

1.5. Prerequisites for Biodiversity Conservation

Flora, rich in specific diversity, composes the pastures and forest resources of the country. In recent decades, the volume of forest food products has been reduced, due to the transformed land use structure.

The genetic resources, selection and practical management of agriculture, are based on the wild fruit plants of Tajikistan, particularly in mountain areas. The fruit resources include 1457 variety of specimens: apple (*Malus*), pear (*Pyrus*), cherry (*Cerasus*), plum (*Prunus*), etc. In this connection, the biodiversity management should be developed in combination with its conservation and sustainable development.

1.5.1. Legislative and Institutional Base

The biodiversity conservation and sustainable management in Tajikistan are included in the Constitution and secured by the legislation. The Law on Nature Protection of Tajikistan promotes the formation and improvement of environmental legislation, as well as the biodiversity conservation.

The system of environmental legislation of Tajikistan, directly related to biodiversity, includes a number of laws and regulations, issued by executive bodies. They regulate the relationships within biodiversity management:

- establishing procedure of managing natural resources, including the vegetation and animal worlds;
- identifying rare and endangered animals and plants, which are forbidden to prey on;
- setting rules for non-commercial and commercial hunting and fishing;
- developing activities (hunting, fishing, gathering medicinal grass, etc.), required special permission (license);
- establishing protected areas with various conservation regimes;
- working out requirements concerning nature protection, which need to be observed while realizing economic and other activities;
- determining types of environmental law violation and crime, responsibility for crime commitment, and procedure of punishment.

- developing procedure of compensating damages caused by illegal use of nature, including the vegetation and animal world;

The environmental legislation is currently being transformed, restructured, and adapted to new economic relations and the country commitments to Conventions.

Despite the approved Law on Nature Protected Areas, the legislative base ensuring the protected area status remains imperfect. A fundamental reconstruction of the environment protection system, adapted to everyday needs of the local population, is required.

In addition to the environmental legislation of Tajikistan, there are regulations (concerning agriculture, forestry, fishery and water use, etc.), which influence the biological resources, e.g.:

- The forest laws regulate forest protection;
- The land laws regulate land management and provides conservation and sustainable use of land;
- The water laws commit water-consumers to sustainable management of water resources;
- The laws on local authorities empower the local administration to control compliance of the Law on Nature Protection and Natural Resource Management.

Main Environmental Laws:

- Administrative Code (1986);
- Law on Nature Protection (1994);
- Law on Animal World Conservation and Management (1994);
- Law on Mineral Resources (1994);
- Law on Air Protection (1996);
- Law on Protected Areas (1996);
- Land Code (1996);
- Forest Code (1996);
- Law on Public Health Protection (1997);
- Criminal Code (1998)
- Water Code (2000);
- Law on Plant Quarantine (2001);
- Law on Production and Consumption Waste (2002).

Main Regulations:

- The Red Data Book of Tajikistan (1988);
- Regulation on the State Environmental Expertise (1994);
- Taxing Illegal Fishing or Killing Valuable Fish Species (1995);
- Taxing Violation of the Republican Law on Biodiversity Conservation (1996, 1997);
- Regulation on Hunting and Hunting Enterprises (1997);
- Regulation on the State Service of Plant Quarantine in Tajikistan (2002).

In recent years, Tajikistan has ratified a number of International Conventions on environmental issues, including on biodiversity.

The legislative base, available in the country, includes the main laws of environment protection; however, the tools of their realization are not developed. The existing legislation is aimed mainly at environment protection and control of environment pollution. The destruction of species and ecosystems, having caused serious and irreversible results, has not got any appropriate legal assessment.

The following reasons and difficulties are hampering an observation of the existing legislation:

- confusing content of some law articles;
- lack of proper coordination between existing laws;
- low effectiveness of economic regulating and controlling tools, due to the lack of laws for legislation observation;
- some regulations become outdated, not confirming with the socio-economic and political situation in the country.

The Institutional Base of biodiversity conservation consists of institutions and organizations working on studying and conserving biodiversity and its components. These are state bodies: National Biodiversity and Biosafety Center (NBBC), Ministry for Nature Protection (MNP), Forestry Department of the Republic of Tajikistan (FD RT), and institutes of the Academy of Science specialized in biology, botany, and zoology.

- Ministry for Nature Protection provides coordination and control of realizing the require-

ments of the Convention on Biological Diversity; develops and implements the state policy in nature conservation and natural resource management.

- NBBC is in charge of coordination of biodiversity conservation, realization of the Convention through National Strategy and Action Plan on Conservation and Sustainable Use of Biodiversity.
- The Forestry Department is committed to conservation and sustainable management of forest resources, providing control of reserves and zakazniks.
- The Academy of Science, with relevant institutions (Institute of Botany, Pamir Botanical Institute, Institute of Plants Physiology and Genetics, Institute of Zoology and Parasitology) carries out researches in botany, zoology, genetics, microbiology, etc.
- The Tajik Academy of Agricultural Sciences and the Ministry of Agriculture work on conservation and sustainable management of agricultural biodiversity; genetic resource preservation; breeding of new and improvement of existing varieties of agricultural plants.
- Local Khukumats provide executive tools of implementing the Convention in local communities; organize the process of environmental education.

The current poverty level in Tajikistan is over 80% of the population. The unemployment, lack of means of subsistence, economic difficulties, and decline in the educational level in rural areas causes unrestrained use of natural resources. To successfully conserve biodiversity, effective institutional base, monitoring system, and legislative base should be developed.

In addition to governmental and administrative bodies, there are over 40 various environmental non-governmental organizations (NGOs), working on environmental and public health issues in Tajikistan. However, all environmental NGOs are separate, their work being insufficient.

Since 1995 in Tajikistan some international facilities implement their activity, the priority of which is supporting NGOs', as well as dealing with environment. Some NGO projects on biodiversity conservation have been funded.

International Relations. The policy of the Republic of Tajikistan in biodiversity conservation and sustainable management is aimed at providing priorities for ecological interests of the country, with scientifically grounded combined development of economic and environmental activities.

The main activity on maintaining biodiversity conservation and sustainable economic development is based on:

- joining the international agreements in biodiversity conservation;
- signing bilateral and multilateral agreements in biodiversity conservation at the regional and international levels;
- establishing long-term relations with regional and international environmental structures;
- developing and implementing regional and international projects and programs.

Tajikistan ratified the main international agreements. The international documents considerably supplement the national environmental legislation.

1.5.2. Requirements of Biodiversity Conservation Included in Industrial Policy

The main factor affecting the biodiversity of Tajikistan is the agriculture, forestry, energy, and transport development. The principle of fa-

Conventions Ratified by Tajikistan:

- Vienna Convention for the Protection of Ozone Layer (1996);
- Montreal Protocol on Ozone Layer Depletion and the London Amendment (1997);
- Convention on Biological Diversity (1997);
- Convention to Combat Desertification (1997);
- UN Framework Convention on Climate Change (1998);
- Ramsar Convention on Wetlands (2000);
- Convention on Conservation of Migratory Species of Wild Animals (2000);
- Aarhus Convention on Access to Information, Public Participation in Decision-Making Processes, and Justice in Environmental Matters (2001);
- Stockholm Convention on Persistent Organic Pollutants (2002).

vorable environment, nature components (ecosystems), fauna, and flora conservation is poorly considered by industrial norms, standards, and strategies for branch development.

Much attention should be paid to determining and analyzing damages, caused to biodiversity, and methods of their prevention and compensation.

Implementation of the developed Strategy and Action Plan will promote development of renewed toolkits.

1.5.3. Biodiversity Research and Monitoring

The problems of research and biological monitoring have been repeatedly discussed at departmental, state, and other seminars, and included in many scientific and technical programs. However, lack of funds and a number of other factors prevent their implementation. There is no summary database on biodiversity, without which the results of research carried out cannot be controlled and analyzed.

Most of researches on biodiversity *in-situ* and *ex-situ* have been carried out within scientific and technical programs of different industries. Many of these researches are carried out by scientists of the Academy of Science RT, and Tajik Academy of Agricultural Sciences.

Comprehensive knowledge of animal and plant species is based on the results of expeditions and analysis of collections. A rich herbarium is collected; maps are drawn up. Scientific publications appeared. The main results of the country biota investigation are published.

The flora and fauna research is carried out at species, community and ecosystem levels. The inter-institutional scientific and technical programs focus mainly on:

- Inventorying and evaluating flora and fauna and their communities;
- Developing scientific base and recommendations for conserving flora and fauna genetic resources;
- Regulating man-caused load on environment;
- Evaluating some natural resources from economic point of view and developing recommendations on their management.

Main Publications on Biodiversity

- Flora of the Tajik SSR, 1-10 volumes, 1957-1991;
- Insect Fauna and Zoogeography of Central Asia, 1966;
- Atlas of the Tajik SSR, 1968;
- The Florogenetic analysis of Natural Flora from Mountainous Central Asia, 1973;
- Forest Resources of Pamiro-Alai, 1976;
- Fauna of Tajikistan. 12 volumes, 1980-1990;
- Entomological Review of Tajikistan, 1981;
- Nature and Natural Resources of Tajikistan, 1983;
- Zoological Science of Tajikistan for 60 years, 1985;
- Cartographic Materials, 1985-1995;
- Plants for Decorative Gardening in Tajikistan, 1986;
- The Red Data Book of the Tajik SSR, 1988;
- The National Report of the Ministry of Environment Protection, 1993;
- Pastures and Grasslands of Tajikistan, 1977;
- Flora of Tajikistan, 2001.

Under new socio-economic conditions, insufficient funding and lack of a material base cause a reduction of researches, both in volume and number of trends.

The biodiversity monitoring is quite limited, being included in rare thematic researches, which do not represent common research system. The most favorable situation is in the forestry system, where monitoring is implemented by systematically estimating the forest resources, controlling the mountain forest state in protected nature areas. However, this does not meet the requirements of all-round and effective monitoring.

No methodology or scientific substantiation of monitoring exists in the country. There is no monitoring system for biological components in the country. Many institutions carry out specific estimation of environment and biodiversity components, e.g. scarce observations of particular plant and animal species areas and numbers. Many authors periodically estimate the numbers of reptiles, snow leopard, wild ram, argali, and nesting birds; these estimations are contradicting and ignoring each other. The num-

bers of game animals and birds are estimated within restricted areas of hunting enterprises. Some rare and endangered animal species, listed in the Red Data Book of Tajikistan, are inventoried.

To create a monitoring system in Tajikistan, the existing network of protected areas, as well as specially selected representative landscapes, could be used. Laws and regulations of environment and biodiversity monitoring should be developed.

1.5.4. Informational Exchange. Environmental Education and Training

The research institutions have rich collections of scientific, specialized, and research literature. However, the latter have not been used in recent years, neither for informational exchange. New subject-matter issues are of poor quality and rarely used.

There is no proper system of inter-institutional exchange of information on biodiversity conservation; rare activities in different branches are not interconnected or included in a common system.

Staff deficiency is observed almost in all branches of natural sciences, forestry, ecology, environment protection, etc. The initial environmental knowledge is taught at schools, gymnasia, lyceums, and colleges. The general environmental training is carried out at all educational institutions, including universities.

NGOs organize seminars and lectures to popularize knowledge of biodiversity conservation.

The Ministry for Nature Protection of Tajikistan organizes press-conferences, meetings, round tables, etc., within the program on environmental education.

New curricula are developed at high and secondary schools for training specialists in ecology and environment protection. However, lack of the material and technical base of educational institutions, new teaching methods, and informational network produces negative impact on the teaching quality.

There is no system of improving professional skills, no special courses on biodiversity, no inter-institutional plans on organizing courses of biodiversity conservation and sustainable management.

A number of international conventions being signed, the access of the public to environmental information is still restricted, due to the weak participation of the population in decision-making in the field of environmental protection.

1.5.5. Local Potential Use

One of the effective tools of biodiversity conservation is increasing the role of the local potential through interacting with Khukumats, communities, various NGOs. All the existing institutional, human, and financial resources should be used at the district and regional levels.

The local policy of biodiversity conservation includes work on providing favorable environment for living nature through observing the ecological norms and standards in economic activity, reducing waste products and water pollution, introducing secure technologies, controlling imported chemicals, developing public initiatives (subbotniks, planting of trees), etc. Envi-

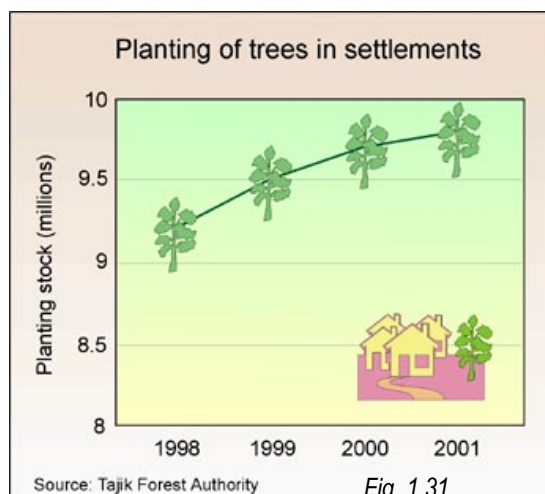


Fig. 1.31.

ronmental education, propaganda of environmental safety, and access of the population to environmental information are very important at the present time.

Considering need of sustainable use of flora resources and national traditions, President E.Sh.Rakhmonov called the people to take part in annual planting actions all over the country (fig. 1.31).

Realizing specific programs on: improving protected areas, expanding forest-shelter belts, planting trees, conserving and restoring mountain forests and coastal zones, will promote resuming of anthropogenic impact on the environment.

II NATIONAL STRATEGY

2.1. Strategy Actuality

The biodiversity conservation strategy for rural countries provides sustainable development and guarantees the economic and social sustainability of the community and nature.

The guiding principles of the development and implementation of National Biodiversity Strategy are adapted to the approaches of many Asian and European countries. The approval of these principles shows a Strategy connection with other similar strategies and proves the approaches of Tajikistan are conformable with those of other countries.

The interrelation between NBSAP and the Convention provides the identity of strategies of different countries and is a scheme of biodiversity conservation, coordinated on the international scale.

2.2. Strategy Goals

The main goal of the strategy is to preserve and manage the biodiversity and to conserve ecosystems, thus providing the sustainable economic and social development of Tajikistan.

The components of the Biodiversity Conservation Strategy are:

- complex economic and social evaluation of national biological resources;
- regeneration and conservation of the genetic pool of plants and animals;
- biodiversity conservation *in-situ* and *ex-situ*;
- providing biological safety of the country;
- sustainable use of biological resources to reduce poverty and to improve human quality of the life.

2.3. Strategy Objectives

The strategy objectives are to take consecutive and purposeful actions according to the terms and volume of funding. Special attention is given to the legislative and institutional capacities. The main objectives of National Strategy are:

- Developing the economic mechanism, promoting a conservation and sustainable management of the biological and landscape diversity.
- Seeking for funds inside and outside the country to provide the biodiversity conservation and its sustainable management.

Table 2.1. Strategy objects and their internal diversity

Approaches	Object	Object internal diversity
Population and Species	Organism	Diversity of genes, cells, tissue, and organs
	Population	Diversity of individuals within a population, including genetic diversity. Diversity of elements of an intrapopulation structure
	Species	Diversity of populations, intraspecific forms, and subspecies
Ecosystem	Community of organisms	Species diversity
	Ecosystem	Diversity of species, communities, and abiotic environment
	Ecosystem complex of the related territories	Diversity of ecosystems
	Biosphere	Global diversity of species. Global diversity of ecosystems

- Providing sustainable development and management of the country biodiversity at the level of ecosystems, species, intraspecific forms, and useful inherited forms.
- Determining the needs of the country in the biodiversity use, basing on governmental priorities, with specific conditions of the country being considered.
- Defining technologies and methods of the biodiversity management and alternatives of its conservation on the part of governmental bodies, institutions, and organizations.
- Determining and improve the role of the public in biodiversity conservation.
- Contributing to implementation of the program on the poverty alleviation by 2005.

The approval of strategy for the nearest 5 years will create objective basics to meet the requirements of the Convention on Biodiversity.

2.4. Methods of Strategy Development

According to the requirements of the Convention on Biodiversity, Article 6, Resolution 2 of the Conference on agreed text of the Convention on Biodiversity (Nairobi, May 1992), the key elements of Strategy development are:

- determine the biodiversity components;
- collect and evaluate data for monitoring;
- determine process and activities having affect on biodiversity;
- evaluate possible economic consequences on the biodiversity sustainable management;
- determine the value of biological resources;
- evaluate primary measures on biodiversity conservation and sustainable management.

Creation of information database and collection of initial information on the biodiversity and its state, was the base for planning biodiversity conservation.

The planning process considered the need of both inventory and monitoring of biological resources and economic benefits resulting from implementing the measures on biodiversity conservation.

The database should be constantly renewed, because of dynamic state of the biodiversity.

The biodiversity analysis was based on the evaluation of the internal potential, with the assessment of legislative base, informational network, and organizational capacity being considered.

2.5. Main Strategic Action Trends on Biodiversity Conservation

Considering the natural and historic conditions of biodiversity development and the present state of biodiversity components within National Strategy, effective measures should be taken on the following priorities:

- establishing a joint center for biological diversity management within the framework of the general state policy;
- improving the scientific research base of biodiversity conservation and biosafety;
- improving management of available protected areas and establishing new areas, which will serve an environmental base for providing further sustainable use of biodiversity;
- biodiversity conservation *in-situ* and *ex-situ*;
- organizing a biological monitoring system and creating an electronic database and databank on biodiversity;
- restoring the structures and functions of degraded ecosystems;
- providing sustainable management of biological resources (pastures, forests, wildlife, etc.);
- reducing human negative impact on urban ecosystems and biodiversity;
- using indigenous traditional methods on biodiversity conservation and sustainable management;
- developing regulations and standards for biodiversity conservation and sustainable management, and economic measures on stimulating this work;
- improving a legislative base for implementing state policy on biodiversity;
- improving regional interaction and international cooperation on biodiversity issues;
- providing scientific information and developing a personnel training system;

- improving NGOs' work; involving the public in the biodiversity decision-making process; and providing environmental education of the population.

2.6. Priorities of Biodiversity Conservation

1. General Biodiversity Issues:

- Improving the biodiversity conservation policy in order to reach sustainable management of biological resources.
- Improving the legislation base to provide the Biodiversity Convention implementation.
- Developing long-term programs of research and biological monitoring.
- Investigating and estimating the climate change impact on biodiversity.
- Organizing and implementing forest-restoration work in all forest types.
- Compiling and publishing the Red Data Book of Tajikistan (second edition).
- Publishing the Green Book of Tajikistan (rare plant communities).
- Developing and implementing a national program of juniper, floodplain, xerophytic forest, and light forest restoration.
- Developing and taking measures on conservation and sustainable management of biological resources in the Tien Shan and Pamir-Alai transboundary mountain systems.
- Developing and implementing branch and area plans of actions to preserve and restore ecosystems and landscapes.
- Developing national program on pasture restoration and sustainable management.
- Developing monitoring of forest resources and creating an informational system.
- Developing complex program of environmental education in the sphere of biodiversity.
- Providing financial, technical, methodological, and consulting support in developing and publishing educational and popular scientific manuals on biodiversity conservation.
- Providing an economic evaluation and running the list of biological resources, used in the national economy.
- Involving donor countries in biodiversity conservation of global value.
- Creating a database of flora, fauna, and microorganism biodiversity.
- Determining priorities in co-operation on biodiversity conservation (establishing transboundary nature reserves, migration corridors, green corridors, regional ecological networks, and shared environmental regions).
- Developing national criteria, indicators, and regulations under commitments of environmental Conventions.
- Preparing the text of Convention on Cultural and Natural Landscape Conservation in Central Asia.
- Initiating the development of the Central Asia Ecological Network.
- Ratifying the Cartagena Protocol on Biosafety.



Swamps



Mesophyllic forest ecosystems

2. Creation of the National Ecological Network:

- Developing a concept and methodological instructions on creating the ecological network.
- Drawing up an area map of the national ecological network (1:1000 000).

- Determining and mapping areas to be included in the national ecological network.

3. Biodiversity Conservation at the geosystem level:

- Developing a draft law of creating a national ecological network.
- Developing a draft law of natural monuments.
- Organizing new and transforming the existing protected areas into micro zakazniks and microreserves.

4. Nival Glacier Ecosystem Conservation:

- Developing laws regulating tourism, international hunting, and damage compensation.

5. High-Mountain Desert Ecosystem Conservation:

- Establishing a National Park in the mountain desert ecosystem.
- Developing programs on restoration of teresken plant communities in the Pamirs.

6. High-Mountain Meadow and Steppe Ecosystem Conservation:

- Improving the nature protection regime in habitats of rare and endangered animals and plants.
- Regulating pasture management in habitats of valuable steppe communities.

7. Mid-Mountain Conifer Forest Ecosystem Conservation:

- Developing new and improving the existing regulations concerning a conservation and sustainable management of forest resources.
- Creating permanently operating forest nurseries.



Vitis vinifera



Mid-mountain savannoide ecosystem

8. Mesophyllic Forest Ecosystem Conservation:

- Developing a specialized program of walnut forest area restoration.
- Inventorying biodiversity of mesophyllic forests.

9. Mid-Mountain Xerophytic and Light Forest Ecosystems Conservation:

- Creating microzakazniks.
- Inventorying xerophytic light forests.

10. Low-Mountain Semisavanna (Savannoide) Ecosystem Conservation:

- Expanding the area of wild medicinal plants.
- Creating a bank of wild flora seeds.

11. Foothill Semidesert and Desert Ecosystem Conservation:

- Establishing microreserves and microzakazniks in habitats of rare and endemic animal and plant species.
- Restoring saxaul in the buffer zone of the Tigrovaya Balka Reserve.

12. Wetland Ecosystem Conservation:

- Developing and implementing a program of water area restoration.
- Developing a program on minimizing the chemical contamination of water ecosystems.
- Developing and introducing recommendations on stopping erosion processes in the watershed area of the Nurek Reservoir.
- Organizing a system of wetlands monitoring.

13. Agroecosystem Conservation:

- Creating a database of genetic resources of fruit and vegetable, berry and melon crops.
- Creating a germ plasma bank of collection animal varieties.

- Developing recommendations on creating shelter forest belts.
- Establishing zakazniks to restore the populations of cultivated plant wild relatives and to prevent their degradation.

14. Urban Ecosystem Biodiversity Conservation:

- Developing draft laws and regulations on plants in urban ecosystems.
- Improving the environmental requirements to conserve biodiversity in the process of urban development.
- Determining valuable urban and rural green zones to include these in protected areas.

15. Species Conservation *in-situ*:

- Developing and passing the law on genetic resource conservation.
- Developing and passing the law on vegetation.
- Developing principles of identifying categories of rare species and communities (according to IUCN) and selecting them to be included in the Red Data Book of Tajikistan (second edition).
- Inventorying rare and endangered species within protected areas.

- Organizing monitoring of endangered species.

16. Conservation of Biodiversity Outside Natural Habitats (*ex-situ*):

- Developing draft law and regulations of genetically modified organisms (GMO).
- Developing a national program of biodiversity conservation *ex-situ*.
- Establishing a Center for genetic resources.
- Carrying out inventory and monitoring of biodiversity *ex-situ*.

2.7. Strategy Components

Biodiversity Conservation Strategy includes a number of interconnected components (or approaches to conservation), which, being combined, will help to reach the main goal of the plan. The Strategy components are:

A. Biodiversity Conservation *in-situ*

This approach considers the importance of conservation within wild nature and emphasizes the importance of biotic community and ecosystem conservation within protected areas and outside.



High-mountain meadows

Geosystem (GS) Level:

- GS₁** – maintaining a general geographic balance of landscapes by creating a national ecological network,
- GS₂** – restoring degraded landscapes, providing their life balance
- GS₃** – preventing degradation of protected areas, protected by Government.
- GS₄** – restoring landscapes when constructing cities, settlements and engineering structures.
- GS₅** – restoring landscapes implementing mining-ore industry.
- GS₆** – establishing protected areas in the water territories of hydro-power knots and power stations.
- GS₇** – establishing special nature management regime in nival zones.
- GS₈** – restraining activities in large mountain watercourses.

Ecosystem (ES) Level. This approach considers biodiversity as important resource, on which local communities are dependent. A sustainable management is a mechanism correlating consumers' needs and natural resources conservation. Also, it is a tool of conservation in situ outside protected areas, connected with providing incentives and means of subsistence for the population.

- ES₁** – preventing forests degradation by maintaining them in proper state, regenerating valuable natural forest communities, increasing forest restoration,
- ES₂** – improving the state of natural ecosystems;
- ES₃** – regulating water ecosystems management and preventing changes of hydrological conditions;
- ES₄** – preventing degradation of high-mountain ecosystems by regulating their management;
- ES₅** – preserving and improving savannoid ecosystems;
- ES₆** – balanced using of agricultural ecosystems;
- ES₇** – improving state of environment in urban ecosystems;
- ES₈** – regulating and establishing a special order of cattle grazing in mountain-meadow and steppe ecosystems.

- ES₉** – fostering the nature protection regime in water areas of tugai ecosystems.
- ES₁₀** – reconsidering structure and status of nature protected areas.
- ES₁₁** – preventing decrease of semidesert-desert ecosystems.

Population and Species Level (SL):

- SL₁** – conserving diversity of biological species;
- SL₂** – preventing a drop in numbers of species and populations in natural biocoenoses;
- SL₃** – conserving flora and fauna habitats;
- SL₄** – protecting native species;
- SL₅** – restoring the species diversity of forest communities;
- SL₆** – conserving diversity of game species;
- SL₇** – organizing specialized test points on plants growing and animals breeding listed in Red Data Book of Tajikistan.
- SL₈** – restraining of economic activities in the habitats of valuable plant and animal species.

Genetic Level (GL):

- GL₁** – preventing reduction of intrapopulation genetic diversity of flora and fauna species;
- GL₂** – preventing degradation of the genetic pool of local and introduced taxa;
- GL₃** – conserving biodiversity by supporting indigenous cultural traditions of the population;
- GL₄** – preventing reduction of, and impact on wild relatives of fruit plants;
- GL₅** – fostering protection of intraspecific diversity of valuable wild and forage plants.

B. Biodiversity Conservation ex-situ

Conservation outside the natural habitats of species is considered as a duplication of conservation in nature that provides protecting system of wide range of genetic resources aimed at their possible restoration in the former habitats:

- ExS₁** – developing complex programs on studying and conserving biodiversity *ex-situ*
- ExS₂** – preventing a drop in numbers of taxa, cultivated *ex-situ* (plants, mushrooms, animals);

ExS₃ – preventing further degradation of international taxa, not typical for Tajikistan;

ExS₄ – providing phytopathological and veterinary control for genetically modified organisms;

ExS₅ – developing an economic mechanism of biodiversity conservation *ex-situ*.

2.8. Principles of Biodiversity Conservation

Biodiversity conservation requires sustainable management of biological resources, policy of sustainable development pursued in the ecosystems management, and state protection of representative and unique natural areas. For this reason, the general and specific principles of biodiversity conservation, followed by most countries, have been adopted.

a) General principles:

- generations equality – the next generation has the same right to favorable environment, landscapes, biological diversity, as the present generation;
- ecological equality – all people in the world have equal rights to a healthy environment and its natural resources;
- state obligations – biodiversity conservation and the economic prosperity of the country are the inherent obligations and concern of the state;
- public access to information and participation in the decision-making process – assurance of the population active participation in the implementation of biodiversity conservation measures by means of adequate information.

b) Specific principles:

- principle of avoidance – every decision, which may have an impact on biodiversity should be accepted with maximum caution, taking into consideration all possible consequences;
- precautionary principle – in each action it is necessary to take into consideration the minimization of possible negative impacts, even though, the proofs are missing;
- principle of careful decision-making – all decisions, which have an impact on biodiversity, should have scientific motivations;

- principle of ecological compensation – any activities, method or material that could adversely affect biodiversity have to be replaced by less harmful ones;
- principle of translocation – any activities, which pose a threat to biodiversity have to be relocated to other sites less valuable from the biological point of view, in cases where there is no possibility to change or neutralize them;
- principle of ecological integrity – biological conservation should be based on the ecosystem approach, the analysis of habitats and relations between species;
- *in-situ* priority principle – in the protection of all species, *in-situ* measures should be absolutely dominant, and *ex-situ* protection considered only as a supplement thereto;
- principle of regionalization – acceptance of full responsibility for biodiversity conservation in a region's territory, even when the biological objects occur in other countries; the same principle applies to separate regions of the country;
- polluter pays principle – physical and legal entities must compensate for the damage they cause to natural environment and biodiversity;
- principle of best available technology – assurance and utilization of modern technologies with minimum negative impact on biodiversity.

2.9. Terms of Strategy Implementation

The Strategy components were classified according to period of implementation: short-term – less 5 years, mid-term – 10 years, long-term – more than 10 years. To implement many Strategy components at the geosystem level, at least 10 years are required. The terms of the Strategy components implementation at the ecosystem level are from 5 to 10 years, while those for the components, related to species conservation, genetic pool preservation and conservation *ex-situ* – 5 years.

III

IMPLEMENTATION OF ACTION PLAN ON BIODIVERSITY CONSERVATION

3.1. Financial Mechanism

Implementation of Action Plan will be funded partially from the available sources. However, review of current financial mechanisms and new financial sources is required.

Below is a list of possibilities to provide financial mechanisms for NBSAP implementation.

The State Budget is quite limited and cannot cover all planned expenses for implementing activities on biodiversity conservation and organizing work on its sustainable use.

In spite of this, the state budget provides funds for maintaining reserves (zapovedniks and zakazniks), national parks, ecological departments, institutes of the Academy of Science (Institute of Botany, Institute of Zoology, Institute of Plant Physiology and Genetics, Pamir Biological Institute); training specialists; providing forest conservation services, and a number of other sectors working on biodiversity conservation and restoration.

Republican Funds for Nature Protection. Later on, it can become important sources of funding of managing biodiversity and relevant actions, which are funded from internal sources.

Local Budgets. Implementing work at the local level will allow using local funds for nature protection to preserve biodiversity and promoting investments to bioresources management.

Microcredits. Developing programs on microcredits, will create additional possibility to fund mini-scale activities.

Small Grants are particularly effective at the initial stage, including support for local initiatives.

FOOD FOR WORK programs. As a part of employment plan aimed at poverty alleviation at the local level, conservation of species habitats could be emphasized. This measure shows the capacity of employment in the sphere of environmental protection.

Funds, formed to liquidate the consequences of natural disasters. Methods of planting and slope fortification with trees and bushes are considered one of the most effective means of the regulation of natural phenomena.

Projects funded by donors. Considering a wide range of effective activities within NBSAP, there are many possibilities for close cooperation with various local and foreign donors during project implementation period.

The Global Environmental Facility. One of the main goals of the Facility is to manage biodiversity issues of global importance. For this purpose, there is a series of financial mechanisms (including small and medium grant programs).

3.2. Funding Action Plan

To maintain the general quality level of the environment, the expenses for nature protection should make up 6-7% of the GDP (gross domestic product), while to conserve the state of natural resources, they should be increased to 10% for areas with the disturbed environmental balance. According to the UN standards for developing countries, including Tajikistan, the capital investments in environment protection should be 0.8% of the GDP.

In 2000, the funds spent for environmental measures made 0.07% of the GDP. In the previous 5-year period (1995-2000), the annual average expenses were 0.034% of the GDP (table 3.1).

The total amount of expenses needed for the 10-year period of the Biodiversity Action Plan implementation is estimated at 67.8 million somoni (US\$26.6 million; prices of 2002), with annual expenses being over 5 million somoni (table 3.2).

The state budget share will be 35%. Funds from environmental foundations will make 10%. Some funds (20%) will be provided

Table 3.1. Expenditures on Environmental Protection and Sustainable Use of Natural Resources
(current prices)*

Name	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Expenditures on environmental protection and sustainable use of natural resources, ths. somoni	28.9	436.1	5485	1794.1	43.9	151.7	169	179.8	149.6	1268.8
GDP, mln. somoni	13.4	64.5	707.1	1786.5	69.8	308.5	518.4	1025.2	1345.0	1806.7
For expenditures on environmental protection and sustainable use of natural resources in GDP, %	0.2	0.7	0.8	0.1	0.06	0.05	0.03	0.02	0.01	0.07

*Annual edition of Republic of Tajikistan for 2000 Dushanbe: State Statistic Committee, 2001. – P.148, 161.

Table 3.2. Funding Required for the Action Plan Implementation (2001, \$1=2.55 somoni)

No.	Actions	Terms of implementation	Cost							
			Total		Including					
			ths. doll.	ths. somoni	SB		LM		EF	
ths. doll.	ths. somoni	ths. doll.			ths. somoni	ths. doll.	ths. somoni			
1	2	3	4	5	6	7	8	9	10	11
1.	General Action Plan on Biodiversity Conservation	2003-2010	4283	10921	1008	2570	2508	6395	767	1956
2.	Creation National Ecological Network	2003-2010	745	1900	341	870	339	864	65	166
3.	Biodiversity Conservation at Geosystem Level	2003-2010	3995	10187	850	2168	2990	7624	155	395
4.	Conservation of Nival Glacier Ecosystems	2003-2010	1115	2843	493	1257	422	1076	200	510
5.	Conservation of High Mountain Desert Ecosystems	2003-2010	1922	4901	473	1206	1332	3397	117	298
6.	Conservation of High Mountain Meadow and Steppe Ecosystems	2003-2010	1885	4807	758	1933	1032	2632	95	242
7.	Conservation of Mid-mountain Conifer Forest Ecosystems	2003-2010	1038	2647	560	1428	455	1160	23	58
8.	Conservation of Mid-mountain Mesophyllic Forest Ecosystems	2003-2010	1223	3119	851	2170	372	949	–	–
9.	Conservation of Mid-mountain Xerophytic Light Forest Ecosystems	2003-2010	1415	3608	324	826	1091	2782	–	–
10.	Conservation of Mid- and Low-mountain Semisavanna (savannoide) Ecosystems	2003-2010	1069	2726	591	1507	448	1142	30	77
11.	Conservation of Foothill Semidesert and Desert Ecosystems	2003-2010	821	2093	366	933	455	1160	–	–
12.	Conservation of Wetland Ecosystems	2003-2010	1505	3838	814	2076	498	1270	193	492
13.	Biodiversity Conservation of Agroecosystems	2003-2010	2657	6776	710	1811	1947	4965	–	–
14.	Biodiversity Conservation in Urban Ecosystems	2003-2010	765	1951	718	1831	13	33	34	87
15.	Biodiversity Conservation <i>in-situ</i>	2003-2010	1452	3703	329	839	634	1617	489	1247
16.	Biodiversity Conservation outside natural habitats (<i>ex-situ</i>)	2003-2010	690	1759	136	347	283	722	271	691
Total :			26580	67778	9322	23771	14819	37788	2439	6219



Barzangi Mountains

by other nature managers and economic institutions (land-users, forestry, NGOs, etc.) while implementing programs on sustainable development of particular economic branches supported by international investments and grants. The support of international financial structures and foreign donors (nearly 30-35%) will also be required (table 3.3).

The environmental costs could be minimized through update production technologies, sustainable management of natural resources, and development of economic incentives.

The process of the Action Plan implementation suggests increasing the role of internal financing sources in biodiversity conservation, including those envisaged by the Law on Nature Protection but not completely used:

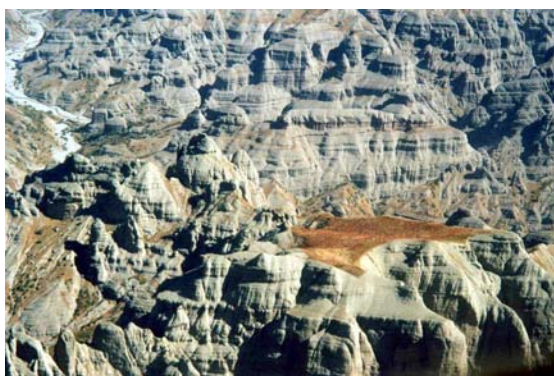
- Republican and local budgets;
- Specialized funds for environmental protection;
- Private funds of nature users;
- Contributions and donations made by private persons and organizations;
- Other financing sources not forbidden by the RT legislation;
- Compensatory payments (penalties).

The greatest part of the expenses is spent on mountain reforestation, making about 40% (table 3.4) of the total funds.

The greatest part of the activity funding structure is occupied by area planning and biodiversity conservation programs – 50.2%; research and monitoring – 27.2%, informational and educational measures, environmental education of population – 12.3%, and improvement

Table 3.3. Expenditures Chart on Biodiversity Conservation in the Context of Ecosystems (%)

No.	Actions	Cost			
		Total	Including		
			SB	LM	EF
1.	General Action Plan on Biodiversity Conservation	16.1	10.8	16.9	31.4
2.	Creation National Ecological Network	2.8	3.7	2.3	2.7
3.	Biodiversity Conservation at Geosystem Level	15.0	9.1	20.2	6.4
4.	Conservation of Nival Glacier Ecosystems	4.2	5.3	2.8	8.2
5.	Conservation of High Mountain Desert Ecosystems	7.2	5.1	8.9	4.8
6.	Conservation of High Mountain Meadow and Steppe Ecosystems	7.1	8.1	7.0	3.9
7.	Conservation of Mid-mountain Conifer Forest Ecosystems	3.9	6.0	3.1	0.9
8.	Conservation of Mid-mountain Mesophyllic Forest Ecosystems	4.6	9.1	2.5	-
9.	Conservation of Mid-mountain Xerophytic Light Forest Ecosystems	5.3	3.5	7.4	-
10.	Conservation of Mid- and Low-mountain Semisavanna (savannoide) Ecosystems	4.0	6.3	3.0	1.2
11.	Conservation of Foothill Semidesert and Desert Ecosystems	3.1	3.9	3.1	-
12.	Conservation of Wetland Ecosystems	5.7	8.7	3.4	7.9
13.	Biodiversity Conservation of Agroecosystems	10.0	7.6	13.1	-
14.	Biodiversity Conservation in Urban Ecosystems	2.9	7.7	0.1	1.4
15.	Biodiversity Conservation <i>in-situ</i>	5.5	3.5	4.3	20.1
16.	Biodiversity Conservation outside natural habitats (<i>ex-situ</i>)	2.6	1.5	1.9	11.1
Total:		100.0	100.0	100.0	100.0



Childukhtaron

of policy, legislation, and intellectual base – 7.5%. The following activities require particularly great expenses: improving the legislative and institutional base; introducing new technologies and improving management; organizing expeditions and providing update high-precision devices and equipment for laboratory analyses, expertise, and other investigations, as well as computers.

3.3. Economic Mechanisms and Means for Action Plan Implementation

Economic mechanisms should promote economic activities to create conditions stimulating sustainable management of natural resources, particularly biodiversity conservation.

The key elements of economic mechanism on biodiversity conservation are:

- using taxation on favorable terms for measures on biodiversity conservation;
- introducing special taxes (duties) on processes that affect biodiversity;
- introducing mechanism of compulsory insurance of technologies that affect the environment;
- using favorable terms of crediting for measures on biodiversity conservation;

Table 3.4. Means Allocation According to the Activities (summary on ecosystems)

Measures	Total	Including		
		SB	LM	EF
1. Improvement of policy, legislative and institutional base (ths. \$US):	1989	1039	462	488
Same in % to horizontal total	100.0	52.2	23.2	24.5
Same in % to vertical total	7.5	11.2	3.1	20.0
2. Research and monitoring (ths. \$US)	7241	2445	4106	690
Same in % to horizontal total	100.0	33.8	56.7	9.5
Same in % to vertical total	27.2	26.2	27.7	28.3
3. Territorial planning, biodiversity conservation programs (ths. \$US)	13334	4160	8316	858
Same in % to horizontal total	100.0	31.2	62.4	6.4
Same in % to vertical total	50.2	44.6	56.1	35.2
4. Education of the population. Informative-educational measures (ths. \$US)	3277	1403	1599	275
Same in % to horizontal total	100.0	42.8	48.8	8.4
Same in % to vertical total	12.3	15.0	10.8	11.3
5. Fostering of the funding support mechanisms (ths. \$US)	255	138	75	42
Same in % to horizontal total	100.0	54.1	29.4	16.5
Same in % to vertical total	1.0	1.5	0.5	1.7
6. Information, coordination, creation of clearing-house mechanism (ths. \$US)	319	84	159	76
Same in % to horizontal total	100.0	26.3	49.8	23.8
Same in % to vertical total	1.2	0.9	1.1	3.1
7. International cooperation (ths. \$US)	165	53	102	10
Same in % to horizontal total	100.0	32.1	61.8	6.1
Same in % to vertical total	0.6	0.6	0.7	0.4
8. Total all expenses (ths. \$US)	26580	9322	14819	2439
Same in % to horizontal total	100.0	35.1	55.8	9.1
Same in % to vertical total	100.0	100.0	100.0	100.0

- e) providing quota for by-products gathered within natural ecosystems, at least 5%;
- f) introducing payment for entering (visiting, crossing) protected areas and parking in specially organized sites, etc.

3.4. International Support

Measures on biodiversity conservation are subdivided into five categories, according to the decision-making levels: global, interregional, regional, national, and local.

International support is needed to create national environmental network, conserve endangered species.

3.5. Actions on Biodiversity Conservation in Particular Regions

The implementation of the Action Plan on biodiversity conservation requires differentiation of the regional policy of biodiversity conservation.

Considering the environmental state of the country, the biodiversity conservation and sustainable management should be organized and provided in view of particular natural and environmental areas.

From this point of view, **foothill plain landscapes** (geosystems) are most intensively used areas with degraded vegetation. It is necessary to create environment-stabilizing areas, exclude the degraded areas from agricultural lands and restore wild plants and fauna.



Hills



Mountain river

Low-Mountain and Plain Landscapes (geosystems) are intensively used for rain-fed and partly irrigable agriculture. Here, a considerable transformation of the geosystem, destruction of ecosystem composition, and reduction of valuable communities and species areas occur.

Mid-Mountain Light Forest and Forest Landscapes (geosystems) are used for cattle grazing and rain-fed agriculture (Central Tajikistan). Here, forested areas are being considerably reduced.

Efforts on biodiversity conservation should be aimed mainly at species conservation:

- organizing protected areas and biota migration corridors;
- restoring destructed habitats of endangered species;
- reproducing rare species and returning these in their natural areas;
- regulating abundant species according to area capacity.

The protected areas contain limited number of rare animal and plant habitats. Most of them are located outside the State Forest Resources areas. These areas are allotted to economic bodies. The flora and fauna of the Romit, Tigrovaya Balka, and Dashti-Jum reserves, the Varzob and Yakhsu River valleys, lakes and reservoirs (Nurek, Kairakkum, etc.) are endangered.

High-Mountain Landscapes (geosystems) with desert and steppe vegetation, combined with alpine meadows, intensively used by people, are partly choked with weeds and need regulated grazing and undertaking biotechnical measures on pastures.

High-Mountain Snow-Glacier Landscapes (geosystems) with sparse vulnerable vegetation need regulating all kinds of tourist activities.

3.6. Coordinating and Organizing Monitoring of Strategy Introduction Process

To introduce the Strategy of biodiversity conservation, coordination body and operational and institutional unit should be created with participation of the Governmental Working Group and National Biodiversity and Biosafety Center.

The coordination body will discuss work on meeting the commitments of Republic of Tajikistan under the Convention on Biological Diversity.

The operational and institutional unit will be NBBC. It will coordinate actions on biodiversity conservation, develop a concept of national clearing-house mechanism, mechanisms of collecting, providing access to, and exchange of information, and relevant regulations; and determine informational gaps. NBBC will implement work on creating database on biodiversity of flora, fauna and microorganisms, ecosystems, and landscapes. NBBC will also attract donors to projects on biodiversity conservation; and prepare annual reports for internal use.

NBBC will work on international cooperation by developing national concept of equally accessible biotechnologies, distributing resources and income at the international level.

The effective implementation of National Strategy and Action Plan on biodiversity conservation will help to conserve biodiversity and stabilize the ecological situation in Republic of Tajikistan.

3.7. Monitoring and Evaluation

Monitoring and evaluation are integral parts of the strategy implementation process; they assess the effectiveness of the actions planned, help to avoid work duplication, use the experience stored, and allows plan corrections, when situation has changed.

NBSAP monitoring and evaluation will be based on using available structures and information.

It will be implemented as follows:

- Participating organizations will provide monitoring and evaluation of implementation progress in particular activities.
- The Governmental Working Group in cooperation with NBBC will be responsible for collecting information on actions implementation within NBSAP from participating organizations.
- Results of monitoring and evaluation will be widely distributed through various reporting systems.

Reporting Instructions

Reports on NBSAP implementation should be submitted systematically and conform to its purpose and specific character of users.

The major reports are:

- Annual National Report on the activities implemented.
- Report on projects progress for the public.
- International report on implementation of the Convention on Biological Diversity.
- Final report on Strategy implementation (table 3.5).

Basic Principles of Project Coordination Structures

The general structures of project implementation are:

- based on the current GWG and established NBBC;
- efficient in terms of required resources and personnel;
- based on self-financing principle, with the above requirements being considered;
- based on long-term internal financial sources.

Strategy Management and Action Plan Implementation

Project will be realized by a wide range of organizations and agencies. Essential role in NBSAP implementation is given to NBBC, Ministry for Nature Protection, Tajik Forest Production Enterprise, State Land Committee, and

Government. NBSAP implementation will be supported by available and new financial mechanisms.

The Governmental Working Group (GWG) having the experience of project and information management is independent to make assessments and realize monitoring. It does not implement the activity related with NBSAP and biosafety. National Focal Point and National Biodiversity Center coordinate with

mayor participating organizations and form the structure and staff of executing bodies of conservation and sustainable use of biodiversity and biosafety.

NBSAP management structure is supposed to function as follows:

- coordinating work on NBSAP implementation (to avoid duplication or repetition, as well as emphasize the interconnection between activities);

Table 3.5. Reporting instructions

Report type	Content	Person/agency to report	Where to submit reports	How often
Annual	Detailed review of strategy implementation for year, corrected plans for the next year	NBBC Governmental Working Group (GWG)	Main participating organizations; Main financing organizations; Other organizations, closely related to NSBAP	Annually
Materials of seminars, conferences, and meetings	Final reports: Work progress, planning, financing, general situation, etc. from the GWG; Recommendations on plan correction	NBBC	Governments, organizations concerned	Each meeting
Annual report to the public	Brief and adapted version of total annual report	NBBC	Participating organizations The public International parties concerned Mass media	Annually
Reports on sectors/problems (if necessary)	Detailed reports of experts on key sectors or issues according to GWG requirements, containing: Correction and analysis of information available; Progress review within sector; Progress evaluation; Recommendations on further work and plan correction	Technical consultants	GWG	Annually
National report to the CBD	Modified version of annual report, with focus on the progress in the CBD articles implementation on national scale	NBBC Ministry for Nature Protection	CBD Secretariat Parties of the CBD	Annually
NBSAP reports	Reporting on NBSAP implementation for organizations coordinating/ included in NBSAP. Based on the annual report	Coordination Group (CG) and relevant governmental agencies	Other countries/ organizations, planning and implementing NBSAP	When required
Other international reports	Reporting for other conventions, agreements, and organizations working on this problem. Based on the annual report	NBBC and relevant organizations	Relevant international organizations	When required
Reports to financing organizations	Any organization financing NBSAP activities can ask for reports on work progress, probably in addition to the annual report and reports on activities.	Implementing organizations and NBBC	Financing organization	When required
Final report	Detailed review of NBSAP implementation, on which renewed NBSAP should be based	NBBC, GWG and all parties concerned	All organizations participating in NBSAP	By the end of 5-year period

- encouraging the involvement of wider range of organizations in NBSAP implementation, including possible investors;
- promoting contacts between possible participating agencies and appropriate financial mechanisms;
- examining the activity affecting biodiversity and biosafety;
- determining needs and providing specific contribution in training and technical support, if possible as well as presenting certificates of qualification;
- keeping and disseminating information on NBSAP implementation;
- developing decision-making systems on biodiversity and risk assessment on biosafety;
- discussing and evaluating NBSAP progress annually;
- providing evaluation and conclusion on use of biodiversity including flora and fauna species listed in Red Data Book;
- updating regularly the National Report in accordance with the requirements of Secretariat of the Convention;
- planning the progress of a country's ecological network and participate in regional planning of ecological network;
- disseminating information on NBSAP implementation both on local and international levels;
- forming structure of decision-making on GMO, biodiversity conservation, plants protection from invasive species.

The National Center should organize its work in five key directions, which provide managing and administrating processes of biodiversity conservation and providing biosafety:

1. Coordination Committee: controlling general process of Strategy implementation through the following functions:

- providing support for participating organizations in fundraising and project implementation;
- coordinating financial mechanisms operation for NBSAP;
- collecting information on NBSAP;

- coordinating all levels of NBSAP planning;
- assessing the process of NBSAP implementation together with the Working Group on providing technical support;
- providing annual review of NBSAP implementation;
- disseminating and publishing information on NBSAP;
- promoting interaction of all parties participating in NBSAP implementation.

2. National Commission on Biological Safety including scientific organizations and National Focal Point on Biodiversity and Biosafety (Chairman) and representatives of stakeholders. Its activity include:

- Coordinating of works on biosafety
- Developing of project documents
- Consideration of applications on introduction of GMO
- Making contacts with international organizations.

3. Scientific Expert Council is to support the project at the highest level, determine priorities and trends of project activities:

- projects expertise concerning biodiversity conservation and biosafety;
- meeting on monitoring NBSAP implementation progress;
- preparing feasibility study of projects on biodiversity and biosafety;
- public awareness campaign;
- analysis and assessment of all kinds of work in biodiversity and biosafety sectors

The Council will involve officials, governmental and business circles, NGOs, and Academy institutes, which are interested in providing independent support (consulting) for projects.

NBSAP Implementing agencies are:

4. Organizational analytical Working Group will take part in evaluating information and assess technical aspects of project implementation, together with scientists and mass media representatives.

5. Information -technical Group will create database and be responsible for:

- Regular assessment of NBSAP implementation, biodiversity and biosafety state;
- Preparing of annual report on NBSAP implementation and other works on biodiversity and Biosafety;
- collecting information;
- independent monitoring and evaluation of NBSAP implementation in particular areas;
- providing general reviews;
- providing training on necessary activities, including submitting applications for grants;
- disseminating and publishing of information on biodiversity and biosafety;
- creating database on biodiversity and biosafety and web-site.

Implementing organizations

To provide effective implementation of NBSAP, NBBC will need to maintain contacts with major participating organizations.

- **Governmental institutions, including:**

- Governmental Working Group
- Ministry for Nature Protection
- Tajik Forest Production Enterprise

- Ministry of Agriculture
- State Land Use Committee
- Ministry of Finance
- Ministry of Economy and Trade
- Ministry of Health Protection

- **Local Authorities, including:**

- Regions, districts
- Community representatives

- **Institutions, including:**

- Academy of Science: Branch Institutes
- Universities, schools
- Tajik Academy of Agricultural Science

- **Mass Media, including:**

- National and local newspapers
- National and local TV
- National and local radio

- **National and international environmental initiatives, including:**

- Action program on improving the environmental and economic and social situation in the Aral Sea Basin
- Agricultural projects
- Project on NBF preparation

- **NGOs, working on:**

- Environmental protection



Mountain settlement

- Rural areas development
- Education
- Renewable energy
- International sector

The Action Plan was developed to reach the main objective of the Strategy on biological and geographical diversity conservation. The plan consists of numerous sub-plans with separate goals (e.g. creating an ecological network, conserving forest ecosystems); each sub-plan is developed according to a particular activity in 4 fields: legislative and institutional framework, area planning and biodiversity conservation, research and monitoring; providing information and education.

The terms of implementation does not exceed 10 years. The Action Plan determines financing sources and other organizations responsible for its implementation.

Action Plan Implementation. The cost is US\$26.6 m, including \$9.3 m for priority actions. Financing sources are: state budget, national and local ecological foundations. The support of international donors is also required.

NBBC is responsible for the Action Plan implementation. The first priority of the Action Plan implementation is further development of the legislative base for regulating activities in all branches of national economy.

The second priority is the re-orientation of the environmental policy to agriculture, forestry, and other sectors.

The third priority is establishment of the National Ecological Network. This process will contribute to the biodiversity conservation and environmental balance sustainability at the regional and local levels.

Evaluation of Biodiversity Conservation Problems

These problems were evaluated by the ecosystem approach and comparative analysis of their priority and complexity, with 7 criteria (biodiversity level, environment degradation, economic losses, problem solvability, results of rehabilitation process, area distribution, monitoring level) being used.

The following primary problems were determined as a result of biodiversity state and tendencies evaluation: disturbance of landscape environmental balance; degradation of natural ecosystems (forest, steppe, meadow, water); reduction of species diversity and biocoenosis impoverishment; degradation of flora and wild animal genetic resources, and agricultural crops; destruction of wild plant and animal migration routes; low level of environmental education (Annex, Table 1).

ANNEX

Table 1. Biodiversity State Assessment and Bioresources Conservation Issues

Categories of assessment	Priority				Complexity					
	Biodiversity loss	Environmental degradation	Economic loss	Total	Ways of solution	Environment conservation	Areas distribution	Regulation level	Total	
Coefficient	0,5	0,3	0,2		0,4	0,3	0,2	0,1		
	1	2	3	4	5	6	7	8	9	10
1	2	3	4	5	6	7	8	9	10	
IN-SITU CONSERVATION										
1. Geosystem level										
1.1. Ecobalance degradation in foothill-valley zone	3 1,5	3 0,9	3 0,6	3,0	1 0,4	3 0,9	2 0,2	1 0,1	1,6	
1.2. Pasture biodiversity degradation in low-mountain zone	3 1,5	2 0,6	3 0,6	2,7	2 0,8	1 0,3	2 0,4	2 0,2	1,7	
1.3. Decrease in species number	3 1,5	2 0,6	2 0,4	2,5	2 0,8	2 0,6	3 0,6	2 0,2	2,2	
1.4. Ecosystems reorganization	3 1,5	3 0,9	3 0,6	3,0	1 0,4	2 0,6	2 0,4	2 0,2	1,6	
1.5. Wetland ecosystems degradation	2 1,0	2 0,6	1 0,2	1,8	2 0,8	2 0,6	3 0,6	1 0,1	2,1	
1.6. Degradation of landscape in reserves	2 1,0	2 0,6	1 0,2	1,8	2 0,8	3 0,9	1 0,2	2 0,2	2,1	
1.7. Degradation of the protected areas structure	2 1,0	2 0,6	1 0,2	1,8	2 0,8	3 0,9	1 0,2	2 0,2	2,1	
1.8. Partial degradation of mountain landscapes	1 0,5	2 0,6	2 0,4	1,5	1 0,4	2 0,6	2 0,4	1 0,1	1,5	
1.9. Reorganization and degradation of landscape in the light forests extension zone	3 1,5	3 0,9	3 0,6	3,0	2 0,8	3 0,9	3 0,6	2 0,2	2,5	
1.10. Partial degradation of alpine and subalpine landscapes structure	2 1,0	2 0,6	2 0,4	2,0	1 0,4	2 0,6	2 0,4	1 0,1	1,5	
1.11. Eutrophication of watercourses	1 0,5	2 0,6	2 0,4	1,5	2 0,8	2 0,6	3 0,6	2 0,2	2,2	
1.12. Urban landscapes degradation	3 1,5	2 0,6	1 0,2	2,3	1 0,4	2 0,6	3 0,6	1 0,1	1,7	
1.13. Degradation of high-mountain steppe zones	2 1,0	2 0,6	2 0,4	2,0	2 0,8	2 0,6	2 0,4	1 0,1	1,9	

Table 1 continued

1	2	3	4	5	6	7	8	9	10
2. Ecosystem level									
2.1. Complete degradation of tugai ecosystems	3 1,5	2 0,6	2 0,4	2,5	1 0,4	2 0,6	2 0,4	1 0,1	1,5
2.2. Reorganization of desert and semidesert ecosystems	3 1,5	3 0,9	3 0,6	3,0	1 0,4	2 0,6	2 0,4	1 0,1	1,5
2.3. Degradation of savannoide ecosystems	3 1,5	3 0,9	3 0,6	3,0	2 0,8	3 0,9	3 0,6	2 0,2	2,5
2.4. Degradation and reorganization of xerophytic light forests	3 1,5	3 0,9	3 0,6	3,0	2 0,8	3 0,9	3 0,6	2 0,2	2,5
2.5. Reorganization of mesophyllic forests ecosystems	3 1,5	3 0,9	3 0,6	3,0	2 0,8	3 0,9	3 0,6	2 0,2	2,5
2.6. Reduction in area of conifer forest ecosystems	3 1,5	3 0,9	3 0,6	3,0	2 0,8	3 0,9	3 0,6	2 0,2	2,5
2.7. Reduction of productivity and introduction of invasive species into meadow-steppe ecosystems	2 1,0	3 0,9	2 0,4	2,3	2 0,8	3 0,9	3 0,9	2 0,2	2,5
2.8. Degradation of high-mountain desert ecosystems	3 1,5	3 0,9	2 0,4	2,8	2 0,8	3 0,9	2 0,4	2 0,2	2,3
2.9. Lack of detailed classification of ecosystems of Tajikistan	2 1,0	2 0,6	1 0,2	1,8	3 1,2	2 0,6	3 0,6	3 0,3	2,7
2.10. Pollution of nival ecosystems by waste	3 1,5	1 0,3	1 0,2	2,0	3 1,2	1 0,3	1 0,2	2 0,2	1,9
2.11. Degradation of ecological balance in agroecosystems	3 1,5	2 0,6	3 0,6	2,7	2 0,8	3 0,9	3 0,6	2 0,2	2,5
3. Specific level									
3.1. Reduction of species natural habitats	3 1,5	2 0,6	3 0,6	2,7	2 0,8	2 0,6	3 0,6	2 0,2	2,2
3.2. Reduction of specific number of foothill and low-mountain ecosystems	3 1,5	3 0,9	3 0,6	3,0	2 0,8	2 0,6	3 0,6	2 0,2	2,2
3.3. Reduction of specific number of and high-mountain desert ecosystems	2 1,0	1 0,3	2 0,4	1,7	2 0,8	3 0,9	3 0,6	2 0,2	2,5
3.4. Reduction of specific number of rare endemic flora and fauna species	3 1,5	3 0,9	2 0,4	2,8	2 0,8	3 0,9	3 0,6	2 0,2	2,5
3.5. Degradation of migration corridors of species in all landscape units.	2 1,0	3 0,9	2 0,4	2,3	2 0,8	2 0,6	2 0,4	1 0,1	1,9
3.6. Reduction in area of valuable communities and their diversity	3 1,5	3 0,9	3 0,6	3,0	2 0,8	3 0,9	3 0,6	2 0,2	2,5
3.7. Extension of alien and invasive flora and fauna species introduction	2 1,0	3 0,9	3 0,6	2,5	2 0,8	2 0,6	3 0,6	2 0,2	2,2
3.8. Reduction in relic flora and fauna species	3 1,5	3 0,9	3 0,6	3,0	2 0,8	3 0,9	3 0,6	2 0,2	2,5
3.9. Degradation of game species and their resources	3 1,5	3 0,9	3 0,6	3,0	2 0,8	3 0,9	3 0,6	2 0,2	2,5
4. Genetic level									
4.1. Reduction in area of wild relatives of fruit plants	3 1,5	3 0,9	3 0,6	3,0	3 1,2	3 0,9	3 0,6	2 0,2	2,9
4.2. Degradation of wild relatives of cultural and medicinal plants	3 1,5	2 0,6	3 0,6	2,7	2 0,8	3 0,9	3 0,6	2 0,4	2,7
4.3. Reduction of number of wild relatives of domestic animals	3 1,5	3 0,9	2 0,4	2,8	2 0,8	3 0,9	3 0,6	2 0,4	2,7

Table 1 continued

1	2	3	4	5	6	7	8	9	10
4.4. Reduction in number of ungulates populations	3 1,5	3 0,9	3 0,6	3,0	2 0,8	3 0,9	3 0,6	2 0,4	2,7
4.5. Reduction in number of valuable plants species	3 1,5	3 0,9	3 0,6	3,0	2 0,8	3 0,9	3 0,6	2 0,4	2,7
4.6. Reduction in number of snow leopard population	3 1,5	3 0,9	1 0,2	2,6	2 0,8	2 0,6	2 0,4	2 0,4	2,2
EX-SITU CONSERVATION									
5. Genetic problems									
5.1. Degradation of genetic pool of indigenous breeds of animals	3 1,5	1 0,3	3 0,6	2,4	2 0,8	1 0,3	2 0,4	2 0,2	1,7
5.2. Loss of some indigenous varieties of fruit, melon and food cultures.	3 1,5	2 0,6	3 0,6	2,7	2 0,8	1 0,3	1 0,2	2 0,2	1,5
5.3. Degradation of genetic pool of cultural plants	3 1,5	2 0,6	3 0,6	2,7	2 0,8	2 0,6	2 0,4	1 0,1	1,9
5.4. Reduction of genetic pool of mountain varieties of oil-bearing, food and forage plants	3 1,5	3 0,9	3 0,6	3,0	2 0,8	3 0,9	2 0,4	1 0,1	2,2
5.5. Lack of catalogue and databases on <i>in-situ</i> species	3 1,5	1 0,3	2 0,4	2,2	2 0,8	1 0,3	2 0,4	2 0,2	1,7
6. Organizational problems									
6.1. Lack of funding and financial-technical provision of <i>ex-situ</i> problems	3 1,5	2 0,6	1 0,2	2,3	2 0,8	1 0,3	2 0,4	1 0,1	1,6
6.2. Lack of monitoring system on flora and fauna GMO	3 1,5	2 0,6	3 0,6	2,7	2 0,8	3 0,9	3 0,6	2 0,2	2,5
6.3. Insufficient use of <i>ex-situ</i> methods for wild biota conservation	3 1,5	2 0,6	3 0,6	2,7	2 0,8	3 0,9	3 0,6	2 0,2	2,5

Table 2. Implementation Terms of the Biodiversity Conservation Strategy Components

Implementation period	Conservation level	Strategy components	
		Priority	Other
Short-term	Species		S ₆
	Genetic	V ₁ , V ₂ , V ₄	V ₅
	<i>Ex-situ</i>	ExS ₂	ExS ₃
Mid-term	Geosystem	G ₃ , G ₄ , G ₈	
	Ecosystem	E ₁ , E ₃ , E ₈	E ₁₀
	Species	S ₁ , S ₃	S ₄
	<i>Ex-situ</i>	ExS ₁ , ExS ₄	
Long-term	Geosystem	G ₁ , G ₂	G ₇
	Ecosystem	E ₂	
	Species	S ₅	S ₈

ABBREVIATIONS

AS	Academy of Science
BD	Biological Diversity
C	Cattle
CBD	Convention on Biological Diversity
CDGC	Central Department of Geodesy and Cartography
CGD	Central Geology Department
CIS	Commonwealth of Independent States
CSR	Center for Strategic Research
CWB	Convention Working Body
DRS	Districts of Republican Subordination
EF	Ecological Foundation
EFK	Ecological Foundation of Khukumats
EFKR	Ecological Foundation of Khatlon Region
FPE RT	Forest Production Enterprise of the Republic of Tajikistan
GBAR	Gorno-Badakhshan Autonomous Region
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GMO	Genetically Modified Organisms
GRT	Government of the Republic of Tajikistan
GWG	Governmental Working Group
HPS	Hydroelectric Power Station
IF	International Foundation
IHE	Institute of Higher Education
IUCN	International Union for Conservation of Nature
LA	Local Authorities
LKh	Local Khukumats
LM	Local Means
LR	Leninabad Region (renamed to Sogd Region)
LTU	Long-term Use
MA	Ministry of Agriculture
MC	Ministry of Culture
ME	Ministry of Emergency
ME	Ministry of Education
MET	Ministry of Economy and Trade
MF	Ministry of Finance
MFA	Ministry of Foreign Affairs
MJ	Ministry of Justice
MM	Mass media
MM	Ministry of Melioration
MNP	Ministry for Nature Protection

NBBC	National Biodiversity and Biosafety Center
NBF	National Biosafety Framework
NBSAP	National Strategy and Action Plan on Conservation and Sustainable Use of Biological Diversity of the Republic of Tajikistan
NEAP	National Environmental Action Plan
NGO	Non-Governmental Organization
NPA	Nature Protected Areas
PIZP	E.N.Pavlovsky Institute of Zoology and Parasitology
PO	Private owner
RI	Research Institute
RIF	Research Institute of Forestry
RLNP	Research Laboratory on Nature Protection
RT	Republic of Tajikistan
SB	State Budget
SBC	State Broadcasting Committee
SFR	State Forest Resources
SLUC	State Land Use Committee
SPE «Bogparvar»	Scientific Productive Enterprise «Bogparvar»
SPE «Ziroat»	Scientific Productive Enterprise «Ziroat»
SSA	State Statistic Agency
TAAS	Tajik Academy of Agricultural Sciences
TAP	Tajik Aluminum Plant
TGD	Tajik Geodesy Department
TRICB	The Tajik Research Institute of Cattle-Breeding
TSNU	Tajik State National University
UNDP	UN Development Programme
UNO	United Nations Organization
UNO	United Nations Organization
WB	World Bank
WB CW	Working Body of the Convention on wetlands
WHO	World Health Organization
WR	Wildlife Resources

c/ha	centners from hectare	mln.	million
dol.	dollar	mm	millimeter
gr	gram	r.	river
ha	hectare	R.	Range
kg	kilogram	reg.	region
km	kilometer	rr.	rivers
km ²	square kilometer	settl.	settlement
km ³	cubic kilometer	som.	somoni
l.	lake	t	tonnes
m	meter	t/ha	tonnes from hectare
m ²	square meter	th.	thousand
m ³	cubic meter	un.	unit
masl	meters above sea level	v.	village

GLOSSARY

- Agroecosystem** – area under ploughing lands, farmlands, gardens and settlements located within cultivated lands areas.
- Alien species** –the term is used under the commitments of the Convention on biodiversity and refers to a species occurring outside their normal distribution; and "**alien invasive species**" refers to those alien species which threaten ecosystems, habitats or species.
- Biogeocoenosis** – (*bio*, gr. *geo* – earth and *coenosis*) – a homogeneous territory with a certain diversity of living (biocoenosis) and inert (ground atmosphere layer, solar energy, soil, etc.) components comprised by the substance and energy interchange into common natural complex. The term "biogeocoenosis" suggested by V.N.Sukachov (1940) has been used as the synonym to the term "ecosystem".
- Biomass** – the summary mass of species individuals, a group of species or community usually calculated in mass units of dry or moist substance related to the units of square or volume of any ecotope.
- Biosphere** – the Earth shell which structure and power are characterized by common activity of living organisms.
- Biotope** (*bio*– and gr. *topos* – plot) – the homogeneous plot corresponding to separate parts of biocoenosis.
- Biocoenosis** (*bio*– and gr. *koinos* - common) – totality of plant, animal and microorganism populations that have common relations with each other and suitable to environment factors. The term "biocoenosis" was suggested by K.Mebius (1877). Biocoenosis is a component part of biogeocoenosis.
- Community** – a group of populations of different species in a certain space and time.
- Dynamics of ecosystem** – seasonal (annual), the form of cyclic change in biota community related to seasonal transition. Cyclic changes (periodical) - reversible change of ecosystems caused by occasional environment factors with gradual return to initial state.
- Ecological niche** – the term comprises not just physical space occupied by an organism but its function within the community and its position to gradients of environment factors – temperature, moisture, pH, soil, etc.
- Ecology** – science studying the organization and functioning of under-organism systems of various levels: populations, biocoenosis (communities), biogeocoenosis (ecosystems) and biosphere.
- Ecosystem** (gr. *oikos* - dwelling and *systema* - combination) – ecological system - complex of communities of plants, animals and microorganisms and their abiotic surroundings, which function as a unit.
- Ecotype** (gr. *oikos* - dwelling and *type*) – totality of individuals of species coexisting in one habitat, hold heritable features.
- Environment** - habitat of human; natural and material surrounding world. Environment includes natural and artificial surroundings, i.e. totality of nature components created from natural substances by humans and having no analogues in virgin nature (buildings, constructions, etc.)
- Genetic pool** – totality of genes hold by individuals of the population. Emphasizing the need of conservation all living organisms there is a concept of G.p. of the Earth (biosphere). The methods of conservation of the biosphere genetic resources, especially G.p. of endangered plants and animals are in the process of elaboration.
- Melioration** (lat. *melioratio* – improvement) – the system of organizational economic and technical measures on the core improvement of unfavorable hydrological soil and other conditions with the purpose of their effective use.

Monitoring – system of supervision, evaluation and prognosis for population dynamics.

Pest killers – chemicals used to combat the organisms unfavorable in medicinal and economic meaning (e.g. pesticides).

Pesticides (lat. *pestis* – infection/pest and *caedo* – kill) – (pest-killers), chemicals used to combat the weeds (herbicides), vermins (insecticides, acaricides), diseases (bactericides) of cultural plants.

Population (Mid latin *populatio*, lat. *populus* - people, population) – a group of individuals of one species with common genetic pool, occupying one territory.

Reproduction of natural resources - natural (regulated/non-regulated) and artificial accretion of natural resources, reproduction of their qualitative characteristics. It comprises land reclamation and melioration, agrotechnical activity on soil improvement, reforestation, biotechnical measures on conservation and reproduction of wildlife and water resources protection as well.

Reserve (Zapovednik) – specific territories of economic, scientific and cultural value.

Selection (lat. *selectio* – assortment) – the science applying the methods of creation the varieties and hybrids of agricultural plants and animals.

Soil degradation – gradual soil distortion, loss of fertility.

Soils salinity – soils with increased content (over 0.25%) of water-soluble mineral salts mainly chloride and sulfuric natrium, calcium, magnesium salts, sodium, sometimes natrium and potassium nitrates.

Species (biological) – basic structural and classification (taxonomic) unity in the system of living organisms; totality of populations that cross-breed and produce fertile descendants, hold common morphological and physiological features, occupy a limited region and have common relations with biotic and abiotic environment factors.

Succession (lat. *successio* - inheritance) – consequent change in time period of one biocoenosis by others on the definite territory.

Zakaznik — Species management area

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