dictionary of terms and conceps related to conservation of biodiversity.

4.7. Monitoring Biodiversity

In Russia, information on biological resources used in agriculture, forestry, fishery, and commercial hunting, on the activities of sanitary and epidemiologic service, land and water use services, and the network of specially protected natural territories is collected on a multi-sectoral basis. However, such a systems does not ensure a comprehensive characteristic of biodiversity because different sectors are focused on its different parameters, employ different methods, and on the whole act in an uncoordinated manner. The efficiency of the system has greatly reduced in the last years.

Monitoring must provide governing bodies, research institutes, non-governmental organizations, commercial companies, and general public with the information on the current stand and trends of biodiversity. Concrete tasks and organizational forms of the monitoring system as well as the use of its results depend on the object of monitoring and the way it functions. Timely biodiversity information allows for rapid and adequate correction of biosystem conditions and socio-economic processes influencing them. The most general information on biodiversity should be incorporated into a national report on the environmental situation.

Main objectives

● Inventory of biodiversity at population, species and ecosystem levels; soil inventory. Identification and estimation of the most valuable, rare and threatened objects of biodiversity and soils. Biodiversity inventory is in the first place needed in high-risk regions to ensure rapid elaboration and implementation of conservation programs.

● Establishment of a biodiversity monitoring system, organization of continuous monitoring and collection of information necessary for decision-making.

In Russia, high diversity and complexity of objects of monitoring coupled to significant differences in regional conditions do not allow to construct a state monitoring system based on a single scheme. The efficient government system of biodiversity monitoring (a sub-system of the General System of State Ecological Monitoring) can be organized based of the common informational space and an extensive network of relatively independent regional, departmental, and other information centres.

The biodiversity monitoring system must include the following complementary subsystems.

- Federal information and analytical biodiversity centre coordinating collection, storage, and analysis of data necessary for the decision-making at the federal level and the fulfillment of international commitments of the Russian government concerning biodiversity conservation.
- Regional systems of biodiversity monitoring with the involvement of local nature reserves and biological stations. These systems must ensure informational support for the management actions at the regional level, collection and preparation of information for the federal information centre.
- Sectoral monitoring systems in agriculture, forestry, fishery, hunting, sanitary epidemiologic service, water economy, and a network of specially protected natural territories.
- Information system on genetic resources.
- Data analysis system on land use and soils.
- Data analysis system on abiotic components of the environment with emphasis on biodiversity conservation.
- System of remote sensing data analysis.
- Systems of data analysis for general statistics (estimation of human impact on living nature) and monitoring public opinion (elucidation of attitudes of different groups towards biodiversity).

Main lines of work

- Organization of federal and regional information and analytical biodiversity centres.
- Elaboration of a system of biodiversity indicators based on characteristics of populations, species, communities and ecosystems, health parameters of organisms in natural populations; elaboration of a scheme for the siting of observation points over the territory, development of applications of modern techniques for the collection of information including remote sensing systems.
- Elaboration of common standards for the collection, storage, and presentation of biodiversity information taking into account the traditional milti-sectoral approach.
- Modification of the multi-sectoral system of data collecton in compliance with the aims of biodiversity monitoring including that at specially protected natural territories.
- Organization of an information system on genetic resources.
- Establishing links with the systems of monitoring abiotic components of the environment.
- Establishing links with the state monitoring system for land resources; setting up a state system for monitoring protected soils.
- Collection of information about unexploited biodiversity outside specially protected territories. A substantial body of relevant data can be obtained from research institutes, lay observers, and students.
- Development of methods for the collection of information about economic activities and estimation of their influence on biodiversity.
- Rational use of remote sensing data.
- Co-ordination and integration of biodiversity data obtained from regional and departmental information centres.
- Preparation of biodiversity monitoring data for decision-makers at all levels of goverment management and in all sectors of economy;
- Training of technical servants and the senior staff of information biodiversity centres.