Achieving the
2010
Biodiversity
Target

MINISTRY OF NATURE PROTECTION
OF THE REPUBLIC OF ARMENIA

CBD

Fourth National Report to the Convention on Biological Diversity

Republic of Armenia

Yerevan 2009

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Abbreviation

AMD - Armenian Dram
BSAP - Biodiversity Strategy and Action Plan
CBD - Convention on Biological Diversity
CEPF - Critical Ecosystem Partnership Fund
CITES - Convention on International Trade in Endangered Species of Wild Fauna and Flora
CJSC - Close Joint-Stock Company
CWR DCS - Crop Wild Relatives Data Collecting System
EECCA - Eastern Europe, Caucasus and Central Asia
ECPGR - European Cooperative Programme for Plant Genetic Resources
FAO - Food and Agriculture Organization of the United Nations
GEF - Global Environment Facility
GIS - Geographic Information Systems
ICARDA - International Center for Agricultural Research in the Dry Areas
IUCN - International Union for Conservation of Nature
KfW - Kreditanstalt fü r Wiederaufbau, meaning Reconstruction Credit Institute
MAVA - MAVA Foundation Pur la Nature
NABU - Nature and Biodiversity Conservation Union
NAS - National Academy of Science
NEAP 2 - The Second National Environmental Action Program
NFG - Norwegian Forestry Group
NGO - Non-Goverment organisation
PA - Protected Areas
PGRFA - Plant Genetic Resources for Food and Agriculture
PRSP - Poverty Reduction Strategic Program
RA - Republic of Armenia
SDP - Sustainable Development Program
SIDA - Swedish International Development Cooperation Agency
SNCO - Statutory Nature Conservation Organization
UNEP - United Nations Environment Programme
WWF - World Wide Fund for Nature
WB - World Bank

Executive Summary

The geographic location, the complicated geological structure, and altitude zonation of the Republic of Armenia, as well as its location on the crossroad of the habitats of different plants and animals, have contributed to the formation of rich biodiversity and different types of natural ecosystems. Despite its small area (29.74 thousand square kilometers), about 3600 species of vascular flowering plants and more than 17 500 animal species (including 536 species of vertebrates) have been found in Armenia. With the concentration of superior plant species, Armenia occupies one of the first places in the world, with an index of more than 100 species on one square kilometer.

The biodiversity of Armenia is especially rich in economically valuable, rare and endemic species. Among the useful plants, of specal importance are the wild plants of the agrobiodiversity group, an important component of which are crop wild relatives. Armenia is considered a global centre for the species of wild wheat, rye, barley, from where a number of species have spread all over the world. Wild relatives of a number of domestic animals are still conserved here.

There are 125 endemic species of flora in Armenia; this is about 3% of the total species diversity of countrys flora. There are 339 endemic species of terrestrial fauna, including 316 invertebrates. About 2000 plant species have food, fodder, medicinal, dye-producing, ether-bearing, honey-producing, and rubber-producing values; a number of animals are valued for their fur and meat.

386 plant species (or 12% of the flora) are included in the Red Book of Armenia. 35 valuable species have become extinct in the territory of Armenia; several others have become threatened.

99 species of vertebrates only are registered in the Red Book of Armenia (2 species of fish, 1 species of amphibia, 11 species of reptiles, 67 species of birds and 18 species of mammals), including 6 species included in the IUCN Red List.

The leopard (Panthera pardus), the Armenian moufflon (Ovis orientalis), the Bezoar goat (Capra aegagrus), the Trans-Caucasian grey bear (Ursus arctos), the Marbled polecat (Vormela peregusna), the Common otter (Lutra Lutra), and the Pallas' Cat (Felis manul) are Among the most threatened mammals.

Biodiversity conservation is mainly carried out in specially protected nature areas (PA) where 60-70% of the flora and fauna species of the Republic is conserved, including the majority of the rare, threatened, endangered and endemic species, as well as wild genetic resources.

The total area of the PAs in Armenia is about 308 thousand hectares, which is approximately 10% of the total area of the Republic (6% of the total area without the surface of Lake Sevan). 54% of this area (91% without Lake Sevan) is occupied by forest ecosystems.

The PA system of Armenia includes three state reserves (Khosrov Forest, Shikahogh, Erebuni), 25 reservation, two national parks (“Sevan” and “Dilijan”) and 230 natural monuments.

The main threats to biodiversity are directly or indirectly connected with anthropogenic influence. The main threats are: loss and change of habitats, overexploitation of bioresources, environmental pollution, the impact of introduced alien species, climate change and other factors.

The results of anthropogenic influence are more substantial on the orrest, semidesert and steppe ecosystems, as well as on the aquatic ecosystem of Lake Sevan. The connection between the bioresources and the socio-economic situation of the country is expressed clearly in Armenia. Bioresources are the main factor supporting the economy of the country, especially in terms of supplying agriculture, food and other industries with raw materials and in terms of the development of recreation. Although the level of air, soil and water pollution has gone down as a result of the reduction in industrial volumes, the degradation of different ecosystems and exinction of species is going on which is mainly a result of the decreasing living standards of the population.

Direct use of bioresources is widely spread in Armenia (use of alpine and subalpine meadows as natural grasslands, gathering of edible and medicinal plants and berries, use of timber, hunt, etc) which has reached overexploitation in separate cases (forest resources, fishing). Furthermore, use of

bioresources has mostly been spontaneous, without taking into account the natural potential for restoration of bioresources and the preconditions for ensuring the restoration.

Although the legal framework for biodiversity conservation and use of bioresources has been improved for the last few decades, the adoption of a number of by-laws (for the regulation of bioresource consumption and determination of the quantities of use, determination of establishment standards of PAs, determination of econetwork creation principles, etc) and full-scale implementation of existing legislation are still priorities.

The main components required for efficient bioresources management, i.e. inventorization and monitoring, are not being carried out fully. The absence of a complete information system on biodiversity in its turn excludes the practical assessment of the impact of natural and anthropogenic factors on biodiversity, reliable calculation of the damaged caused and adoption of decisions based on accurate information.

Three main strategic documents have been developed in Armenia which are directly connected with biodiversity conservation. These are: “The Second National Environmental Action Programme of the RA” (approved by the RA Government on August 14, 2008), “Biodiversity Strategy and Action Plan of the RA” (1999), and “National Strategy and Action Plan of the Development of Specially Protected Nature Areas of Armenia” (2002). These documents include a number of actions the implementation of which has great practical importance for biodiversity conservation and sustainable use. According to the above mentioned strategic documents, the following actions have been or are being implemented through financing from the state budget: improvement of the legal framework, preparation of the second edition of the Red Book of Armenia, clarification of the borders of the PAs of Armenia and development of management plans of PAs, development and introduction of afforestation programs in different marzes of the Republic, creation of new PAs, inventorization and listing of natural monuments, preperation of a strategic plan of environmental education in the Republic of Armenia, replenishment of fishstock in Lake Sevan and restoration of endemic fish species, etc. The programs implemented through the financial assistance of international donor organizations are mainly aimed at the creation of new PAs, support for the conservation of endangered species, and raising awareness of local population.

The main obstacles are: low living standards of the population and overexploitation of bioresources as a result, the absemce of state inventorization and state cadastre of biodiversity, a monitoring system and database, the scarcity of financial resources needed for the implementation of environmental measures, low degree of cooperation between different branches of economy and absence of efficient coordination of actions, absence of ecologically clean modern technologies, etc.

The main achievements in the field can be considered: the improvement of the legislation and the institutional structures of the field, inventorization of biodiversity in the existing and future PAs, development of management plans of protected areas, initiatives to introduce a monitoring system, creation of new PAs, improvement of the state of populations of several critically endangered species biodiversity (the leopard, the Bezoar goat, the Armenian moufflon, birds of prey), and updating of the Red Book of Armenia.

The priorities of Armenia in the field of biodiversity conservation are stipulated in the Second National Environmental Action Programme of the RA (Chapter 2, point 2.1) and are basically directly related to the 2010 Biodiversity target.

Introduction

The signatory states of the Convention on Biological Diversity, recognizing the importance of biological diversity for environmental protection and for the sustainable development of the countries, have assumed the obligation to reduce the current rates of the loss of biodiversity on the global, regional and national levels by 2010, as a contribution to poverty reduction and for the welfare of all the life forms on the planet. For the achievement of this goal and in order to assess the situation, the signatory states of the Convention, including Armenia, have assumed the obligation to present the Fourth National Reports of their respective countries to the CBD Secretariat, which gives an opportunity to analyze the current situation and to assess the results of the achievement of 2010 targets on the basis of the biodiversity development trends, as well as to define the necessary directions of further activity.

The National Reports are an important source of information for analysis and decision making within the framework of the Convention. The Fourth National Report has to contribute to the assessment of the achievement of three goals on the national level and has to support their achievement through:

a) ensuring a general and accessible analysis of the state of biodiversity in the country and the trends in the field and revealing the main threats to biodiversity,

b) assessing the implementation of biodiversity strategies and action plans,

c) analyssing of the results of the achievement of 2010 targets and the goals and tasks of the Strategic plan,

d) establishing of communication between different parties of activity and their involvement into the achievement of the goals of the Convention,

e) information sharing between signatory states about experience contributing to the implementation of the Convention.

Armenia started the preparation of its Fourth Annual Report on April 1, 2008, with the financial assistance of the Global Environment Facility. A working group of national experts was formed, the members of which analysed and summarized the existing information about different fields related to biodiversity. Experts from the Armenian National Academy of Sciences, Yerevan State University, the Armenian State Agrarian University and different NGOs participated in the preparafion of the Fourth National report.

During the whole course of the development of the report, the experts have had discussions about different aspects of biodiversity conservation and sustainable use with different governmental and non-governmental organizations, scientific-research institutions, and representatives of international and national programs.

A seminar on the discussion of the draft report prepared within the framework of the “Preparation of the Fourth National Report on Biodiversity” project took place in December 2008. Representatives of different Ministries and scientific and non-governmental organizations took part in the seminar. A comprehensive discussion of the material in the draft report took place and several suggestions were made on it which were included in the final draft of the report.

The Ministry of Nature Protection of the Republic of Armenia would like to thank the representatives of all governmental and non-governmental organizations and individuals wh0 participated in the development of the Fourth National Report on Biodiversity.

Chapter 1.

Overview of Biodiversity Status, Trends and Threats

1.1. An overview of the country's biodiversity (in terms of ecosystems, habitats, species) and the importance of these biodiversity components for human well-being

The Republic of Armenia is a small mountainous country (with a total area of 29.74 thousand square kilometers) located in the Caucasian region of Eurasia. With its exceptionally rich biodiversity, Caucasus is included in the list of Global 200 Ecoregions by the World Wide Fund for Nature (WWF). Caucasus is also considered an endangered area and is ranked among the planet's 25 most diverse and endangered hotspots by Conservation International. Altitude zonation is typical of the territory of Armenia; it is reflected in the diversity of landscapes and species. The location and the relief of the country have contributed to the formation of a wide range of bioresources, a high level of endemism and rich agrobiodiversity.

Armenia is one of the important centers of origin of a number of economically valuable plants and animals. Until now, crop wild relatives and wild relatives of domestic animals can be found here. The clarified quantitative data of the species composition of the biodiversity of Armenia and the number of endemic species is given in the table below, by large taxonomic groups.

Table 1. The number of plant and animal species and endemic species by taxonomic groups10

Taxonomic groups	N of species	N of endemic species
PLANTS		
Algae	388	
Fungi	4167*	2
Lichens	300*	
Moss	395	
Vascular plants	about 3600*	125*
Total	8,850*	127*
ANIMALS		
Invertebrates	about 17000	316
Fish	39*	9
Amphibia	7*	1
Reptiles	53	6
Birds	353*	1
Mammals	83	6
Total	17,523	339

Source: Biodiversity Strategy and Action Plan of the Republic of Armenia, 1999

- *Data is clarified within the period of the last five years*

Table 2. The frequency of occurrence of species by taxonomic groups (units per thousand square kilometers)

Taxonomic groups	N of species in Armenia	N of species on 1000 square km	
		In Armenia	In the world
PLANTS			
Lower plants	4855*	161.8	0.15
Higher plants	abaut 4000	131.66	1.67
ANIMALS			
Mollusks	155	5.16	0.10
Arthropodas	about 5900*	194.33	5.86
Fish	39*	1.31*	0.05
Amphibians	7*	0.23*	0.02
Reptiles	53	1.76	0.05
Birds	353*	11.86*	0.06
Mammals	83	2.76	0.03

Source: Biodiversity Strategy and Action Plan of the Republic of Armenia, 1999

- *Data is clarified within the period of the last five years*

The majority of the biodiversity of the country has an environmental and economic significance and has been used by the population for centuries. A number of ecosystems have been the basis for the development of the economy (natural grasslands, meadows and forests). For more than 6000 years the plant resources of Armenia have been used by people as food, fodder and medicine. The forests have been used for timber and firewood. Alongside with the development of the society the involvement of the components of biodiversity into different spheres of human activity has been enlarged. It has mostly been spontaneous, without taking into account the natural potential for restoration of bioresources and the preconditions for ensuring the restoration. As a result of this approach to consumption a gradual degradation of bioresources and even their loss has taken place, which has resulted in an overall reduction in biodiversity. This process has been most rapid in the last century, connected with the development of industry, agriculture, urban development, energy and other sectors, as well as with the intensive exploitation of forests, grasslands and other ecosystems.

The diversity of landscapes and altitudes in the territory of the country is one of the decisive factors of the biodiversity of Armenia and its distribution. The altitudes in the country reach up to 3 000 meters, and the six main landscape zones can be found here: deserts, semideserts, steppes, forests alpine and subalpine meadows. In addition, there are several azonal habitats (e.g. wetland zones).

Flora. The flora and vegetation of Armenia is surprisingly rich and diverse. Here, in a territory of less than 30 000 square kilometers, one can find about half of the flora of the Caucasus, as well as all the main plant formations of the region (except for humid subtropical vegetation). Among the richest families of the flora of the Republic are: Asteraceae (429 species), Fabaceae (346 species), Poaceae (336 species), Rosaceae (210 species), Brassicaceae (203 species), Caryophyllaceae (183 species), Lamiaceae (153 species), Scrophulariaceae (142 species), Apiaceae (132 species), Cyperaceae (198 species).

The number of endemic species is very high in the flora of Armenia (125 endemic species among vascular plants only). According to this index, landlocked Armenia is comparable to such Mediterranean islands as Sicily and Sardinia which are famous for their wealth of endemic plants. In Armenia, the floristic regions of Yerevan (40 species) and Darelegis (40 species) are considered rich in endemic species. Genus Centaurea is especially rich in endemic species (15 species).

Many species of the flora of Armenia are assessed as vulnerable, endangered or critically endangered. On the whole, about half of the wild species growing in Armenia needs protection. Only 387 species (about 12% of the flora) which are in a more alarming state are included in the Red Book.
Vegetation: The diversity of the landscapes and peculiarities of the mountainous areas of Armenia are the decisive factors for the plant diversity of the Republic. A rich diversity of semi-desert plant formations can be found in the lower mountain belt, at an altitude of 400 - 1 200 meters. The main diversity of gypsophilous and halophilous plants is also concentrated here. There are also saline marshes and even specific sectors of sandy deserts. For this belt, rich floristic communities of spiny shrubs (especially those of Paliurus spina-christi, commonly known as Jerusalem thorn), the so-called shibljaks are typical, as well as deciduous and juniper open forests, which rise towards medium and sometimes high mountain belts.

The medium and high mountain belts (1 200 – 2 200 meters above sea level) are characterized by a diversity of steppe and forest plant communities, meadow-steppe and steppe-shrub communities and tragacanths. Forest vegetation in Armenia is widespread mainly at an altitude of 500 – 2 000 meters. In separate areas forests reach up to an altitude of 2 400 meters above sea level, creating so-called park forests. The main forestlands of the country are centered in the southern and northern regions, and the center of the country is covered with few forests. The main species in the forests are the beech, the oak tree and sometimes the hornbeam. From the floristic point of view the small-size relict groves of Taxus baccata (European yew) and Platanus orientalis (Oriental plane) are of real interest. The Plane-tree Grove of Tsav which consists of several rare plant species and is the only one in the Caucasus is currently included in the Shikahogh state reserve

Not so long ago the mountain steppes were obviously the most widespread type of vegetation in Armenia. They occupied all the forestless slopes of the medium mountain belt. In Soviet times the majority of the steppes was arable and used as farmland. At present only separate fragments of steppes are preserved, mainly on steep and rocky slopes, or small fragments between fields of mountain tables.

Alpine and subalpine zones (2 200 – 4 000 meters above sea level) are occupied mainly by meadows. Alpine meadows are astonishingly beautiful plant communities. Here usually one of the representatives of the diverse vegetation of alpine flora is dominant – it ensures the generally bright background (Bellflower - Campanula tridentata – bright blue, Dandelion -Taraxacum stevenii - yellow, Primrose - Primula algida - violet, Spring Gentian - Gentiana verna – violet, Buttercup - Ranunculus aragazi – golden, etc). From the scientific and economic points of view the high grasses of subalpine communities are of interest. Among those the main plant mass is more than 1 meter high (usually 1.5-2 meters).

Apart from plant communities which are adapted to the specific altitudes of mountain belts, intrazonal vegetation is spread in many areas of the Republic too. Its communities can be found in all the mountain belts. Those are wetland vegetations which spread richly around lakes and marshes, along rivers, in wetlands, and near natural and mineral springs. The vegetation typical for rocky areas, i.e. rocks, clives and screes, can be found in all the mountain belts.

Fauna. The fauna of Armenia includes about 17 500 species of animals. According to the latest data, there are currently 535 species of vertebrates in the fauna of the Republic; among those 83 are mammals, 353 are birds, 53 are reptiles, 7 are amphibia and 39 are fish. In comparison to vertebrates, invertebrates are much less studied (only 30%), which is accounted for by their abundance and large diversity. At present we can speak about only an approximate picture of the species composition of invertebrates. 90% of invertebrates are insects (Insecta). Among the best studied orders are the orthopterans (Ortoptera), the dragonflies (Odonata), the beetles (Coleoptera), the dipterans (Diptera), the hymenopterans (Hymenoptera), and the butterflies (Lepidoptera). A number of insect families haven't been studied at all (Ephemeroptera, Embiodea, Neuroptera and others). Of the other groups of invertebrates in Armenia, the helminths of plants and animals (Plathelmintes, Nemathelmintes), the mol-

luscs (Mollusca), the arthropods (Arthropoda), the ticks (Acarina), the scorpions (Scorpiones), the spiders (Aranei) and the crustaceans (Crustacea) have been studied.

About 2% of the fauna (more than 200 species) are endemic; there are also a lot of rare and endangered species. The distribution of fauna by landscape zones is as follows: 12% of the animals are found in the semidesert-desert zone, 26% - in the mountain steppes, 31% - in forests, and 8%-in the alpine meadows. As for intrazonal landscapes, mainly invertebrates and several types of vertebrate animals can be found there.

11% of the fish, 17% of the amphibia, 24% of the reptiles, 23% of the birds and 24% of the mammals in Armenia have been estimated to be rare and endangered and have been included in the Red Book of Armenia (1987).

Aquatic biodiversity. The aquatic biodiversity of Armenia isn't sufficiently studied. Among the most studied territories are Lake Sevan and Lake Arpi, as well as Gavaraget, Makenis, Masrik, Dzknaget, Argichi, Lichq and Hrazdan rivers. Lake Gosh and Lake Parz, as well as near-border Debed and Voghdji rivers have been studied only partially.

During the studies attention has been paid mostly to the study of fish communities. The trade supplies of fish have been assessed for Lake Sevan only. The fish studies in the rivers have been restricted to determining the species composition; for separate rivers (Vorotan, Debed) the distribution and density of the fish supplies has been determined.

With a view to assessing the quality of the water of the rivers, the zoobenthos, as well as macrophytes have been studied. Studies of plankton samples have been carried out in Lake Sevan and Lake Arpi, as well as in the rivers and water reservoirs of the Sevan-Hrazdan hydrosystem.

124 species of water invertebrates have been found in the aquatic ecosystems of Armenia, including 46 species of Rotatoria and 78 species of crustaceans (Crustacea). Benthic animals are also widely spread (316 species).

In the aquatic ecosystems of Armenia, there are 39 species of fish (43 taxons) which belong to the Salmonidae, Coregonidae, Ciprinidae, Cobitidae, Balitoridae, Siluridae, Ictaluridae, Poeciliidae, and Gobiidae families. Araks River in the Ararat valley is famous for its fish diversity (32 species). There are 31 species of fish in Metsamor River, 25 in Akhurian, 25 in Hrazdan, 14 in Arpa and 9 in Aghstev.

About 62% of the fish in the aquatic ecosystems of Armenia belong to the Carp family the representatives of which are famous for their adaptability to the environment. In several small aquatic ecosystems, e.g. Lakes Gosh and Parz, they are the only representatives of the fish fauna

Nine of the fish species in Armenia are endemic, and 16 are acclimatized or occasionally introduced. In the course of years seral processes have taken place in the piscifauna of the hydroecosystems, and less valuable fish species have become dominant in a number of aquatic ecosystems.

417 plant species of 67 families have been found in the rivers and lakes of Armenia. The majority of those (58%, i.e. 246 species) belong to ten families. About 10% of these species can be found in the mountain lakes and rivers located at an altitude of more the 2 700 meters; the bulk of the plant species (50%) can be found in aquatic ecosystems at medium altitudes (1 200 – 2 700 meters); and about 40% of plants can be found in ecosystems located at an altitude of less than 1 200 meters.

The flora of wetland ecosystems is quite diverse and includes 245 species of algae and more than 600 species of vascular plants. Wetland ecosystems are considered conservation sites for endemic plant species. Here the “Sonchus araraticus” and “Linum barsegianii” endemic species can be found. As for the rare species included in the Red Book of Armenia, the following can be found here: Alisma lanceolatum, Falcaria falcarioides, Acorus calamus, Coronaria flos-cuculi, Microcnemum coralloides, Carex bohemica, Carex cilicica, Iris musulmanica, Utricularia intermedia, Merendera soboliferaNajas minor, Sparganium minimum, Thelypteris palustris, Juncus tenuis, Scilla rosenii, Ranunculus lomatocarpus, Populus euphratica, and Tamarix florida.

Lake Sevan and its basin. Lake Sevan is the only large source of fresh water in South Caucasus and stands out for its distinctive flora and fauna. The lake has a strategic significance for Armenia: 80% of the water supply of the Republic is centered here. There are three endemic fish species in the Sevan: the trout with its four subspecies, the khramicarp and the barbel.. As a result of the decrease in the water level of the lake, the water balance of the ecosystem has been changed substantially, as a result of which the coastal spawning areas of the endemic fish species have dried out.

The fauna of the Sevan basin is represented by 34 species of mammals, 267 species of birds, 3 species of amphibia, 17 species of reptiles and 9 species of fish. 1 600 species of superior plants have been found in the Sevan basin, out of which 94 are trees and bushes. As a result of the study of the flora of the rivers of Lake Sevan basin, 136 plant species have been inventorized. Following the scale developed by the International Union for Conservation of Nature (IUCN), the rare and endangered plant species of the river network of the basin have been divided into groups:

- Extinct species - 3
- Endangered species - 25
- Rare species - 30
- Vulnerable species - 40

As a result of bad living conditions of the population of the Sevan basin territory, there has always been a pressure on natural resources, particularly on edible plants and herbs. As a result, several species have become threatened.

118 species of wild edible plants and herbs needing protection have been found in the Sevan basin territory. They belong to 76 genera of 35 families of flowering plants. The analysis of the flora of rare and endangered plants has shown that the majority of those is hydrophilous plants and are connected with the general xerophytic succession of the Sevan basin vegetations, the drainage of more than 10 thousand hectares of coastal marshes, the decrease in the water level of the lake, and unreasonable consumption of the plant material. In future these plants may face the threat of total annihilation in connection with the global warming.

Agrobiodiversity. Agrobiodiversity as an important component of general biodiversity is represented in the Republic by a number of economically valuable plants, crop wild relatives, endemic species of animals, and ancient local varieties which are considered valuable genetic resources for food production and agriculture management.

The necessity and the significance of the reliable protection of agrobiodiversity keeps rising, becoming one of the important components of the policy in the fields of agriculture and nature protection. The components of agrobiodiversity are valuable starting material in the selection process, contributing to economic growth, national sovereignty and food security since possessing in their genotype the genes which are resistant to different diseases, pests, as well as biotic factors. Thus, those components of agrobiodiversity play an important role in the process of maintaining ecological balance.

Being one of the centers of the origination of crops, Armenia is famous for its different species of cereals, melons and gourds, ether-bearing plants, as well as fruiters (wheat, barley, rye, lentil, oats, green peas, melon, watermelon, apricot, grapes, quince, pomegranates, etc), which according to palaeontological research, have been cultivated in the territory of the country since ancient times.

The agrobiodiversity of Armenia stands out for its diversity of economically valuable species which, according to their end use can be divided into the following groups:

- edible plants (represented by more than 200 species) and fungi (about 40 species),
- fodder plants (more than 2 000 species),
- medicinal plants which form more than 10% of the flora,
- honey plants (about 350 species),
- ether-bearing plants (about 350 species),
- dye plants (120 species),

- vitamin-producing plants (30 species),
- rubber-producing plant (60 species) etc.

The main farm animal genera in Armenia have originated from the cross-breeding of farm and endemic species and their wild ancestors. The conservation and improvement of the gene pool of domestic animal species is usually done in breeding farms. There used to be breeding farms in almost all the regions of the Republic. According to 1990 data, there were 38 cattle, 19 sheep-breeding, 4 pig-breeding and 6 poultry farms in the Republic.

In early 1990's almost all the breeding farms were privatized. At present there are no state breeding farms in the Republic.

1.2. Status and trends of important biodiversity components (by important biomes)

The state of the important components of biodiversity has long been studied by different scientific organizations and departments. Thanks to the work carried out for the last few years, we have data about the current state of separate representatives of biodiversity (mainly threatened species and those registered in the national and IUCN Red Books - superior plants, fungi, invertebrates, amphibia, reptiles, several species of birds, mammals, etc). However, the data is not complete yet, since it does not comprise the whole territory of the Republic. On the initiative of the Ministry of Nature Protection, the Red Book of animals, plants and fungi of Armenia is being amended to be republished. With the financial assistance of a number of international organizations, the flora and fauna of the Specially Protected Nature Areas has been studied and inventorized ("Sevan" and "Dilijan" national parks, "Khosrov forest", "Shikahogh" and "Erebuni" state reserves). Still, the small scale of budget financing, and the absence of modern equipment and specialists, as well as scientific-applied software to meet the requirements of the Republic, are a serious obstacle to taxonomic and other types of research.

Data on the biodiversity of Armenia by important biomes is given below.

Deserts. These do not occupy a separate mountain belt in Armenia. They are located mainly in the lower mountain belt, at an altitude of 400 - 1 200 meters above sea level, in the form of separate land plots in the semi-desert vegetation. The majority of the plant species of the desert ecosystem cannot be found in other habitats. The most typical plant species are Calligonum polygonoides, Catabrosella parviflora, Achillea tenuifolia, Erodium oxyrrhynchum, Seidlitzia florida, Salsola ericoides, Panderia pilosa, Camphorosma lessingii, Halocnemum strobilaceum, and Halostachys caspica. A number of endemic species (Scorzonera gorovanica, Astragalus holophyllus) and extremely rare and endangered plant species (Bienertia cycloptera, Halanthium kulpianum, Salsola tamamschjanae, Astragalus paradoxus, Rhinopetalum gibbosum, Nitraria schoberi, Calligonum polygonoides, Aphanopleura trachysperma) can be found in the deserts.

Because of the extremely low quality of the plant cover of the deserts, these ecosystems are rarely used as pastures. The saline and alkaline soils of the Ararat valley are used as farmland (for agricultural purposes) after special measures and only with artificial irrigation. The greatest threat to sandy deserts is sand extraction for construction purposes which results in the total degradation of the ecosystem.

Semi-deserts. These are located in all the submontane and lower mountain belts, at an altitude of 400 - 1 000 (1 300) meters above sea level and are often mosaic ecosystems. The vegetation is characterized by a distinctive species composition. The most typical plant species are Artemisia fragrans, Capparis spinosa, Rhamnus pallasii, and Kochia prostrata).

Owing to pronounced aridity, intensive speciation takes place here, which has contributed to the abundance of endemic and rare plant species. The endemic plant species which can be found in the semi-deserts are: Allium schchianae, Centaurea arpensis, Cousinia daralaghezica, Allochrusa takhtadjanii, Buffonia takhtajanii, and Cotoneaster armenus. The rare species included in the Red

Book of Armenia are: Dorema glabrum, Ferula szowitsiana, Amberboa sosnovskyi, Euphorbia grossheimii, Scilla atropatana, Thesium szovitsii, etc.

A number of endemic invertebrates can be found in the semi-deserts, including those originating from the Mediterranean, from Iran, the Caucasus and the Crimea. Some reptiles are typical of small deserts with xerophyte vegetation. More than 50 bird species are registered in the semi-deserts.

80-90% of the territory of the semi-deserts are arable lands. The natural ecosystems are extremely negatively affected, as a result of faulty irrigation system and development of agriculture. This has resulted in a higher degree of soil erosion, salinization and pollution. At present, these territories are mainly used for the production of fruit, melons and gourds and wine, being at the same time the carriers of most negative anthropogenic influence.

The conservation of endemic animal species and crop wild relatives is carried out in the "Erebuni" state reserve, as well as in "Gorovan sandlands" and "Vordan Karmir" reservations.

Arid open forests. These are complex ecosystems, with a very diverse species composition. Deciduous arid open forests (oak, pistache) are adapted mainly to the lower and partly to the medium mountain belts. Juniper open forests are more widely spread, from the lower to the upper mountain belts (2 200 meters above sea level and higher). Not very high trees and shrubs are dominant in the vegetation: Quercus araxina, Pistacia mutica, Paliurus spina-christi, Juniperus polycarpos, Juniperus foetidissima, Juniperus oblonga, Rosa spinosissima, Spiraea crenata, and Rhamnus pallasii.

There are a number of endemic and rare species in the arid open forests and shibljaks of Armenia: Smyrniopsis armena, Cousinia fedorovii, Cousinia takhtajanii, Isatis sevangensis, Polygala urartu, Amygdalus nairica, Crataegus armena, Crataegus zangezura, Eryngium wanaturii, Prangos arcis-romanae, Convolvulus calvertii, Colutea komarovii, Iris grossheimii, Tulipa sosnovskyi, etc.

The open forests are used by the local inhabitants mainly as a source of wood, and the slopes covered by open forests are used as spring, early summer and summer pastures. Besides, there are a lot of herbs and edible plants in the open forests and shibljaks (mainly fruits and berries) which are gathered by the local inhabitants for personal use and for sale in the domestic market (storage of plants for export is not yet developed in Armenia).

The anthropogenic influence on the arid open forests and shibljaks is not very high, except for the threat to juniper open forests in terms of wood usage by locals and grazing. Sometimes rooting out of open forest communities is carried out, for the purpose of using the lands in agriculture.

Mountainous steppes, meadow steppes, tragacanths. The steppe ecosystems are the most widely spread in Armenia. These are spread on all the forestless slopes and plateaus of the medium mountain belt (1 000 – 2 400 meters above sea level). Tragacanth steppes and tragacanths occupy quite a large area. Thorn cushion formations and ordinary steppe plant species are dominant here. Biodiversity is very rich in steppe ecosystems. Almost half of the representatives of the flora of Armenia can be found here, including a number of endemic and rare plant and animal species (Centaurea fajvuschii, Centaurea hajastana, Centaurea takhtajanii, Centaurea tamanianae, Scorzonera aragatzi, Scorzonera safievii, Tragopogon armeniacus, Tragopogon segetus, Myosotis daralaghezica, Merendera greuteri, Onobrychis takhtajanii, Alcea grossheimii, Bromopsis zangezura, etc). More than 30 bird species are registered in the steppes. The most widespread mammals are the fox, the wolf, the bezoar goat, the Armenian moufflon and the brown bear.

The majority of the territory of the steppes, especially the flat slopes and the valleys, have been ploughed and are being used as farmland. The rest of the steppes and even the steep slopes are used as pastures and sometimes as hayfields. Besides, there are a lot of herbs and edible plants in the flora of the steppes which are gathered by the local inhabitants for personal use and for sale in the domestic market.

Forests. At present, only 10% of the territory of the Republic is covered with forests. The majority of those (more than 60%) is in the North-East of the country, whereas 35-38% is in the South-East. As for the central part of the country, including the Sevan basin and the Shirak valley, forests occupy only about 2% of the territory.

Forests occupy mainly the highly steep and highly indented slopes, at an altitude of 550 – 2 400 meters above sea level and have temperate climate, a solid hydrographic network and indented relief. There are more than 200 forest types, and there are 274 tree and shrub species in the forests, among which the main ones are the oriental beech (Fagus orientalis), the Goergian oak (Q. iberica), the oriental oak (Q. macranthera), the Caucasian hornbeam (Carpinus caucasica), and the pine-tree (Pinus kochiana). These species form 89.1% of the forested territory in Armenia and 97.2% of the overall forest mass. The other tree species – the birch, the elm-tree, the maple, the ash tree, the pear-tree, the apple-tree, the yew, the oak-tree, the platan, the nut-tree and others, are mainly found with other tree species and occupy 8.4% of the forested territory.

There are a number of endemic species (Myosotis daralaghezica, Colchicum goharae, Merendera mirzoevae, Ribes armenum, Cotoneaster armenus, Pyrus elata, Pyrus hajastana, Pyrus sosnowskyi, Pyrus tamamschianae, Pyrus voronovii, Rosa sosnovskyana, Rosa zangezura, Rubus takhtadjanii, Rubus zangezurus) and rare species registered in the Red Book of Armenia (Ophioglossum vulgatum, Pteridium tauricum, Galanthus alpinus, Castanea sativa, Tulipa confusa, Epipogium aphyllum) in the forest ecosystem. There are also rare species of birds and mammals conserved in the forest ecosystems. Large predators, such as the Caucasian leopard, the wolf and the brown bear, depend on forest ecosystems.

From the economic point of view, forests are arguably the most important natural ecosystem of Armenia. The timber is used as firewood and carving wood, and the secondary output of the forest – wild fruits, nuts, mushrooms, berries, medicinal plants and the plant technical raw material, are gathered and stored by the inhabitants for domestic and trade purposes. The secondary uses of forests are: recreation, haying, animal grazing, and placing of beehives and bee-gardens.

Subalpine and alpine meadows and subalpine high grasses. The meadow ecosystems in Armenia can be found in all the mountain chains and can be represented by alpine and subalpine meadows and subalpine high grasses, depending on the altitude of the site and other natural conditions. The biodiversity is very rich in meadow ecosystems, although endemic species are not very abundant. The most typical plant species are: Dactylis glomerata, Phleum pratense, Hordeum violaceum, Festuca varia, Anemone fasciculata, Doronicum oblongifolium, Cephalaria gigantea, Scabiosa caucasica, Campanula tridentata, Taraxacum stevenii, and Carex tristis. The endemic species are: Grossheimia caroli-henrici, Scorzonera aragatzi, Symphytum hajastanum. There are also rare plant and animal species of limited occurrence.

The main anthropogenic influence on the meadow ecosystems is grazing. In case of violation of terms and norms of grazing, there is deterioration of the state of the meadows (waterlogging, shrub invasion, sod formation, etc). Haying has a somewhat less influence on the meadow ecosystems, although annual haying in the same period can bring about a reduction in the floristic composition of the vegetation and a reduction in its fodder values. Recreational trampling is quite frequent in tourist sites.

Petrophilous ecosystems (rocks, clives, screes). Highly rocky habitats are very typical of Armenia. This type of sites with their typical ecosystems have very rich biodiversity, since they include species which can be found on all the mountain belts on the one hand, and are typical only of rocky habitats on the other. The total area of these ecosystems is very difficult to determine, since these rocky areas can be found practically everywhere, but they very seldom occupy large territories.

The biodiversity of petrophilous ecosystems is very rich; there is a rich variety of endemic and rare species here. The most typical species are Cerasus incana, Sempervivum transcaucasicum, Cystopteris fragilis, Ephedra procera, etc.

The frequently occurring endemic species are Allium struzlianum, Allium vasilevskajae, Onosma gehardica; the rare and endangered plant species are: Adiantum capillus-veneris, Steptorhamphus czerepanovii, Sambucus tigranii, etc.

The petrophilous ecosystems are practically not used by the local inhabitants. There are medicinal and edible plants in the flora of the ecosystems, but because of the nature of the site their gathering is usually limited. Anthropogenic influence on the petrophilous ecosystems is not usually much expressed.

Aquatic ecosystems. According to the definitions of the Ramsar Convention on Wetlands, the wetlands of Armenia occupy 6.17% of the territory of the Republic, out of which 5,51% (1584 square kilometers) are open wetlands (lakes, ponds, rivers, water reservoirs, canals), 0,52% (150 square kilometers) are temporarily aquatic areas, and 0,14% (42 square kilometers) are marshes and peatbogs.

There are about 9 479 rivers and streams in the territory of the Republic. The surface of the river basins is 28 491 square kilometers, and the coefficient of distribution of the river network is 0.81. The rivers are mountainous by their nature. They belong to the basins of the two large rivers of the South Caucasus–Araks River and Kura River. The watershed of these rivers divides the territory of the Republic into two unequal parts: the Araks basin - 22 556 square kilometers (76% of the territory) and the Kura basin - 7 185 square kilometers (24% of the territory).

Some of the rivers flow out of the Republic: in the North, the Debed into Georgia, the Aghstev, the Hakhum and the Tavush into Azerbaijan; in the South, the Arpa, the Voghdji and the Vorotan into Azerbaijan too. In the North, the outflow through Debed into Georgia is evaluated to be 890 million m^3 per year, and the outflow into Azerbaijan by different rivers is 555 million m^3 per year. In the South-East, the sum outflow into Azerbaijan by the tributaries of the Araks is 791 million m^3 per year.

There are about 82 water reservoirs in Armenia, with a total capacity of 1 067 million m^3, out of which 72 are of hydromeliorative significance. The largest is the Akhurian reservoir which has a capacity of 525 million m^3 and borders Turkey.

Besides, there are a number of artificial lakes and ponds in the country, out of which 96 have a surface of more than one hectare each.

The largest fresh-water lake of the South Caucasus is Lake Sevan. Before the decrease in the water level of the lake (in 1933) it was at an altitude of 1915.57 meters above sea level; the capacity of the lake was 58.5 cu km and the area of the lake surface was 1416 square kilometers. As a result of constant water discharges, the capacity of the lake had been reduced to 34.5 cu km and the surface - to 1250 square kilometers. Today the level of the lake keeps changing. In 2008 the horizon of the lake was at an altitude of 1899.2 meters above sea level.

The second largest lake of the Republic is Lake Arpa. It is located at an altitude of 2023 meters above sea level. As a result of the construction of a dam in 1946-1950, the surface of the lake grew from 450 to 2 000 hectares, and the capacity grew from 5 to 100 million m^3.

There are a number of small unnamed lakes in the alpine zone of Armenia.

The aquatic ecosystems are used for different economic purposes – as sources of water, fish, peat and forage.

Up to the beginning of the 20th century the ichthyofauna of the Sevan was represented by the Sevan trout, the Sevan barbel and the Sevan khramicarp which are endemic fish species. Since the 1920s the ichthyofauna of the lake has changed. The whitefish has been adapted to the lake. As a result of the decrease in the water level of the lake two of the three endemic species registered in the Red Book of Armenia have almost disappeared. The subtypes of the trout, the winter bakhtak and the bodjak, have not been found in the lake since 1986. Rare representatives of the gegharkouni and the summer bakhtak can be very rarely found in the lake. The lake biotype of barbel has also disappeared from the lake; the quantity of the third endemic species, the kramicarp, has also been reduced greatly.

In the 1980s the crucian carp was introduced into the Sevan. In 1983 there were rare occurrences of the crucian carp in the Sevan; in 1986 the catch of this species was 1.4 tons, in 1987 it was 8.2

tons, in 1990 – 52 tons, and early in the 21st century the yearly catch of the crucian carp was 200 tons, becoming a close second to whitefish.

Table 3: The population index of whitefish in the Sevan

Year	Average density (kg per hectare)	Overall ichthyomass (tons)
1983	87	10788
2005	5	625
2007	0.97	136

Source: Reports of the Institute of Hydroecology and Ichthyology of the Armenian National Academy of Sciences

Table 4: The catch of whitefish in the Sevan (tons) and the coefficient of illegal catch by years

Years	*Catch, tons*	*Illegal catch coefficient*	*Total, tons*
1990	1983.9	3.0	5252.0
1991	1798.1	4.0	7192.0
1992	1017.5	5.0	5090.0
1993	804.9	5.0	4025.0
1994	602.0	9.0	5612.0
1995	607.0	12.7	7684.0
1996	3100.0	1.9	6020.0
1997	2100.0	3.2	6800.0
1998	1800.0	2.7	4800.0
1999	2800.0	-	2800.0
2004	420.0	3.8	1600.0

Source: Reports of the Institute of Hydroecology and Ichthyology of the Armenian National Academy of Sciences

Agrobiodiversity. For the last few years, the substantial increase in construction work, the considerable activity in the field of agriculture and the development of tourism have had a somewhat negative impact on agrobiodiversity, not only reducing the habitat of its components, but also resulting in the degradation of species.

The absence of an order of pasture use, the necessary care, drainage systems to prevent waterlogging, as well as ameliorative measures have contributed to the continuous reduction in the species composition and populations of the vegetation of hayfields and pastures. The factors describing the state of the components of agrobiodiversity which are directly or indirectly conditioned by anthropogenic influence are given below.

- reduction in the habitats, natural populations and plant communities of crop wild relatives,
- genetic erosion, which is conditioned by the introduction of new varieties as a result of the development of modern selection, as well as illegal import of new crop varieties and hybrids,
- disorganized gathering of medicinal, edible and decorative plants, which brings about a substantial reduction in natural supplies,
- enlargement of the range of used medicinal plants and the scales of their trade use as a result of higher market demand,
- developing ecotourism in the Republic, the main principles and requirements thereof not always being observed,
- deterioration of natural grasslands as a result of continuous intensive use, in particular:

– significant changes in the vegetation of grasslands in terms of reduction in quantities of populations and separate species,

– low productivity of pastures which does not exceed 2-3 points (on a 10-point scale),

– use of pastures of local significance near rural areas without any restrictions and predetermined order,

– degradation of near-community subalpine pastures which is conditioned by overgrazing, soil deterioration and sparse and poor plant cover with dominating weed plants here and there,

– Insufficient usage of remote pastures.

Best practices and thematic studies. For the last few years, several actions have been carried out in Armenia which aim at improving the state of the components of biodiversity and which have already given positive results. The legislation and the institutional structure of bioresources management have been substantially improved. Armenia has joined a number of nature protection conventions - the Bern Convention, CITES, etc.

In 2003-2005 Armenia actively participated in the development of the "Ecoregional Biodiversity Conservation Plan for Caucasus" (with the assistance of Germany), during which the state of the biodiversity of the Caucasus region was assessed, the conservation priorities and the primary regions subject to protection were determined, and an action plan was developed for the period until 2014. More than 130 experts from six countries participated in the detailed assessment of the biological and socio-economic description of the Caucasian ecoregion. The aim of the work was to assess the current state of the biodiversity and the institutional frameworks in order to develop a realistic and efficient Ecoregional Conservation Plan. After the preparation of the Plan, it was approved by the Ministers of Environmental Protection of six countries during a meeting in Germany in 2005.

As a result of the work carried out within the framework of the Ecoregional Conservation Plan and other national and international programs, the following positive trends have been recorded:

a) According to the data received within the framework of the project implemented by WWF, the state of the populations of the leopard, the bezoar goat, and the Armenian moufflon has been stabilized. For these three previously critically endangered species, conservation strategies have been developed and are being implemented.

b) Thanks to the black griffon vulture conservation program implemented by the "Armenian Society for the Protection of Birds" since 2002, the continuous and alarming reduction in the quantity of the only population in Armenia has stopped and the situation has been stabilized (if there were 4 pairs of the bird in Armenia in 2002, there were 6 is 2003, 7 in 2004, and 7-8 more pairs in 2005-2008).

c) The black francolin which was last found in 1940s, appeared in 2005 in Shvanidzor (Meghri region), which is the boundary of the expansion of the species.

d) If the pheasant used to be found only in Meghri and Kapan (separate cases), at present its natural habitat has been expanded substantially, reaching up to Shikahogh and even the Goris region (by the Vorotan river bed).

e) The sunwatcher has reappeared in the saline soils of the Ararat valley (2003, Djrarat). It has also been found in other regions of the Republic.

f) There is a process of restoration of degraded ecosystems in the near-border areas of the alpine zone (Pambak and Geghama mountain ranges, Tashir, Meghri, Kapan, Goris, and Sisian regions).

g) Four plant species – Sternbergia colchiciflora, Glycirriza echinata, Nufar luteum, and Cyclamen vernum, which were thought to have disappeared totally, have been found in different regions of the Republic during the last few years.

1.2. Main threats to important biodiversity components, and the underlying drivers or causes of these threats

At present almost all the ecosystems of Armenia are subject to anthropogenic influence, as a result of which hundreds of plant and animal species are endangered. The results of anthropogenic influence are more substantial on the forest, semidesert and steppe ecosystems, as well as on the

unique and specific aquatic ecosystem of Lake Sevan. A number of problems have arisen in the forest ecosystems, connected with the irregular use of forests, degradation and annihilation of forest biodiversity, and mass infestation with pests and diseases. The alarming state of the Lake Sevan ecosystem is firstly conditioned by the decrease in the water level and the lake capacity, the disturbance of the balance of biogenic elements in the water and food chains, and the disappearance of the components of biodiversity. At present, as a result of the increase of the water level in the Sevan, new problems have arisen, connected with the insufficient cleaning of the beaches from the vegetation and tree trunks, which has resulted in the rotting of the lake water and deterioration of its quality. Until now, the main problem of the Sevan is the dumping of a large quantity of non-purified wastewater, mineral fertilizers and agricultural wastes into the lake.

The connection between the bioresources and the socio-economic situation in the country is clearly expressed in Armenia. The bioresources are the central factors supporting the economy of the country, especially in terms of supplying agriculture, food and other industries with raw materials and in terms of the development of recreation. Although the level of air, soil and water pollution has gone down as a result of the reduction in industrial volumes, the degradation of different ecosystems and the disappearance of species is going on which is firstly a result of the decreasing living standards of the population.

The recent increase in the rate of biodiversity degradation and reduction is conditioned by the overexploitation of bioresources, land privatization, a substantial increase in the volumes of mining, agriculture and construction work, and the development of tourism, which brings about the disintegration and loss of the habitats of separate species. The manul and the Dahl's jird have totally disappeared from the territory of the Republic. The nesting areas and the forage reserve of a number of species has been reduced. The quantity of several species (e.g. birds of prey) has been reduced due to the high demand for them in the international market which results in poaching.

Thanks to the state assistance and that of international funds to farms, cattle breeding is developing, which meets the food demand of the population substantially; however, at the same time overgrazing results in the degradation of the pastures (in Geghama and Pambak mountain ranges and in Aragats) and its consequences: disappearance of species, change of landscapes, soil erosion and desertification.

On the ecosystems level, wild areas – alpine meadows, forests (the volumes of treeplanting by the state and by NGOs isn't high), steppes and semideserts, are inevitably being reduced and degraded; cave systems are being destroyed. At the same time, as a result of land privatization and the development of agriculture, there is an increase in agrocenoses, and the development of international trade in the field of agriculture brings about an increase in the quantity of introduced species.

Impartial professional ecological expert examination and assessment of the impact of the anticipated activity on the environment is not always carried out during industrial and construction work and during mining. For example, the impact of new small hydroelectric power stations on the aquatic biodiversity has not been discovered and assessed (20 hydroelectric power stations have been constructed; the construction of 40 more is envisaged).

The forests in Armenia are considered the exclusive property of the state and are managed by the Ministries of Agriculture and Nature Protection of the *Republic of Armenia*, including the current system of the Specially protected nature areas which includes mainly forest landscapes. Although the Forest Code of Armenia adopted in 2005 stipulates the possibility of community and private forms of forest ownership, there are no such forests in the Republic.

Unreasonable forest management has contributed to the degradation of natural resources and a loss of forest biodiversity. Large forested areas have been destroyed, disturbing the ecological balance of the environment. Due to socio-economic reasons, illegal forest logging has reached a high level exceeding annual tree growth (by expert assessment, three times). The insufficient levels of legal

forest logging, the high demand for timber and the requirements of the needy and their low paying capacity contribute to it.

The efficient conservation of genetic resources used for agrobiodiversity and especially food production and agriculture management, is hindered by the absence of a national strategy and a comprehensive national program, inaccurate distribution of functions and responsibilities between different state level structures and insufficient level of coordination, absence of a comprehensive national information base and mechanisms of information exchange, etc.

Thus, it can be stated that there are different factors which have a negative impact on biodiversity, including both natural and anthropogenic threats. The main threats are given below:

I. The natural factors are:

- change of climate
- natural disasters

II. anthropogenic factors are:

- change and loss of habitats of the components of biodiversity,
- overexploitation of bioresources
- environmental pollution (of soil, water, atmosphere)
- impact of alien species

III. Socio-economic factors are:

- high level of poverty
- lack of interdepartmental cooperation
- imperfect legislation
- lack of adequate psychological-ethical atmosphere in the society, and a low level of environmental education.

The main anthropogenic threats to biodiversity, their causes and their impact on natural ecosystems and species is summarized in **Table 5**.

Table 5. Main threats to biodiversity and their impact

THREATS	CAUSES	IMPACT	IMPACT ON HUMAN WELFARE
1. Loss of habitat	**1.1. Impact of agriculture**		
	1.1.1. land appropriation	1.1.1. soil ploughing, soil erosion and secondary salinization, degradation of natural ecosystems, change and loss of biodiversity,	Short-term impact is positive, connected with the growth of agricultural products; long-term impact is negative, connected with the disintegration of natural ecosystems and reduction in services delivered by them.
	1.1.2. cattle breeding	1.1.2. disturbance of pasture plant cover, soil erosion, hardening, desertification, change in species composition of biocenoses, degradation of ecosystems, change and loss of biodiversity,	
	1.1.3. drainage of marshes and wetlands	1.1.3. soil salinization, degradation of natural ecosystems, change and loss of biodiversity,	
	1.2. Forest logging	1.2. forest soil erosion and desertification, activation of natural disasters (torrents, landslides), disturbance of forest hydrological regime and intensification of water deficiency, sedimentation and eutrophication of forest rivers and water reservoirs, qualitative and quantitative changes in most hydrophilous plants, anthropogenic succession and degradation of forest ecosystems, disappearance of nests and habitats of animal species, reduction in fauna,	Extremely negative - connected with the disintegration of forest ecosystems and reduction of products and services delivered by them.
	1.3. Open mining	1.3. disposal of new lands and disturbance of natural landscapes, soil, air and water pollution, disturbance of plant cover, disappearance of nests and habitats of animal species,	Positive - connected with the economic development of the region, creation of new jobs; negative - connected with the disappearance of plant cover, environmental pollution which causes a number of health problems.
	1.4. Construction (urban development, road construction, water reservoirs construction)	1.4. disposal of new lands and disturbance of natural landscapes, disturbance of plant cover and migration routes of animal species, fragmentation of plant and animal populations, reduction and disappearance of components of biodiversity,	Positive - connected with the economic development of the region, creation of new jobs, negative – connected with the disappearance of plant cover, environmental pollution which causes a number of health problems.
	1.5. Recreation and tourism	1.5. recreational trampling of the plant cover, anthropogenic disturbance of animal species and their abandonment of habitats, changes in landscapes and ecosystems,	Positive - connected with the increase of profits in the region and creation of new jobs; negative - connected with the disturbance of plant cover, pollution and littering of the environment,

THREATS	CAUSES	IMPACT	IMPACT ON HUMAN WELFARE
			disintegration of ecosystems and reduction of products and services delivered by them.
	1.6. Development of hydroelectric engineering	1.6.change in the hydrological regime of aquatic ecosystems, exhaustion of water resources and temporary drainage of river-beds, inaccessibility to spawning areas of fish and disturbance of reproduction of fish species, disturbance of migration routes, limitation of the natural habitats of fish species, disintegration of aquatic biocenoses, reduction in biodiversity,	Positive - connected with the economic development of the region; negative – connected with the aggravation of social problems of the population (disturbance of hydrological regime of the area, deficiency of food and fish products).
	1.7. Decrease in the level of Lake Sevan	1.7. change in the physical indices and chemical composition of water, eutrophication of the lake, partial drainage of the lake bed, drainage of spawning areas and disturbance of reproduction of fish, reduction in land and aquatic biodiversity, introduction of alien species,	Extremely negative - connected with the reduction in the volume of food and fish products, disturbance of hydrological regime, change of climate, decrease in the aesthetic value of the lake, development of recreation, aggravation of the sanitary state of the water.
2. Overexploitation of bioresources (timber, medicinal, fodder, edible, technical and decorative plants, mushrooms, wild nuts, fruits, berries, fish and other mater animals, game animals)	2.1. Imperfect legislation	2.1. uncontrolled bioconsumption by the population – poaching, illegal forest consumption and storage of non-timber forest products,	Negative – connected with the reduction in biodiversity, including food supplies, caused by overexploitation of bioresources.
	2.2. insufficient control over the consumption of bioresources	2.2. poaching, increase in illegal consumption of forest resources and non-timber forest products, increase in anthropogenic influence on natural ecosystems,	Negative – connected with the reduction in biodiversity, including food supplies, caused by uncontrolled consumption of bioresources.
	2.3. absence of data on inventtorization of biodiversity components as well as bioresources and their use quota	2.3. increase in anthropogenic pressure on natural landscapes, disturbance and disintergration of forests, semideserts, meadows and steppes, disturbance of the state of land and aquatic symbioses and populations, change in their species composition, disturbance of the plant cover of pastures, decrease in the fertility of fodder plants, reduction of economically valuable, rare and endangered species,	Negative – connected with the reduction of fodder and food resources as a result of nonregulated use of bioresources.
	2.4. Absence of a biodiversity monitoring system	2.4. impossibility of assessment of the state of species, populations and ecosystems, impossibility of application of rationing and quota allocation method, impossibility of making scientifically sound political and administrative decisions,	Negative – connected with the reduction of fodder and food resources as a result of nonregulated use of bioresources.
3. Environmental pollution	3.1. Impact of industry	3.1. accumulation of harmful chemical substances in the soil, pollution of the air with solid and gaseous	Negative – connected with soil degradation and pollution of food products.

THREATS	CAUSES	IMPACT	IMPACT ON HUMAN WELFARE
		elements, pollution of ground waters and rivers, accumulation of industrial wastes and degradation of landscapes, disturbance of the conditions for the growth, development and reproduction of species, extinction of valuable, rare and endangered species in the forest ecosystems, decrease in the fertility of agrocenoses, aggravation of crop quality.	
	3.2. Impact of agriculture	3.2. soil pollution caused by the use of mineral fertilizers, pesticides and toxic chemicals, loss of land biodiversity (invertebrates, microbes), change of the species composition of plant cover, displacement of valuable and rare plant species from symbioses in semideserts, meadows and grasslands,	Negative – connected with soil degradation and pollution of food products.
	3.3. Transport	3.3. soil, air and water pollution, degradation of ecosystems, reduction in species and populations,	Negative - connected with air pollution and its influence on human health.
4. Impact of alien species	4.1. Purposeful introduction of species and spontaneous introduction	4.1. disturbance of sustainability and balance of ecosystems, change of the species composition of natural communities and agrocenoses, replacement or extinction of native valuable species from them,	
5. Change of climate		5.1. decrease in the stock of water resources including ground water reserves, acceleration of drainage processes of wetland ecosystems, inclusion of new territories in the desertification process, increase in the frequency of natural disasters, decrease in the sustainability of mountain ecosystems, vertical shift of expansion borders of fauna and flora, change in phenological indices of species, change in the communities composition, increase of the possibility of extinction of local species including endemic ones, increase in pest infestation cases, increase in forest fire cases,	Negative – connected with the reduction in bioresources and aggravation of human health.

Chapter 2.
Current status of Implementation of Strategies and Action Plans related to biodiversity Conservation

Three main strategic documents have been developed in Armenia which have a direct connection with biodiversity conservation. These are: "The Second National Environmental Action Programme of the Republic of Armenia" (approved by the Government of Armenia on August 14, 2008), "Biodiversity Strategy and Action Plan of Armenia" (1999), and "Strategy on Developing Specially Protected Areas and National Action Plan of Armenia" (2002).

2.1. The Second National Environmental Action Programme (NEAP-2)

The Second National Environmental Action Programme was developed in 2006-2007 and was approved by the Government of Armenia in 2008. The document includes the following actions connected with biodiversity conservation:

1. Inventory of more valuable areas of Armenia from the biodiversity perspective, determination of biodiversity protection mechanisms for those areas.
2. Implementation of state accounting of biodiversity and creation of state cadastre according to the marzes of Armenia, including preparation of the annotated lists of flora and fauna species and basic ecosystems.
3. Establishment of biodiversity monitoring system and database.
4. Analysis of the PAs, elaboration of proposals on the system improvement from the prospective of biodiversity and valuable ecosystems representation, creation of new protected areas, including protected biosphere areas and ecological corridors.
5. Inventory and situation assessment for rare and endangered species of flora and fauna, amendment and publication of the Red Book of Armenia.
6. Identification of the most used and useful species of plants and species of hunted animals in the regions of the Republic, assessment of the resources of the most significant flora and fauna species, development of norms/quotas for collection/hunting of the most important plants and animals species.
7. Examination and analysis of international experience in the assessment of impact of various sectors and natural factors of the economy on the natural ecosystems, localization and piloting of impact assessment methodologies, development of methodological guide-lines applicable for Armenia.
8. Development and introduction of mechanisms for fair distribution of the benefits obtained from the use of genetic resources and their availability .
9. Improvement of industrial fishing mechanisms and restoration of valuable populations of fish species.
10. Clarification of 2009-2012 implementation time-scales designed for the measures stemming from and included in the National Forest Programme.
11. To implement the development and introduction of pilot project on the fight against pests and fire prevention in the most vulnerable forests as a result of climate change

Analysis shows that the actions in the field of biodiversity conservation are really important priorities for the country the implementation of which according to schedule (2008-2012) will create favourable conditions to improve the state of biodiversity conservation.

2.2. Biodiversity Strategy and Action Plan of Armenia (BSAP)

The Biodiversity Strategy and Action Plan of the Republic of Armenia was developed in 1999 aimed at improving the biodiversity conservation in Armenia and its sustainable use. The BSAP was developed in accordance with the requirements of the Convention on Biological Diversity and includes clear mechanisms of program implementation, monitoring and assessment.

The BSAP has been planned for a four-year period (2000-2004). This period is considered enough to realistically control the impact of the BSAP and to revise the plan at the end of it. However, the strategy and the action plans proceeding from it have not been revised and no implementation analysis has been carried out. It is obvious that the development of a new version of the BSAP in the coming years is a priority.

The main goal of the strategy is "To ensure the conservation, sustainable use and regeneration of the landscapes and biological diversity of the Republic of Armenia for sustainable human development". In order to achieve this goal, 13 tasks have been proposed, according to which a detailed action plan has been developed. These tasks are:

- To develop mechanisms which mitigate economic activities that negatively affect biodiversity, while ensuring that a more realistic market value is placed on biological resources.
- To increase internal and external investments in order to conserve and regenerate landscapes and biodiversity.
- To conserve, regenerate and sustainably use forest resources, with a resulting increase in healthy forested areas
- To support and extend the capacity to use science as a vital tool in guiding conservation management (including both research and monitoring).
- To improve management systems relating to biodiversity conservation (including protected areas management) with the result of increased effectiveness
- To improve legislation and economic mechanisms for the conservation and sustainable use of biological and landscape diversity.
- To improve and strengthen the ecological education and training system, along with increasing public awareness of biodiversity
- To ensure the use of appropriate ecologically-friendly technologies in support of biodiversity conservation.
- To ensure the participation of NGOs and other relevant stakeholders in all stages of project development and implementation, and improve their opportunities to take a direct role in conservation management.
- To preserve and regenerate most threatened landscapes, ecosystems and plant and animal species.
- To enlarge the network of specially protected areas and to raise their efficiency.
- To ensure the sustainable use and further regeneration of biological resources, including agrobiodiversity.
- To support and contribute to sustainable development, including the further integration of biological resource management into the development of rural communities, to help to reduce the levels of poverty.

The national action plan includes 245 actions and measures allocated according to 13 strategic components which correspond to the objectives and corresponding target issues of the Strategic Plan of the Convention. The measures of the plan are allocated according to three degrees of priority (I, II, III); on the whole 66 of them have been defined to be of the highest priority, 146 – of the second priority and 33 – of the third priority. The measures fully proceed from the requirements of the implementation of the Convention and biodiversity conservation, covering several important spheres, including the improvement of the legislation and the institutional system, certain practical activities aimed at biodiviersity conservation and use, etc. However, on the whole, the full-scale implementation of the BSAP

was not realistic, due to the insufficiant resource base, let alone in the envisaged period (1-5 years). The country has not had and does not have sufficient human, material-technical and especially financial resources in order to implement all the actions of the BSAP. Furthermore, the Plan includes only approximate estimates of financial needs for each action which are also divided into three categories according to that index.

- I – includes a sum within USD1 000-100 000
- II includes a sum within USD 100 000-500 000
- III includes a sum which exceeds USD 500 000.

Taking into account the fact that the "Biodiversity Strategy and Action Plan of the Republic of Armenia" was developed earier than the goals of the Convention for 2010 were defined and the Strategy Plan of the Convention was adopted, the wording of the target issues in these documents is naturally different from those in the BSAP. However, on the whole we can draw clear parallels, comparing and assessing the 2010 Convention goals and target issues with those of BSAP. Information on the target issues of the Convention and the activities within the framework of different primary directions of BSAP, the national indicators of their assessment, as well as action implementation is given in **Table 6.**

Table 6. The connection of BSAP activities with the targets of the Convention

Goal, Target	Inclusion in BSAP	Inclusion in NEAP-2	BSAP indicators	Implementation
Goal 1. Promote the conservation of the biological diversity of ecosystems, habitats and biomes				
Target 1.1: At least 10% of each of the world's ecological regions effectively conserved.	Conserve and restore the main wetland ecosystems (including Lake Sevan, Lake Gilli and Lake Arpi), Conserve and restore the main forest ecosystems, especially in those forest territories damaged during the period from 1990-1995, Rehabilitate the forests rich in rare and economically valuable species, ensuring their natural productivity, Restore the degraded landscapes and the biodiversity of the territories damaged by economic activity.		Change of the water level of Lake Sevan; dynamics of physical-chemical indices of the water. Changes in the composition and occurrence of forest biodiversity. The area and percentage of the specially protected areas and forested territories against the total area of the Republic.	Work to increase the water level of Lake Sevan in under way – throughout the period from 2002-to 2008 the water level has risen by 146 cm. "Lake Arpi" national park is being designed; "Khor Virap" state reservation was founded in 2007 to conserve wetland ecosystems, afforestation work is under way, and forest management plans are being developed, massive forest rehabilitation and afforestation activities are being carried out.
Target 1.2: Areas of particular importance to biodiversity protected	5 sub-trends and over 35 actions are dedicated to this target in BSAP.	Inventorization of areas in Armenia of particular importance to biodiversity, definition of biodiversity conservation mechanisms in those areas. Analysis of PAs of Armenia from the point of view of presentation of biodiversity and valuable ecosystems, development of proposals about the improvement of the system, creation of new protected areas including biospheric protected areas and ecological corridors.	The area and percentage of the specially protected areas against the total area of the Republic. Percentage of forest and other ecosystems in PAs.	The borders of PAs are being specified and optimized, new reserves and national parks are being created, management plans are being developed. Work is under way to identify and register "Important Plant areas" and "Significant Biodiversity Areas" ("Emerald" network). 18 Important bird Areas have been identified.
Goal 2. Promote the conservation of species diversity				
Target 2.1: Restore, maintain, or reduce the decline of populations of species of selected taxonomic groups.	Develop and realise special plans of restoration activities of populations of threatened species (Armenian mouffllon, leopard, Vordan karmir, Sevan trout, etc.). Realise research projects aiming at the assessment of occurrence and state of the populations of less studied taxons. Develop and realize action plans aiming at the conservation of crop wild relatives.	Creation of the Biodiversity State Inventory and State Cadastre by marzes of the Republic including the making of annotated lists of animal and plant species and main ecosystems. Creation of biodiversity monitoring system and database.	The number of those species (populations) for which measures of restoration, maintenance and reduction of decline are being implemented. The species and quantity of threatened plants or animals living in specially protected areas or having reducing habitats. The number of samples collected and those kept in collec-	Owing to the optimization of the borders of a number of PAs of Armenia the conservation status of some plant and animal species has improved. Work is being carried out in the direction of dissemination of crop wild relatives and creation of seed bank. In particular, within the framework of "The conservation and use of crop wild relatives of Armenia in

Goal, Target	Inclusion in BSAP	Inclusion in NEAP-2	BSAP indicators	Implementation
			tions whose data exists in international catalogues and databases.	selection" program at the plant genetic resources laboratory of the Armenian State Agrarian University, seed samples of wild wheat, barley, rye have been collected and subjected to short-term conservation, their habitats and redution trends in Armenia have been analysed. Restoration of the population of Armenian moufflon and panther in Central and Southern Armenia, reintroduction of the bezoar goat from the territory of Armenia to its natural habitat – Borjomi-Kharagauli national park (Georgia) are important environmental programs and are implemented with the support of WWF. Since 2003 replenishment of fish supplies of Lake Sevan is being carried out as a result of which larvae and young fish of endemic fish species (summer bakhtak, gegharkuni and koghak) have been released into the lake.
Target 2.2: Status of threatened species improved.	Develop and realize a special action plans to restore the main threatened species (including Armenian moufflon, leopard, Vordan karmir, Sevan trout, etc). Develop and realize an action plan for the conservation of cop wild relatives in accordance with the agrobiodiversity program.	Inventorization and assessment of the state of rare and endangered plant and animal species, amendment and publication of the Red Book of Armenia.	The number of species registered in the Red Book, the number of animal species reproducing in natural environment, number of plant and animal species assessed in accordance with IUCN criteria.	Since 2007 the Red Book of Armenia is being amended by state budget resources, the species being assessed in accordance with IUCN criteria. At the moment almost 200 plant and 350 animal species have been assessed. Presumably almost 600 plant and 300-350 animal species will be included in the Red Book of Armenia. In 2009-2010 the amended version of the Red Book will be issued. For the conservation and reproduction of main threatened species, individual strategic plans have been developed for Armenian moufflon, bezoar goat and

Goal, Target	Inclusion in BSAP	Inclusion in NEAP-2	BSAP indicators	Implementation
				leopard. By the protocol resolution N 36 of the Government of Armenia (14.09.06) "The concept of introducing new artificial reproduction biotechnologies to restore the populations of endemic fish species (trout, koghak, beghlu) of Lake Sevan" has been ratified. Within the framework of the "Ensuring of the increase of Sevan trout and its variety" program financed by the state budget, certain quantities of parental stock of 2 trout subspecies (the gegharkuni and summer trout) have been created in fish-breeding farms. Replenishment of the fish supplies of Lake Sevan has been implemented as a result of which larvae and young fish of summer bakhtak, gegharkuni and koghak have been released into the lake.
Goal 3. Promote the conservation of genetic diversity				
Target 3.1: Genetic diversity of crops, livestock, and of harvested species of trees, fish and wildlife and other valuable species conserved, and associated indigenous and local knowledge maintained.	Develop and realize an action plan for conservation of crop wild relatives create seed-plots for crop wild relatives near protected areas for the purpose of reintroduction and conservation. Develop and realize pilot projects on new agricultural technologies and sustainable use of agrobiodiversity. Develop a number of pilot projects to disseminate traditional approaches to the use of biodiversity.	Development and introduction of mechanisms of availability of genetic resources and fair and equitable sharing of the benefits arising out of their use.	The number of plant and animal species or samples conserved ex-situ and in collections.	Work is carried out along the lines of creating a seed bank and enriching its collection. With the support of UNEP/GEF the "In-situ conservation of crop wild relatives by means of information, advanced management and practical application" program is being implemented. The management plan of "Erebuni" state reserve has been developed due to which the conservation of cereals and the wild relatives of some rare species registered in the Red Book will be improved. The subspecies of Sevan trout (endemics) are being reproduced in fish breeding farms. The wild relatives of small cattle (SC) are conserved in zoo; there

Goal, Target	Inclusion in BSAP	Inclusion in NEAP-2	BSAP indicators	Implementation
				is a small flock of hybrid animals (SC of moufflon and bezoar goat).
Goal 4. Promote sustainable use and consumption.				
Target 4.1: Biodiversity-based products derived rom sources that are sustainably managed, and production areas managed consistent with the conservation of biodiversity.	Ensure the sustainable use and restoration of biodiversity, including that of agrobiodiversity.	Improvement of trade fishing mechanisms in Lake Sevan, restoration of valuable fish populations. Specification of the 2009-2012 schedule of implementation of the measures proceeding from and included in the national forest program of the Republic of Armenia.	The sustainably managed forest and aquaculture areas.	The forest management plans of some forest enterprises of the Republic are being developed.
Target 4.2. Unsustainable consumption, of biological resources, or that impacts upon biodiversity, reduced.	Improve the quantitative assessment of the use of the bioresources. Promote the methods of sustainnable use of the biodiversity in the field of agriculture. Promote the sustainable use of forest resources. Promote sustainable fishing. Promote the sustainable use of biodiversity by local communities. Create mechanisms to restore forest resources and reduce the influence on the forests.	Discovery of most useful plant and game animal species for separate marzes of the Republic, assessment of the stock of most important plant and animal species, determination of the quantity of their gathering/hunting		Taking into account the data about the state of populations, licensing of the use of bioresources is being carried out since 2003. However, due to the absence of data on inventorization and the functioning monitoring system, it is impossible to always correctly assess the state of biodiversity and the results of the implemented measures. The “National Forestry Policy and Strategy”, “Forest National Program”, and “Action Plan for Mitigating Actions to help address the Problems associated with Illegal logging” documents make provisions for the implementation of a number of complex measures aimed at the conservation of forest biodiversity, reduction of logging, forest rehabilitation of logged areas and creation of new forests.
Target 4.3: No species of wild flora or fauna endangered by international trade.	Develop mechanisms for the ratification and implementation of the “Convention on International Trade in Endangered Species of Wild Fauna and Flora”. Create an interdepartmental certifying committee for import and export of bioresources.	Creation of biodiversity monitoring system and database.		Armenia ratified the “Convention on International Trade in Endangered Species of Wild Fauna and Flora” (CITES) on April 4, 2008.

Goal, Target	Inclusion in BSAP	Inclusion in NEAP-2	BSAP indicators	Implementation
Goal 5. Pressures from habitat loss, land use change and degradation, and unsustainable water use, reduced.				
Target 5.1. Rate of loss and degradation of natural habitats decreased.	Conserve and restore the main forest ecosystems. Conserve and restore the main wetland ecosystems. Restore the landscapes and their biodiversity degraded due to Industrial activity.	Improvement of trade fishing mechanisms in Lake Sevan, restoration of valuable fish species populations. Development and implementtation of pilot anti-fire and pest control projects in forests vulnerable due to change of climate.		For the last few years, there has been a reduction in the rate of disintegration of forest ecosystems and of degradation of natural habitats, due to structural changes in the forest sector (the functions of forest conservation and use have been separates from the field of forest control), stronger control of logging, higher living standards of the staff of forest enterprises, as well as higher volumes of forest rehabilitation work. As a result of the measures taken by the Ministry of Agriculture aimed at relieving the pressure on pastures near populated areas, there has been a reduction in the rates of degradation of pasture ecosystems and loss of fodder plants.
Goal 6. Control threats from invasive alien species				
Target 6.1. Pathways for major potential alien invasive species controlled.	Include measures of restriction of invasive species in the departmental projects and species conservation action plans. Create a regulation about the breeding of introduced fish species in ponds. Implement research to find out and control the occurrence of introduced species and their impact on biodiversity.	Creation of biodiversity monitoring system and database.	The number of re-discovered alien invasive species; changes in the habitat and quanities of alien invasive species.	On the whole the situation is not being controlled. Quarantine services have traditionally been realizing control of imported goods which can contain potentially invasive species. Scientific reasearch for discovering invasive species and for study of their occurence and their threat to natural acosystems is under way.
Target 6. 2. Management plans in place for major alien species that threaten ecosystems, habitats or species.				No such plans have been developed.
Goal 7. Address challenges to biodiversity from climate change, and pollution				
Target 7.1. Maintain and enhance resilie-	Conserve and restore the main wetland ecosystems.	Development and implementtation of pilot anti-fire and pest control		The Government of Armenia resolution N1840-N (02.12.04) on

Goal, Target	Inclusion in BSAP	Inclusion in NEAP-2	BSAP indicators	Implementation
nce of the components of biodiversity to adapt to climate change.	Rehabilitate the forests rich in rare and economically valuable species, ensuring their natural productivity. Define the optimal ratio of pastures to hayfields for different types of landscapes.	projects in forests vulnerable due to change of climate.		"Confirming the list of activities to meet the Armenia's obligations under a number of international environmental conventions" provides for. Development of a policy and a strategy of adaptability to climate change, reduction in greenhouse gas emission and absorbent development Creation of mechanisms to develop, exchange and apply technologies to contribute to the reduction in greenhouse gas emission, as well as adaptation to consequences of climate change The National Forest Program (2005) provides for the following activities. Promotion of afforestation and forest rehabilitation within the framework of Clean Development Mechanisms. Assessment of expected vulnerability of forests as a result of climate change. Development of activities aimed at raising forest adaptability. Assessment of capacity to absorb carbon dioxide from the atmosphere of rehabilitated and new forest enterprises. Since 2008, the "Raising of adaptability of mountain forest ecosystems of Armenia to climate change" project is being realised.
Target 7.2. Reduce pollution and its impacts on biodiversity.	Develop and implement a project of direct control of anthropogenic influence on natural ecosystems. Carry out monitoring of stored chemical and industrial wastes and assessment of their threat to biodiversity, with a view to alleviating the later	Assessment of the risk of impact of harmful chemicals on human health and the environment. Development of methodological approaches to harmful chemicals impact assessment and reduction. Development of a national strategy	The indicator of the pollution of Lake Sevan is the amount of elements exceeding maximum permissible concentration, and the quantity and quality of water used in industrial processes.	Due to the absence of monitoring of the state of biodiversity, it is impossible to assess the implemented actions in this regard

Goal, Target	Inclusion in BSAP	Inclusion in NEAP-2	BSAP indicators	Implementation
	Carry out analysis of the impact of pesticides and fertilizers on biodiversity.	on reduction of the risk of impact of harmful chemicals on human health and the environment. Monitoring of the environmental situation near waste sites.		
Goal 8. Maintain capacity of ecosystems to deliver goods and services and support livelihoods				
Target 8.1. Capacity of ecosystems to deliver goods and services maintained.	Promote the methods of sustainable use in agriculture. Promote the sustainable use of forest resources. Promote sustainable fishing Promote the sustainable use by local communities. Create mechanisms to restore forest resources and reduce the influence on the forests. Develop and implement projects to promote sustainable ecotourism.	Discovery of most useful plant and game animal species for separate marzes of the Republic, assessment of the stock of most important plant and animal species, determination of the quantity of their gathering/ hunting Improvement of trade fishing mechanisms in Lake Sevan, restoration of valuable fish populations		Afforestation is under way in forest enterprises of Armenia. Licensing of the use of bioresources is being carried out since 2003
Target 8.2. Biological resources that support sustainable livelihoods, local food security and health care, especially of poor people, maintained.	Improve the quantitative assessment and control of the use of bioresources. Promote the methods of sustainable use of biodiversity in agriculture. Promote the sustainable use of forest resources. Promote sustainable fishing. Promote the approaches of sustainable use of bioresources. Create mechanisms to restore forest resources and reduce the influence on the forests.	Discovery of most useful plant and game animal species for separate marzes of the Republic, assessment of the stock of most important plant and animal species, determination of the quantity of their gathering/hunting Improvement of trade fishing mechanisms in Lake Sevan, restoration of valuable fish populations.		Within the framework of the project Natural Resources Management and Poverty Reduction (WB) the following have been carried out: a) “Community-based management of water basins” subcomponent – in about 100 communities in Tavush and Gegharkunik marzes, improvement (fertilization) of natural grasslands and rehabilitation of irrigation systems – rehabilitation of field canals, water drainage system lining, construction of animal watering sites, installation of gabions for preventing water erosion, etc Demonstration and training of community population in terms of wheat and barley cultivation in dry-farming lands, application of crop rotation of leguminous plants, and sustainable irrigation system has been carried out. Management plans have been developed in 100 communities,

Goal, Target	Inclusion in BSAP	Inclusion in NEAP-2	BSAP indicators	Implementation
				inventorization and assessment of productivity of grassland flora has been carried out. The communities are allotted the necessary amount of seeds for the cultivation of fodder plants, and treeplanting work is carried out. b) "State Forest Management" component – development of forest management plans for "Ijevan", "Sevqar", "Artsvaberd", "Chambarak" and "Noyemberian" forest enterprises has been concluded. In the process of their preparation, forest inventorization and stock assessment has been done. Seed-plot rehabilitation has been concluded in "Noyemberian" forest enterprise. c) "Management of Specially Protected Nature Areas and Biodiversity Conservation" subcomponent – management plans of "Sevan" and "Dilijan" national parks were developed and approved by the Government of Armenia in 2007. Buildings have been constructed or restored; in particular, a visitor centre has been constructed in Dilijan National Park.
Goal 9 Maintain socio-cultural diversity of indigenous and local communities				
Target 9.1. Protect traditional knowledge, innovations and practices.	Develop a number of pilot projects to disseminate traditional approaches to the use of biodiversity. Develop mechanisms for adapting the principles of biodiversity conservation and sustainable use for local experience. Carry out continuous training and educational programs for local communities about the methods of sustainable use of biodiversity. Develop a grant outline to promote	There are none	There are none	With small grants given within the framework of the "Natural resources management and poverty reduction" program (WB) sustainable use of bioresources programs are being implemented in the communities of two marzes, with the application of traditional knowledge and experience.

Goal, Target	Inclusion in BSAP	Inclusion in NEAP-2	BSAP indicators	Implementation
	traditional experience in biodiversity and sustainable use in local communities.			
Goal 10. Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources				
Target 10.1. All access to genetic resources is in line with the Convention on Biological Diversity and its relevant provisions.	Develop mechanisms to promote exchange of genetic resources and the fair and equitable sharing of the benefits arising out of their use. Develop and introduce methods to broaden the possibilities of getting benefits from specially protected nature areas. Develop regulations to ensure the participation of local communities in the sharing of the benefits arising out of the use of specially protected areas.	Development and introduction of mechanisms of access to genetic resources and fair and equitable sharing of the benefits arising out of their use.		Within the framework of the "Biodiversity Primary Capacity Creation Need Assessment" project (UNDP/GEF, 2002) the "Access to genetic resources and strategy of fair and equitable sharing of benefits arising out of their use" was developed which in accordance with the basic principles of Bonn Agreement defines the main principles of access to and use of genetic resources on the basis of fair and equitable mechanisms of benefit sharing. Within the framework of the "Development of integrated strategy to raise food security of Armenia through improved use of genetic resources" project (ICARDA) research has been done about capacity development on the national level, and efficient management and use of plant genetic resources, contributing to the development of food security and agriculture development in the country. The present state of plant genetic resources management in Armenia has been revised, the rising challenges have been identified and decisive suggestions have been presented to develop a national policy through comprehensive integrated approach to conservation and use of plant genetic resources. The "Creation of national information sharing mechanisms on Plant Genetic Resources for Food and

Goal, Target	Inclusion in BSAP	Inclusion in NEAP-2	BSAP indicators	Implementation
				Agriculture (PGRFA) and preparation of a national report on the state of PGRFA" project is currently being implemented in the Ministry of Agriculture, with the support of the Food and Agriculture Organization.
Goal 11: Parties have improved financial, human, scientific, technical and technological capacity to implement the Convention				
Target 11.1. New and additional financial resources are transferred to developing country Parties, to allow for the effective implementation of their commitments under the Convention, in accordance with Article 20.	Carry out analysis of potential external donors and investors in the field of biodiversity conser-vation and define primary projects. Revise the existing financing mechanisms ensuring the management and protection of specially protected areas.			For the implementation of Article 20 of the Convention, financial resources are allotted by the World Bank, the Government of Norway, the Government of Germany, World Wildlife Fundation, Global Environment Facility as well as CEPF and MAVA funds.

2.3. Strategy on Developing Specially Protected Areas and National Action Plan of Armenia

The "Strategy on Developing Specially Protected Areas and National Action Plan of Armenia" was developed and approved by the Government of Armenia in 2002. This document is practically aimed at the development of Strategic component A of the BSAP. The main objectives of the in-situ conservation of biodiversity have been enlarged and clarified here. The action plan covers 5 chapters:

- Improvement of legal field/legislation;
- Improvement of management system;
- Enlargement of PAs network;
- Improvement of financial-technical mechanisms;
- Improvement of staffing.

According to the enumerated titles, the following have been implemented since 2002.

Improvement of legal framework. The Law "On specially protected nature areas of Armenia" was adopted in 2006. In order to ensure its implementation the Government of Armenia has adopted several resolutions, including the procedures of PA monitoring, cadastre management, creation of new PAs, and development of management plans.

Out of the four International Conventions Armenia was supposed to join according to the Action Plan (point 1.1), three have been signed and ratified.

Improvement of management system. The Bioresources Management Agency of the Ministry of Nature Protection of Armenia was founded in 2002. Its statute was confirmed in the same year (Resolution N1236 of August 8, 2002, of the Government of Armenia). The PAs Management department functions in this agency.

For the clarification of the authorizations regulating the field, the Law "On specially protected nature areas of Armenia" clearly defines the competences of the Ministry of Nature Protection, as well as those of local and regional authorities. The relationships between the state, regional and local authorities and state departments in terms of control activities have been defined by the Law "On Environmental Control" adopted in 2005.

The management plans of "Sevan" and "Dilijan" national parks were also confirmed by the Government of Armenia in 2007. The management plans of "Khosrov forest" and "Shikahogh" state reservations have been developed and are currently being discussed.

Enlargement of PAs network. The following medium-term projects have been financed by the Government of Armenia in 2004-2005:

- Development of the programs for establishment of six more PAs ("Arevik" State Reserve, "Arpi (Gnishik)" and "Jermuk" National Parks, "Kirants" and "Vorotan" Parks of Nature, "Arayi Mountain" Reservation),
- Creation of the PA cadastre of Armenia
- Work on revision of the PAs, clarification of their borders and mapping work (including "Khosrov forest" State Reserve, State Reservations, "Erebuni" State Reserve, "Sochut", "Vanadzor", "Soranner" and "Ijevan" dendroparks),
- Development of a program of inventorization and listing of natural monuments.

On the basis of these programs, the clarification of borders and mapping of state reserves and reservations was carried out and the list of natural monuments of Armenia was confirmed in 2008. The Government of Armenia resolutions about the establishment of "Gnishik" and "Jermuk" national parks and "Vorotan" State Reservation, as well as "Arevik" national park and «Zangezur» State Reservation which have been implemented with the financial assistance of the Critical Ecosystem Partnership Fund (CEPF) have been developed and are currently being discussed.

With the financing of state and international donor organizations, technical assistance has been given to state reserves and national parks, and visitor centres have been built in “Khosrov forest” State Reserve and “Dilijan” National Park.

Two new reservations were established in 2007 – “Guilan” and “Khor Virap”. Work is under way for the establishment of “Lake Arpi” transboundary national park (KfW-financed).

Improvement of financial mechanisms. For the last few years the volume of financing for the protected areas has risen significantly. The financing of national parks, state reserves and the “Reserve park complex” has risen six-fold in 2000-2008.

On the initiative of the Government of the Federal Republic of Germany, a decision has been made to found a Caucasus Protected Areas Fund (a trust fund) which commits itself to assist the conservation of the PAs in the Caucasian ecosystem (Armenia, Georgia, Azerbaijan), particularly:

- the management of national parks, state reserves and state reseravations
- conservation of landscapes and natural resources,
- cooperation between state structures and bodies engaged in nature protection issues,
- the organizations, legal institutions and agencies the functions of which are congruent with the objectives of the Fund.

The text of the declaration between the Caucasus Protected Areas Fund and the Ministry of Nature Protection of the Republic of Armenia is currently being agreed upon.

Improvement of staffing. Technical enhancement of existing PAs, development of the infrastructures of existing and future PAs, staffing with scientists, creation of visitor centres, restoration of museums and other activities are being carried out by state means and with the support of international structures.

A serious shortcoming of the “Strategy on Developing Specially Protected Areas and National Action Plan of Armenia” is the absence of provisions aimed at the creation of ecological networks which are considered primary in the practice of PA development and which are the conceptual basis for the Protected Areas Work Programme functioning within the framework of the Convention. The PAs Strategy essentially does not discuss the creation of transboundary PAs either. There is no clearly formulated concept of development of the PAs network in the Republic; however, the development of its elements has partially been planned in the Action Plan; in particular, point 1.3.9 stipulates development of criteria of establishment of new PAs, etc.

2.4. An Ecoregional Conservation Plan for the Caucasus

This document is not a national action plan, but it contains a number of activities to be implemented both on the regional and on the national levels.

The Caucasian ecoregion which is ranked among the planet's 25 most diverse and endangered hotspots by Conservation International is a centre of global significance of plant and animal diversity and endemism. It is obvious that the biodiversity in the region is currently being reduced at an alarming rate.

In the “An Ecoregional Conservation Plan for the Caucasus” the threats to the natural resources of the region have been assessed, out of which illegal tree-logging, poaching, overuse of bioresources, development of infrastructures and water pollution have been emphasized. The origins of these threats can be divided into three groups:

a) socio-economic (poverty, low public awareness, etc)
b) political (lack of cross-border cooperation, incompatible legislation, military actions, etc)
c) institutional (lack of cooperation among structures, insufficient knowledge and research, etc).

“An Ecoregional Conservation Plan for the Caucasus” is designed for 20 years (until 2024), and the majority of its actions refer to all the six countries of the Caucasian ecosystem, reflecting similar issues in the field of biodiversity conservation. Several other actions are meant for separate countries.

All the actions of the program are divided into six large blocks out of which one (conservation and sustainable use of coastal and marine ecosystems in the Caucasian ecoregion) is not directly related to Armenia. The first block, "Developing an Institutional Framework and Building Capacity for Biodiversity Conservation in the Caucasus Ecoregion", is on the one hand not directly related to the Convention on Biological Diversity, but on the other hand is the basis on which all the activities of biodiversity conservation must be built (it largely corresponds to target 11.1).

The second part of this block, "Efficient institutional frameworks and management opportunities for the development of the ecological network in the Caucasian Ecoregion and management of the protected areas", includes actions about the corresponding sections of the Convention (in-situ conservation and ecosystem approach). Taking into account the fact that forest ecosystems are extremely important for the Caucasus from the points of view of both biodiversity conservation and socio-economic development, the second block of actions is dedicated to the forest sector of the region ("Conservation and sustainable use of forest ecosystems in the Caucasius ecoregion").

The activities of this block coincide with targets N1.1, 1.2, 4.1, 4.2, 5.1, 8.1, 8.2 and aim at 10% increase in the forests in the Caucasus. For Armenia, the following activities are offered: creation of new PAs and several corridors in Southern Armenia, development and implementation of forest reforestation activities with the participation of local communities, as well as actions to prevent fires, pests and diseases and introduction of invasive species.

The third block ("Conservation and sustainable use of freshwater ecosystems in the Caucasus ecoregion") is also very important for Armenia and has a direct connection with targets N1.1, 1.2, 4.1, 4.2, 5.1, 7.1, 7.2, 8.1 and 8.2 .

The fifth block ("Conservation and sustainable use of high mountain ecosystems in the Caucasius ecoregion") is also related to targets N 1.1, 1.2, 4.1, 4.2, 5.1, 7.1, 7.2, 8.1 and 8.2 . For Armenia in particular, is suggests the establishment of new Protected Areas, and separation of Important Bird Areas and Corridors. The sixth block ("Conservation of focal species and their habitats in the Caucasius ecoregion") in the first place relates to targets 2.1 and 2.2 26 most important animal species have been determined for the Caucasian ecoregion (plant species have not been determined yet) for which restoration and population stabilization activities have been suggested.

2.5. An overview of progress made in implementation of priority activities or actions, focusing on concrete results achieved

For the achievement of the primary targets of the Convention the following have been or are being implemented on the national level:

- Improvement of the legal framework,
- Preparation of the second edition of the Red Book of Armenia,
- Clarification of the borders of the PAs of Armenia,
- Development of management plans of PAs,
- Development and introduction of afforestation programs in different marzes of the Republic,
- Development of programs of new PA establishment ("Jermuk" and "Gnishik" national parks, "Kirants" and "Vorotan" parks of nature, "Arayi Mountain" reservarion,
- Inventorization and listing of natural monuments,
- Preparation of a strategic plan of environmental education in Armenia,
- Replenishment of fishstock in Lake Sevan and restoration of endemic fish species.

On the international level:

- Making of the Red List of plants in Caucasus (CEPF),
- Development of management plans for "Sevan" and "Dilijan" national parks, technical reequipment of parks, staff trainings (WB),

- Establishment of “Arpi” national park (KfW- WWF),
- Determination of Important Bird Areas of Armenia,
- Reinforcement of Khosrov and Shikahogh State Reserves and development of ecotourism, as well as raising awareness of local inhabitants about biodiversity (Government of Norway),
- Development of a management plan for Shikahogh State Reserve,
- Establishment of “Arevik” national park and “Zangezur” State Reservation in South Armenia (CEPF),
- Implementation of the “Establishment of a group to protect the Armenian moufflon and to combat poaching” and “Inventorization and conservation of wetland territories of the Ararat valley” projects (NABU),
- Development of the “Public relations and public awareness raising national strategy and action plan”, preparation of the “Analysis of the legal and institutional frameworks in the sphere of protected areas of Armenia and detection of gaps and obstacles” document (Fund MAVA),
- Development of a draft management plan for Erebuni State Reserve (UNEP/GEF),
- Development of the “National strategy for management and use of plant genetic resources in Armenia” (ICARDA- FAO).

2.6. A review of successes and obstacles encountered in implementation and lessons learned

The main achievements can be considered the improvement of the legal framework and institutional structures of the field, inventorization of biodiversity in the territories of existing and future PAs, development of management plans and the initiative of introducing a monitoring system, inclusion of biodiversity conservation activities in the SNEAP, the granting of more and more yearly state financing for carrying out research and applied work, etc.

The main difficulties are: the lack of financial resources and up-to-date information, as well as the lack of specialists and opportunities of their training. There is little cooperation between sectors; there is also a lack of efficient coordination of both research and nature protection activities. Anthropogenic influence on natural ecosystems is growing constantly, and there is a deterioration of the state of biodiversity due to mining, urban development, high rates of forest use and the lack of ecologically clean modern technologies.

The Biodiversity Strategy and Action Plan was developed 10 years ago, when a comprehensive analysis of the threats to biodiversity had not been carried out yet. Thus, the Action Plan does not fully reflect the current situation, and the priorities raised during those years must be changed.

First of all, a new Biodiversity conservation national strategy must be developed and confirmed on the state level, on the basis of the analysis of the current situation and priorities of threats. On the basis of that strategy, the realistic possibilities of the implementation of the offered activities must be assessed during the development of the action plan, proceeding from financial, staff, political, social and other restrictions.

Chapter 3.
Sectoral and Cross-sectoral Integration of Biodiversity Considerations

3.1. A description of the extent to which biodiversity has been integrated into sectoral and cross-sectoral strategies and plans (agriculture, forestry, industry, fishing, education, tourism)

The modern approaches to environmental protection presuppose the inclusion of biodiversity issues in the development plans and strategies of other spheres and fields of the economy of the country.

Agriculture, forestry, industry, power engineering and urban development are the main sectors influencing biodiversity, Furthermore, the first two have the most influence on the natural ecosystems and the flora and fauna.

For the last few years, the policies and strategies in the field of agriculture and forestry have improved significantly. Laws and political and strategic documents regulating those fields have been adopted, according to which a number of various projects are being implemented both by state finances and with the assistance of international donor organizations. Although the importance of environmental protection is mentioned in agriculture and forestry policies and other strategic documents, plans and laws, the lack of opportunities, means and commitment hinder the implementation of actions aimed at protection.

Furthermore, the absence of substantial progress in the application of environmental approaches in the practice of agriculture and forestry management has a negative impact both on the development of economy and on the health of the population. For example, the losses from soil erosion amount to tens of millions of dollars, and the contamination of drinking water with agricultural fertilizers and pesticides has a negative impact on the health of the population.

It is known that a lot of effort is needed to prevent the negative impact of agriculture and unsustainable forest use on the environment. The state of soil erosion conditioned by economic activity is aggravating year by year, and the efforts towards preserving soil fertility and combatting pests are limited to pilot projects and small-scale activities. Despite the positive trends of rising water use efficiency and decreasing salinization owing to the rehabilitation of irrigation and drainage systems, it is still difficult to assess their impact on the environment, including biodiversity. The results of the fight against illegal forest loggings aren't obvious either, although significant steps are being taken towards improving the situation.

Agriculture. For the last few decades, in the context of reducing state assistance to and subsidization of the field of agricultural, change of agriculture structure and management, as well as rising frequency of occurence of extraordinary climatic events, the negative impact of agriculture on the environment (including biodiversity) is more striking.

Land is the main resource of agricultural production, and it is obvious that land protection and rational and sustainable use of land resources have not only agricultural and environmental, but also general significance. Soil degradation has a direct impact on growth rates of agricultural production and the fertility of crops, hayfields and grasslands. In this connection, land protection and soil improvement is beneficial not only for raising agricultural productivity, but also for the environment in general.

The land balance of the Republic of Armenia by July 1, 2008, is given in **Table 7**:

Table 7. The land balance of the Republic of Armenia (in thousand hectares)

		Total	Including irrigated
1	Area of the Republic of Armenia	2974.26	208.97
1.1	Available land of the Republic of Armenia by end use		
a)	farmland	2121.21	155.85
	including arable land	450.36	123.48
	perennial plantations	31.57	30.88
	hayfields	127.36	1.50
	grasslands	1117.14	-
	other lands	394.78	-
b)	residential lands	151.24	52.69
c)	industrial, mining and other production lands	29.20	-
d)	lands of energy, communication, transport and municipal infrastructures	12.20	-
e)	specially protected nature areas	229.72	-
f)	special-purpose lands	31.69	-
g)	forest lands	369.78	0.43
h)	water lands (excluding Lake Sevan and other specially protected water areas)	28.59	
i)	reserve lands	0.63	-

Source: National Statistical Service of the Republic of Armenia

The 2974.3 thousand hectares of total available land of the Republic is divided into the following land zones:

- semidesert - 236 thousand hectares,
- dry steppes - 242 thousand hectares,
- steppes - 797 thousand hectares,
- forests - 712 thousand hectares,
- mountainous meadows - 629 thousand hectares,
- outcrops of bed rocks, sands, waters and other areas - 358.3 thousand hectares.

The adverse influence of agricultural activity on the natural environment is especially reflected in the following phenomena: degradation of farmlands, soil erosion, salinization, overwetting, disturbance of the plant cover of natural grasslands, disappearance of many vascular plants, larger scales of pest infestation and diseases, wrong implementation of agricultural melioration, farming and cattle breeding, as well as contamination of soil, water and atmosphere as a result of land irrigation with industrial and domestic wastewaters.

Around 40% of the farmlands of the Republic is eroded. About 75% of total lands and more than 50-60% the arable land in mountainous areas is subject to the destructive influence of water streams. Furthermore, water, wind and irrigation erosion inflict heavy losses on agriculture each year: eroded land gives 3-4 times less harvest as compared to uneroded land.

For the last few decades around 44.0% of the total land area and 20.3% of arable lands has faced different degrees of erosion. It usually includes Aragatsotn, Kotayq, Lori, Syuniq, and Vayots Dzor marzes of Armenia. The overgrazing of grasslands also contributes to erosion, as a result of which the area of natural grasslands is steadily declining.

The natural grasslands of Armenia have degraded substantially during the last two decades, since during the whole pasture period the livestock in the Republic is fed with natural fodder.

Because of low productivity and small quantity of livestock in today's farms, as well as due to the lack of finance, livestock grazing takes place mainly in near-village pastures, hence remote summer and alpine grasslands remain undeveloped.

The majority of community near-village pastures is currently overexploited and subjected to different types of degradation, from change of the plant cover to creation of erosion centres which are also a result of landslides and torrents. As a result of continuous inefficient use of natural grasslands and lack of attendance, a part of them (about 150 thousand hectares) has become useless. There is currently acceleration of water erosion and enlargement of marshes in the natural grasslands.

The difficulties of plant diversity conservation in grasslands are connected with the imperfection of the mechanisms of their management by local authorities and village dwellers, and the lack of means for carrying out monitoring and restoration activities.

The conservation of grasslands of particular importance to biodiversity must be focused on their regulated efficient use, development of new technologies, assessment and improvement of the ecological state of the grasslands, and wide use of local flora in the process of practical selection for getting new perennial fodder crops.

In Soviet times thousands of tons of mineral fertilizers and pesticides and about 1.8 tons of organic fertilizers were used in the fields of the country every year. As a result, agriculture created an ecologic pressure on the environment.

For the last 15 years the agriculture in the Republic is in the phase of extensive ploughing; there are almost no scientifically developed agroactivities. For the last decade, the use of mineral fertilizers has been reduced more than 10 times, and that of organic fertilizers - about 18 times. At the same time, according to the data from the National Statistical Service of the Republic of Armenia, the import of pesticides rises year by year, which results in additional soil and water contamination. **Table 8.**

Table 8. *Quantity of pesticides imported into the Armenia in 1999-2005*

Import year	1999	2000	2001	2002	2003	2004	2005
Quantity of pesticides (tons)	144.12	216.9	247.5	160.91	273.7	364.1	540.1

Source: National Statistical Service of the Republic of Armenia

Protection of the Armenian lands is carried out in accordance with republic and regional programs. The owners/users of land have certain responsibilities in terms of land protection.
Natural grasslands and pastures usually belong to the state; they are not subject to privatization and are managed by relevant state authorities.

The Land Code of Armenia (1991) clearly separates the responsibilities of the land users in the field of land protection. Land protection and its efficient use is carried out on the basis of state and regional land construction and environmental programs. The necessary actions for the protection of privatized lands are carried out by land users and owners at their own expense; state land conservation is carried out at the expense of the state (community) budget.

The inclusion of biodiversity issues in the field of agriculture is reflected in a number of founding documents and international and national projects. Thus, one of the goals of the "Agricultural Sustainable Development Strategy" of Armenia (2006) is the protection of the gene pool of agricultural plants (particularly crop wild relatives) and animals and the efficient use in selection, particularly:

- conservation of natural resources, restoration, sustainable use and improvement of management mechanisms of degraded grasslands,
- control of the quality and import of chemicals used in the field of agriculture, with a view to maintaining the ecological balance.

At the same time, the Agricultural Sustainable Development Strategy states that until the year 2015, the cultivated areas will reach 446.1 thousand hectares which will exceed the 2003-2005 index

by 37.7%, and the cultivated areas, productivity and gross production of fruit, potato, grapes, vegetables and fodder and industrial plants will grow. Naturally, all this will be possible to realize with the help of modern agrotechnology which supposes a growth in the use of fertilizers and chemical means of plant protection. As a result, until 2015 the volumes of pesticide and chemical fertilizer use can reach the Soviet index, which can bring about serious and radical changes in natural ecosystems and in the structure of biodiversity.

The following are among the tasks of the "Food security programme in Armenia" (2005):

- to ensure the efficient management and use of agricultural genetic diversity and of fodder plants and domestic animals in particular,
- to ensure a lower reduction and degradation rate of natural habitats,
- to ensure the assessment, monitoring and restoration of agrobiodiversity, particularly fodder plants and domestic animals.

Similar issues are stipulated in the "Food safety programme in Armenia", that is, efficient management and use, as well as assessment, monitoring and restoration of crop diversity and in particular fodder plants, crop wild relatives, and domestic animals.

In order to promote the protection of natural habitats of valuable fodder plants, the implementation of the following activities has been stipulated by Resolution N880 of the Government of Armenia (2005):

- assessment of the state of grasslands and registration of species,
- improvement measures, rehabilitation of irrigation systems,
- improvement of legislation, development of local management plans,
- development of criteria for assessment of values and efficiency of biodiversity.

Agrobiodiversity management issues. As may be seen from the above mentioned founding documents, the issues of the conservation and rational use of agrobiodiversity as an important component of genetic resources is given high importance in agricultural strategies. The efficient management of agrobiodiversity is in the focus of two fields, agriculture and nature protection, and is a vivid example for the development of inter-sector joint policy and cooperation.

A brief description and the main issues of the agrobiodiversity of Armenia is given in Chapter 1. Since agrobiodiversity management includes the tasks of the conservation, study and use of resources, the components of agrobiodiversity management are under the supervision of different departments.

Agrobiodiversity conservation in natural habitats is regulated by the Ministry of Nature Protection, which is at the same time the coordinator of the Convention on Biological Diversity.

The conservation of agrobiodiversity in gene banks and separate seed and animal collections, its use with the aims of selection, as well as the issues of the conservation and restoration of biodiversity of natural grasslands and pastures are coordinated by the Ministry of Agriculture, which is also the coordinator of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA).

The scientific-research work on agrobiodiversity issues in Armenia is financed by the Ministry of Education and Science, in accordance with the assessment of independent experts and taking into account the development priorities of each field.

On the principles of base financing, Armenian National Academy of Sciences contributes to the comprehensive research and conservation work on agrobiodiversity, which is implemented in scientific institutions under the control of the NAS.

In order to prevent the potential threats to agrobiodiversity, a number of activities are being developed and implemented in the country, which aim at improving environmental protection and the sustainable use of natural resources. In particular, during the last 5-10 years the legal framework of the sphere has been improved: a number of laws have been amended and adopted, including the Law "On specially protected nature areas" (2006), the Forest Code (2005), the Law "On plant protection and plant quarantine" (2006) and a number of by-laws. The main objective of the development and im-

provement of legislative documents is their harmonization with the criteria of international legislation and their approximation with international legislation.

The issues of agrobiodiversity conservation and its sustainable use are currently in the focus of the attention of a number of multi-party and two-party projects and initiatives. For the last few years Armenia has participated in a number of initiatives of international organizations and donor countries, expanding international cooperation in the field of nature protection and particularly in biodiversity conservation. The issues of international agreement ratification and membership in international or regional conventions pass an obligatory phase of discussion and agreement with relevant departments.

In terms of the conservation of plant genetic resources the recent participation of Armenia in several international conventions and treaties is worth mentioning: in particular, the "International Plant Protection Convention" (2006), within the framework of which the Law "On plant protection and plant quarantine" is being approximated to international standards for phytosanitary measures and CoE regulations, and elimination of discrepancies between international and national criteria is being carried out, as well as the "International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)" (2007), which is aimed at the creation of a comprehensive system of availability of genetic resources of plants used for food production and agriculture management and ensuring the protection of the rights of farmers.

Armenia has been member of the "European Cooperative Programme for Plant Genetic Resources" (ECPGR) since 2007. Within the framework of the programme, inventorization, assessment and database creation is being carried out for collections of plant genetic resources, which contributes to conservation of agrobiodiversity, information sharing on existing resources, and raising efficiency of selection activity.

At the moment the "2008-2012 National programme of self-sufficiency with agriculture development main crops" is being developed. The issues of efficient conservation and sustainable use of food and plant genetic resources (in seeds gene banks and field collections) are supposed to be included into the programme.

- With the support of the Food and Agirculture Organization, the Ministry of Agriculture implemented the "Creation of national information sharing mechanism on Plant Genetic Resources for Food and Agriculture (PGRFA) and preparation of a national report on the state of PGRFA" program in 2008. The aim of the program is to create a national information sharing mechanism, ensuring the availability of information on PGRFA management, the participation of all the interest parties by data collection, granting and analysis, and to prepare the second national report on the state of plant genetic resources. The Armenian and English versions of the report have been uploaded to the website www.pgrfa.org/gpa/arm. A database has also been created (in Armenian and English) which contains data on:
  - Organizations engaged in PGRFA conservation and use and people involved in the field,
  - projects, publications, laws, Government resolutions, scientific and educational articles, books, as well as international, regional and national treaties in the field of PGRFA conservation and use,
  - variaties of crops cultivated in the Republic, existing ex situ colletions, preserved samples,
  - information systems applied in the country, etc.

Measures for the solution of problems. In countries with transition economy like Armenia, substantial improvements of agriculture management are needed in order to ensure a stable resource base. In this connection, from the environmental point of view, the primary issues in the field of agriculture are:

- sustainable management of lands and conservation of their fertility,
- decrease and prevention of soil degradation, implementation of anti-erosion ameliorative actions to that end, definition of principles of privatized farmland consolidation,

- introduction of a land monitoring system, creation of Geographic Information Systems (GIS) based on modern technologies and with the application of monitoring criteria,
- passing of authorizations in the field of remote grassland management on to intercommunity unions, with a view to preventing their degradation, biodiversity conservation and ensuring the use of remote pastures by all the communities,
- development of a national strategy and national program on genetic resources for agrobiodiversity and particularly for food and agriculture,
- efficient coordination of activities in the field of agrobiodiversity conservation, use and information sharing: an interdepartmental committee for plant genetic resources for agriculture and food safety was created in 2005; its aim is to coordinate the development of national programs and strategies in the field of plant genetic resources conservation. At the moment the Committee needs functional enhancement and expanding of the scope of activities,
- clear separation of functions and responsibilities of structures in the field of protection on different state levels,
- creation of comprehensive national databases,
- close cooperation between institutions involved in the field on national, regional and international levels,
- creation of information sharing mechanisms between institutions involved in the field,
- development of a strategy regulating the delivery of agrobiodiversity samples and genetic plasma and profit sharing.

Sustainable management of grasslands and water stream formation zones, development of organic agriculture and reduction in greenhouse gas emissions are also included in this list.

Forestry

Forests have their own place and role among the rich vegetation communities in Armenia. Armenia is a mountainous country for which the soil-protecting, water-protecting and climate-regulating properties of forests are invaluable.

According to official data, the average yield class of the forests of Armenia is 3.6 bonitets, the average integrity is 0.55, and average timber stock is ~ 125m^3/hectare, average annual growth is ~1.3 m^3/hectare. By volume, there is about 12 m^3 live timber per person in the Republic.

The forested areas of Armenia have been reduced almost by half for the last century due to anthropogenic factors. The vertical borders of forests have also been changed. As a result of grazing, haying and irregular logging the upper forest zone has gone down from its natural borders by 100-500 meters and been replaced by subalpine and sometimes mountainous meadows. The same phenomenon is observed in the lower forest zone; the main reason is the enlargement of arable land and spring pastures at the expense of forests. The pressure of the impact of anthropogenic factors is higher especially in thickly populated areas. As a result, losing the natural borders of vertical distribution, the forests border mountain slopes in thin belts.

A large area of forests was overlogged in 1930-1950 for industrial needs and annihilated in 1990s as a result of the economic and energy crisis, disturbing the ecological balance of the environment. At present around 70% of the natural forests of Armenia is old and disintegrated. 36% (13.5 million m^3) of the overall timber stock is located in mature and old forests. The latters are located in areas which are relatively difficult to access. Here there is a need to combine forest exploitation with increase in economic efficiency of forests and implementation of ecological activities. According to the latest data of forest survey (1993), the total stock of timber of forest resources is 41.74 million m^3, and annual growth is 354 thousand m^3.

In the farms of the state system carrying out forestry management there are 300 hectares of nursery forests (out of which 192 is irrigable) which are in a very unfavorable state. A considerable part of

its does not operate; as for the rest, only 15-20% of their capacity is used. The variety of the seedlings has also been reduced (not more than 10-12 varieties).
Irregular forest use harms the forests of Armenia greatly, having at the same time a negative impact on the other fields of forestry management. Due of different social reasons as well as high demand for timber, there are still illegal loggings going on which sometimes exceed the volumes of legal loggings. On the other hand, during trade loggings economically more valuable trees are usually stored as timber, threatening the quality of the forests. Forest biodiversity has reduced greatly, natural habitats have been damaged, and a number of rare, endemic and relict species have become threatened.

Deep structural changes have taken place in the forests: they have lost their ability to reproduce naturally, productivity has dropped, erosion is more active and the hydrological regime has been disturbed which in its turn has brought about a rise in the probability of landslides and torrents.

Consequently, the solution to the problem of conservation, protection, reproduction and sustainable use of the forests of Armenia is an important priority for the socio-economic development of the Republic and demands improvement of the legislation regulating the field and scientifically sound forestry management.

Policy in the field of forestry, national and international projects. With the aim of sustainable management, conservation and protection of the forests of Armenia, as well as for the solution of the economic, social and ecological problems of the forests, serious steps have been taken towards the development of strategic documents. Not only the relevant department, but also all the interested organizations related to the field participate in the development of policies and national programs in the field of forestry, which ensures the the involvement of issues of sectoral character.

- In the **"Biodiversity Strategy and Action Plan of the Republic of Armenia"** (BSAP) the "Conservation and restoration of landscapes and ecosystems" action has been accepted as a national target. It includes the following activities:

  - to conserve and restore the main forest ecosystems, especially the forests destroyed in the period 1990-1995,
  - to rehabilitate the forests rich in rare and economically valuable species, ensuring the process of their natural reproduction,
  - to promote the sustainable use of forest resources,
  - to restore the degraded landscapes and the biodiversity of the areas damaged by economic activity,
  - to create mechanisms of restoration of forest resources and reduction of impact on forests.

- The **"National Forest Policy and Strategy of the Republic of Armenia"** (2003) was developed in 2003, with the support of the grant program of the Swedish International Development Cooperation Agency (SIDA) and within the framework of the forest management component "Natural resource management and poverty reduction program".

The aim of the National Forest Policy and Strategy of the Republic of Armenia is to ensure the restoration and sustainable use of degraded forest ecosystems and the development of useful qualities of forests.

The main tasks of the National Forest Policy are:

- legislation and institutional issues,
- economic and financial issues and illegal activities,
- environment and biodiversity,
- forest management,
- education, science, training, information and international contacts,
- social issues.

- The main aim of the **"Action Plan for Mitigating Actions to help address the Problems associated with Illegal logging"** (protocol decision N38 of the Government of Armenia session of September

30, 2004) is to reduce the volume of illegal loggings while keeping economic and social aspect in focus. Since the majority of illegal loggings is conditioned by the poverty of rural population, the program of illegal logging prevention will be based on actions aimed at reducing poverty. In case of successful implementation of all the components of the program, the pressure on forests will reduce greatly, contributing to the conservation and sustainable use of forest ecosystems and biodiversity.

- The **"National Forest Program of the Republic of Armenia"** (Resolution N 1232-N of July 21 2005 of the Government of Armenia) contributes to the sustainable management of forests, as well as to raising the economic, social and environmental role of forests.

The main tasks of the National program are:

– conservation and protection of forest ecosystems,

– rehabilitation of degraded forests,

– sustainable and continuous use of forest resources,

– ensuring the sustainable management strategy of forests.

The biodiversity conservation component of the National Forest Program envisages activities both implemented by separate departments and coordinated by several departments. For example, the necessity of forest science development is mentioned in the list of activities; without it, sustainable forest management and rational use is hard to imagine; the latters are indirectly related to conservation of forest biodiversity.

A National Coordinating Council has been created aimed at the successful implementation of the National Forest Program. The Council includes the following main beneficiaries: Ministries of Agriculture, Nature Protection, Finance, Economy, Territorial Administration of Armenia, as well as scientific and non-governmental organizations functioning in the field, international donor organizations, etc.

- Within the framework of the **"Natural Resource Management and Poverty Reduction project"** the development of participatory management plans of "Sevan" and "Dilijan" national parks, mapping of national parks, inventorization of components of biodiversity and introduction of a system of biodiversity monitoring has been carried out.

Within the framework of the "Sustainable forest management" component, different activities aimed at forest management and use have been carried out.

As a result of inter-sector cooperation, several steps have been taken in the fields of organization of training courses, capacity development and raising of public awareness. Thus, a number of training courses have been organized in the Ijevan forest enterprise, mainly aimed at forest inventorization, taxation, application of new information technologies and management issued.

With the financing of the partnership fund formed within the framework of the project "Food production growth" of the Japanese Government, "Hayantar" SNCO carried out afforestation and fencing work in different marzes of the Republic (Lori, Tavoush, Syunik, Kotayk, and Shirak) and in Yerevan in 2006.

The "Community-based Forest Management in Armenia" project is being implemented with the grants from the Government of Norway and with the support of the "Norwegian Forestry Group" (NFG). Three pilot communities have been chosen in Lori and Tavoush marzes (Lernapat, Margahovit and Koghb) where work is being carried out aimed at community capacity development in forest management, afforestation and other activities.

The activities implemented and envisaged within the framework of the above mentioned projects contribute to the rehabilitation of degraded forests, growth of forested areas, raise of the productivity of forest lands, improvement of the state of biodiversity, improvement of environmental qualities and sustainable forest management **Table 9**.

Table 9. The Goals, Expected Results and Assessment Criteria of Forestry Projects Implemented by State Budget

1	Ensure efficient conservation of Armenia's state forest resources (360 thousand hectares).	▪ Protection of forests from illegal loggings, grazing, pollution and land takeover. ▪ Anti-fire capacity development.	Reduction in the number of violations of forest use rules and fire prevention on an area of 360 000 hectares of forests.	▪ Increased efficiency of discovery of forest use violations. ▪ Increased efficiency of anti-fire measures.
2	Ensure the efficient protection of the Armenia's state forest resources from disease and pests.	▪ Study of forest pests and diseases. ▪ Development of integrated approaches to forest protection. ▪ Pest infestation and disease outbreak prevention.	Forests free of pests and diseases	▪ Increased efficiency of forest protection. ▪ Data on pest and disease occurrence on Armenia's forest resources and the damage caused by them. ▪ Reduction in the occurrence of pests and diseases.
3	Ensure the rehabilitation of overlogged and degraded forests of the Armenia's state forest resources.	▪ Organization of forest rehabilitation, biodiversity conservation in forest ecosystems. ▪ Development of seed and seedplot economies. ▪ Promotion of the natural rehabilitation of forests.	Rehabilitated forest areas	▪ Enlargement of forested areas. ▪ Increased productivity of forests. ▪ Ensuring establishment of seedlings and saplings. ▪ Prevention of erosions, landslides and desertification.
4	Ensure sustainable management of the Armenia's state forest resources.	▪ Monitoring of the forest resources. ▪ Inventorization of forest resources. ▪ Development of afforestation projects.	Sustainable management of the forests in Armenia.	▪ Inventorization of forest resources. ▪ Development of afforestation projects for forest resources.
5	Improvement of forest legislation.	▪ Development of legal acts regulating the field of forests.	Laws, by-laws, normative documents regulating the field of forests.	▪ Developed and adopted legal acts. ▪ Developed and adopted normative documents.
6	Improvement of the structure of state forest institutions.	▪ Restructuring of state forest institutions, clear role distribution.	Restructured state institutions realizing sustainable forest management.	▪ Founded and restructured forest enterprises.

Barriers to the development of the field. During the last few years serious steps have been taken by the Ministry of Agriculture in the field of forest rehabilitation. The volumes of support to sprout regrowth, natural regrowth of forests, as well as founding of forest cultures have risen dramatically. "Hayantar" SNCO and international donor organizations are carrying out treeplanting and forest protection activities. Combat against illegal tree logging has been enhanced considerably.

Nevertheless, despite certain progress there are still problems in the forest management sphere in the Republic which requires immediate solution. Among those are:

- frequent structural changes in the field,
- unclear separation of management system functions between beneficiary structures, necessity to broaden the scope of authorizations of local authorities and to clarify their obligations,
- insufficient participation of the communities in the forestry management process,
- low public awareness about the functions of the forestry management field,
- small number of activities in the forest sector development projects directly aimed at forest biodiversity conservation,
- insufficient quantity of scientific-research work about forest conservation and protection,
- lack of specialists, especially in the fields of management, afforestation, forest rehabilitation and reproduction (the majority of the specialists are elderly people; there is a lack of young specialists due to the absence of adequate specializations in higher educational institutions, except for the preparation of forest specialists by the silvics chair of the Armenian Agricultural Academy for the last few years. The infrequency of training and qualification courses due to the lack of finance),
- lack of scientific and technical means and equipment, as well as a laboratory facilities necessary for afforestation and forestry management,
- There are violations of the forest legislation not only in the forests of general use, but also in the forests which are included into the list of specially protected areas.

There is still no mechanism of data granting and sharing about the violations of forest legislation and the current situation.

Industry

The current decline in the industry production volumes is an important factor for the improvement of the environmental situation in Armenia, although the direct negative impact of man on ecosystems and biodiversity has obviously increased.

At present mine exploitation and mining industry are the sectors of industry having the most negative impact on biodiversity.

Having a relatively small area, the Republic of Armenia is rich in minerals. By 2007, 579 mines of solid minerals have been registered, including 26 metals, out of which 13 are being exploited, and 553 non-metals, out of which 238 are being exploited.

The lands degraded as a result of extraction of metals and non-metals are located in 281 communities of the Republic. According to the data of the 1978-1998 inventorization, there are 640 sites of degraded lands with a total area of 7530.0 hectares, out of which 3780 hectares used to be farmlands before degradation. Mining has been concluded on 3037 hectares of degraded lands, and they are being recultivated for further use, and 4493.0 hectares are still being exploited.

The possibility of diverse impact on the environment and especially on forest ecosystems by open mining is expected, for example, during the exploitation of the Lori region Teghout copper-molybdenum mine, where, according to the confirmed project, forests containing valuable, rare and endemic plant and animal species will be logged. The construction and exploitation of the Teghout copper-molybdenum concentration plant and the industrial waste accumulated in tailing pits will result in environmental pollution, with typical consequences thereof.

In mountainous areas mining companies are a source of soil pollution; they pollute the soil with heavy metals and chemical compounds. Mining activities occupies about 9700 hectares in Armenia,

out of which 8300 are degraded lands, and 1400 hectares are under tailing pits. The volume of accumulated industrial wastes is several hundred million m^3. During 1996 only, about 300 thousand m^3 industrial wastes have been left from non-metallurgic mines.

The territory of the Alaverdi copper-molybdenum factory in a radius of 3 kilometers is contaminated with heavy metals,the concentration of which exceeds the maximum permissible level 20-40 times.

The areas near the Ararat Gold Recovery factory are also contaminated with heavy metals. There are similar companies is Kajaran, Kapan, Meghri, Agarak, where the nearby territory is also contaminated with heavy metals (there are no statistic data). Chemical industry pollutes the soil with persistent organic pollutants – polychlorobiphenyl, and cement factories – with dioxine, oil products and other harmful substances.

Since 2003 about 300 million m^3 wastewaters are produced in Armenia yearly, out of which 60% flows into open reservoirs without any cleaning whatsoever, and the remained 40% is cleaned mechanically. The wastewaters from the Lake Sevan basin flow into the Sevan without any cleaning. The main sectors of industry in the Lake Sevan basin used to be mechanical engineering, food industry, light industry and timber industry. At present these sectors are either idle, or work with low capacity. Nevertheless, corrosive elements such as chlorine, sulphates, nitrogen, oil products, phosphates, iron and copper, go right into the lake through channels which are never cleaned.

On the basis of the assessment of accumulation, disposal and cleaning of industrial and solid wastes, the Gegharkunik region development project has included proposals about the construction of economic-domestic and industrial wastewater purification stations, as well as solid waste recycling stations. In the absence of purification stations, there has been no reduction in the level or volumes of external impact on biodiversity.

“Environmental impact monitoring centre” SNCO of the Ministry of Nature Protection carries out periodical monitoring of water quality from more than 40 rivers in Armenia each year.

Environmental impact assessment in Armenia is carried out by “State Environmental Expertise” SNCO functioning in the Ministry of Nature Protection, in accordance with the Law “On Environmental impact assessment”. An instance of environmental impact assessment in the specially protected nature areas is the ban on the construction of a gold mining factory in Sotk. The Ararat Gold Recovery Company started the process of construction of the Sotk gold mining factory in 2004; it was to replace the factory in Ararat marz. The suggestion was presented to the Ministry of Nature Protection in order to assess the environmental impact of the project. The project was turned down as a result of independent expert examination.

“Environmental Survival” NGO has implemented the “Reduction of negative impact of tanning industry on the ecosystem of the river Hrazdan” sub-project, within the framework of which they studied the waterworld of the river Hrazdan, assessed the impact of the industrial enterprises on the biodiversity of the river and reconstructed a purification station for “Kashi” CJSC.

On the whole, the impact of industry on biodiversity is as follows:

- open mining causes loss of habitats of plant and animal species, disintegration of populations, degradation of lands and landscapes,
- soil, water and atmosphere pollution through emissions and leakage disturbs the species composition of biodiversity, the natural course of development of species and populations and the ecosystem balance,
- the creation of piles or tailing pits of industrial wastes, including wastes generated by minerals extraction and exploitation, concentration, metallurgical and other recycling industry, expands the area of degraded land, aggravates the degradation of landscapes and biodiversity, the exogenic processes, etc.

Fishing and Fisheries

Lake Sevan has been, and remains, the main center of Armenian fishery. Fish industry was on a high level in Armenia until the 90s. The fish reserves were managed in Lake Sevan on the basis of

scientific research, while in separate fish-breeding farms in Gegharkunik Marz the fish gene pool was preserved by incubation and other valuable fish species were bred as fish products (rainbow trout, silver carp, crucian carp, etc). The quantities of fish products satisfied the demand not only in Armenia but also in neighboring countries.

Since the 90s, as a result of the economic crisis, the stable functioning of the fish-breeding farms and the regular functioning of fish industry has been interrupted. Nowadays there is a rupture of trade fish reserves in Lake Sevan due to non-effective management of fish reserves.

Although fish-breeding farms have been developing rapidly in Armenia for the last few years, the fish product produced this way is considerably more expensive and is not reasonable for every walk of life. Since the price of fish produced in these farms depends on imported food, as well as the prices of used water and electricity, the gradual rise of fish price is inevitable.

There are currently 6 fish-breeding farms in Armenia: Jermuk, Angeghakot, Sevan, Lichk, Karchaghbyur and Kamo, which engage in artificial reproduction of salmonids in order to replenish their stock. All the farms except for the first two are in the Lake Sevan basin.

Thus, the efficiency of fish-breeding in the Sevan basin reduces year by year and requires efficient measures and radical reconstruction not only to improve the biotechnology of breeding, but also in terms of fish stock conservation and regulation of fish catch in the lake.

Trade trout-breeding was not developed enough in Armenia for a long time. The reason was mainly the absence of high-quality and valuable fish food, as well as the uncertainty of competitiveness of the trout with the Sevan trout and the whitefish.

Until recently, there were several rainbow trout breeding farms – Aknalich farm in Armavir, Angeghakot farm in Syunik region, and the farms in Jermuk, Masis and Hrazdan.

The largest of them was the Aknalich farm which was founded in 1966. Its capacity was 300-350 tons of trout per year. Today, a lot of farms have been divided into smaller ones after privatization, and the calculation of their capacity and production has become very difficult.

As for the crucian carp farms, the largest ones are those in Armash and Yeghegnadzor. The designed capacity of the Armash farm used to be several thousands of tons per year. However, nowadays the yearly output of these farms is only 400-500 tons of carp and silver carp.

Although the Armenian legislation prohibits the voluntary introduction of alien species, a number of introduced species are being bred in farms today, the influence of which on the fish world of the country needs to be studied.

Education

Armenia is one of the countries of the UN EEC area which has expressed his readiness to be integrated into the European educational processes, and is the only country in South Caucasus where the Law “On Environmental Education” has been functioning since 2001; in accordance with the main principles of the law, the system of continuous environmental education has been formed in the Republic of Armenia. The Law regulates the principles and the legal, organizational and financial and economic grounds of the state policy in the field of environmental education of the population. Nevertheless, a number of by-laws regulating the field which are necessary for the implementation of the law and by which the mechanisms of environmental education in educational institutions have to be defined, have not been developed and adopted yet. Taking into account the fact that the practical efficiency of the law is still low, it is necessary to study and analyze the reasons for it, reviewing the issue in the context of improvement of the whole educational system and at the same time taking into account the peculiarities of the field of environment. The point is that environmental education has to serve not only for education and awareness, but also, which is extremely important nowadays, for preparation of specialists.

The system of environmental education in Armenia includes the following levels: pre-school, secondary, specialized secondary, higher vocational, post-graduate and public.

The environmental education and training system is managed by the competent authorities of the Government of Armenia such as Ministries of Nature Protection and Education and Science. The main tasks of the above mentioned authorities in the field is the development of a unified educational policy, creation of scientific-educational and methodological grounds for its application, staffing, information supply and financial security, environmental education and training on all the levels of secondary education and regulations of the legal framework. Nevertheless, there is still a lack of harmonized application of the principles of the law, which is conditioned by the non-efficient cooperation of state competent authorities of the environmental education system.

Regardless of certain positive trends, environmental education is still a secondary issue on the secondary education level. There are no subjects about nature in elementary school. As for middle and high schools, there are only a few subjects with the help of which pupils get acquainted with environmental issues, which are however allotted very little time by the syllabus; this hinders the implementation of adequate environmental education and training. The subjects “Nature”, “Natural science”, “Geography” and “Biology” are particularly of environmental significance; with the help of those pupils get some knowledge about the environment.

Higher vocational environmental education can be received in almost all the state and several private higher educational institutions in Armenia. The educational process is based on modern environmental subject selection and software, staffing and methodology. This situation is typical of mainly state higher educational institutions, where for the last few years there is modernisation of syllabi of environmental education, harmonization of the specialization process with international requirements, creation of new chairs of ecology and assistance to student scientific-research activity.

The environmental education and training of different walks of life is one of the strategic priorities of the environmental policy of the 21st century. It is aimed at raising environmental knowledge and awareness, as well as environmental culture and aesthetics of different walks of life (both with vocational training and without it), organization of activities in congruence with the nature, and raising social activeness. It is implemented mainly by environmental NGOs. Their educational-training activity aimed at the formation of environmental ideology of the young generation, and the recognition and protection of the nature and its cultural/spiritual heritage is more praiseworthy.

The activity of the Aarhus Center in Armenia, as well as its regional infrastructures contribute to the organization of public environmental education. However, there is still no clear mechanism of environmental information granting, and the ways of granting are limited. The society is often not aware of the principle of information availability. The opportunities provided by modern information technologies are not fully used.

Tourism and Recreation

Tourism has real potential for getting substantial benefit from biodiversity conservation and sustainable use of natural resources, but at the same time its quick and sometimes uncontrollable growth can cause serious environmental degradation. On the one hand, the rich bioresources and the favorable natural and climatic factors attract tourists, but on the other, success in this field can bring about quick degradation of the environment, reducing the main precondition of its very success - the attractiveness of the site.

The positive impact of sustainable tourism on biodiversity conservation can be manifested only if the local communities have immediate benefit from the development of tourism, which in its turn will raise the responsibility of the communities in environmental protection. Besides, sustainable tourism can contribute to raising the educational level of the population, raising awareness about the benefits of natural ecosystems and natural resources.

The reasons for the negative impact of unregulated tourism and recreation on the biodiversity of Armenia are:

- direct use of land resources: construction of houses, buildings and infrastructures, which causes soil erosion and loss of biodiversity,

- forest logging, disturbance of water balance of forests, change of quality and quantity of products and services delivered by forest ecosystems,
- increase of consumption of ground waters, contamination of water shores and water objects, eutrophication, presence of malignant bacteria in waters,
- pollution of areas with domestic waste,
- recreational trampling of the plant cover, unregulated gathering of plants, their parts and their fruit, fishing, hunting, troubles to animals, and abandonment of habitats by animals, as well as invasion of alien species.

This impact is mainly conditioned by wrong planning of activity, irresponsible conduct of tourists and tourism operators, and lack of knowledge and awareness about the negative impact.

Nowadays, there is a rising demand in the world tourism market for those tourism products which are maximally close to natural conditions and are in close contact with wild nature. These include ecotourism, including tourism in protected areas, agrarian (or rural) tourism, scientific tourism, all the types of adventure tourism, etc. In Armenia, where on a relatively small area one can find a number of natural and tens of thousands of historic-cultural monuments (ancient petroglyphs, pagan and medieval temples, rich flora and fauna), as well as highly qualified specialists, there are undoubtedly real perspectives for the development of ecotourism. However, the Law "On Tourism and Touristic Activities" (2004) does not define the tourism priorities for Armenia, and the peculiarities of different types of tourism and their modes of development are not separated.

In this connection it is important to carry out an assessment of the perspectives and needs of development of tourism and the field of recreation, and the natural resources having economic and environmental value. In particular, it is necessary to carry out:

- analysis of legislation in the field of environment and improvement of the legal framework related to tourism and recreation,
- development of mechanisms of fair and equitable sharing of the benefits arising out of tourism and recreation activity, stressing the role of local population,
- development of mechanisms to enhance the participation of local population in different aspects of tourism and recreation activity (decision making, project development, implementation and monitoring),
- analysis of the present state of tourism and recreation infrastructures, assessment of advantages and needs,
- development of infrastructures (visitor centers, marked paths, mountain huts, separate sites for garbage, tent stations, etc), taking into account their harmony with the natural landscapes and ecosystems,
- assessment of human resources and specialized staff in the field of tourism and recreation and creation of preconditions for development,
- study of modern methodology of tourism advertisement and marketing, selection of localized methods for the country,
- cooperation and exchange of experience between specialists in natural heritage and tourist businesses,
- preparation of methodological guides: regulations, codes of ethics, booklets about natural heritage, etc.

3.2. Integration of biodiversity issues in other national strategies and projects

The majority of the processes in the country more or less include the principles of the Convention on Biological Diversity.

Thus, the "Concept on Sustainable Development" gives the following definition of development: "Sustainable development is a development which guarantees maximum starting adequate conditions for present and future generations in order to make use of their capabilities and support livelihood.

Sustainable development is based on economy which in a society protecting human rights is combined with the principles of environmental security and social justice".

One of the objectives of sustainable development is "transition to sustainable and balanced use of nature, where all the components of the impact of man on the nature are agreed with the ability of natural systems to bear anthropogenic pressure". One of the main global principles of this aspect of the Concept comes to the necessity to conserve biological and landscape diversity. Furthermore, for that purpose, there are proposals to take measures aimed at the sustainable use and in-situ and ex-situ conservetion.

The Concept also discusses issues about the legislation in the country in the context of sustainable development, improvement of the system of ecological monitoring, eco-audit and eco-certification, and formation of national and local environmental funds. It mentions that the proposed sustainable environmental development strategic goals are based on international principles.

"Ensuring environmental sustainability" is one of the goals of the "Millennium Development Goals" (Goal N7). It gives the analysis of the situation and the adopted policy, and mentions the peculiarities of the environmental situation in Armenia and the reasons for deterioration. Biodiversity conservation is reviewed in the context of the improvement of management mechanisms of the specially protected nature areas, creation of new specially protected areas, as well as conservation and restoration of the forest gene pool. However, the goals in the above mentioned document are very general; nonetheless, it is important that the issue of biodiversity conservation be considered a priority for the country.

By joint effort of the Government and the civil society, the Poverty Reduction Strategic Program (PRSP) was adopted in 2003, where the overexploitation of natural resources and the problems of the Lake Sevan are mentioned as serious environment problems. The problems of forest resources degradation and forest rehabilitation are given a lot of attention. The PRSP puts forward a number of suggestions directed at the improvement of the field of environment. The second PRSP for 2008-2015 has been renamed "2008-2021 Sustainable Development Program of Armenia" (SDP), proceeding from the current situation of the country . The main goal of this paper is to ensure high speed of economic growth and to distribute the benefits to poor and vulnerable groups by social projects. It is noteworthy that the PRSP-2 also refers to the role of forests in biodiversity conservation. Realizing the requirements of the PRSP, the Government hopes that it will be able to eradicate mass poverty and improve living standards by 2015. In this context, Armenia has made a Millennium Development Goals report, the 7^{th} goal of which, among other targets, refers to sustainable use of water supply, forest rehabilitation and prevention of desertification.

The "Environment for Europe" process made decisions in 1998 in Aarhus about satisfying the requirements of newly independent states. The need for a strategy adopted to the sustainable development requirements for Eastern Europe, Caucasus and Central Asia (EECCA) was mentioned on the initiative of Ministers of Environmental Protection (Hague, 2002) and was supported in the World Summit on Sustainable Development (Johannesburg, 2002) by the declaration of East-West cooperation on Environmental Issues. An environmental strategy for the EECCA countries was developed and adopted in Kiev; one of its central goals is the sustainable management of natural resources. It includes the issue of "Biodiversity conservation and ecosystems protection"; the activities targeted at the solution of this issue are very up-to-date for Armenia.

However, it should be noted that the awareness of the main principles and provisions of the above mentioned global process and their importance and the possibilities of their implementation for our country are not yet included in the scope of interests of structures functioning on different levels, which does not contribute to the creation of integrated links and partnership initiatives between the representatives of the Government, businesses, local communities and NGOs, in order to slow down the speed of biodiversity loss and anthropogenic influence.

Chapter 4.
Conclusions: Progress Towards the 2010 Target and Implementation of the Strategic Plan

During the period of 1998-2008 the development of the field of environment in the Republic of Armenia has taken place parallel to the development of the economy and in congruence with the reforms in almost all the sectors of the economy. Environmental policy, including that in the fields of biodiversity conservation and sustainable use of bioresources, is aimed at ensuring:

a) environmental protection and sustainable use of natural resources, prevention of the negative impact of economic and other activities and their possible reduction,

b) implementation of commitments under international environmental conventions,

c) implementation of environmental activities which are envisaged and stipulated by a number of official founding documents/programs, including:

- in the National Environmental Action Programmes (1998 and 2008)
- in the program of Restoration of the ecological balance of Lake Sevan (1998)
- in the National Action Programme To Combat Desertification in Armenia (2002),
- in the National Strategy and Action Plan of the Development of Specially Protected Nature Areas of Armenia (2005),
- in the Poverty Reduction Strategy Paper (2003),
- in the Action Plan for Mitigating Actions to help address the Problems associated with Illegal logging (2005),
- in the National Forest Program of the Republic of Armenia(2005),
- in the State Environmental Monitoring Concept of Armenia (2006) and the 2007-2011 program to implement the actions proceeding from that Concept,
- in the Sustainable Development Program of Armenia (2008), etc.

It is noteworthy that since 2000, almost all the laws in the field of environment have been revised, the need for which was conditioned by the socio-economic development of the country and the issue of approximation of the legislation of the Republic of Armenia to EU legislation. In this context, the National Assembly of Armenia adopted the new Land Code, Water Code, and Forest Code, the new Laws “On Specially Protected Nature Areas of Armenia” and “On Nature Protection Payments Rates”, as well as the Laws “On Flora”, “On Fauna”, “On Lake Sevan”, “On Rehabilitation of Lake Sevan Ecosystem, its Maintenance, Reproduction and Utilization”, “On Environmental Education and Training of the Population”, “On Environmental Supervision”, “On the Tariffs of Accounting the Size of Compensation Caused to the Fauna and Flora as a Result of Environmental Legal Offences”, “On National Water Program of the Republic of Armenia” and “On Hunting and Hunting Farms” regulating the field, and a number of legal acts.

During the year 2002 a number of institutional changes were made in the state governing bodies of the Republic of Armenia. As a result if these changes, agencies providing services in different fields were created in the Ministry of Nature Protection, in congruence with structural departments developing the policies of corresponding fields. In particular, the Bioresources Management Agency was created, with its 4 departments.

Within the framework of the structural reforms in the field, significant changes were made in the specially protected nature areas and the state structures carrying out their protection. The corresponding resolutions adopted by the Government of Armenia defined the PA regimes and statutes of the managing executive bodies.

The activities in the field of biodiversity conservation and bioresources management were aimed at the conservation and sustainable use of the flora and fauna, as well as the improvement of their management system, the conservation of specially protected nature areas (national parks, reserva-

tions, reserves, natural monuments), scientific-research studies in the field, as well as capacity development in the field of sustainable use of natural resources.

According to the "National Strategy and Action Plan of the Development of Specially Protected Nature Areas of Armenia" approved by the Government of Armenia in 2002, clarification of the PA borders and their mapping, as well as work on creation of new PAs, the 2007-2011 management plans of "Dilijan" and "Sevan" national parks were approved, and the confirmation of the management plans of several reservations is under way.

All the above mentioned processes and the implemented or envisaged actions are one way or another related to or proceeding from the provisions of the Convention on Biological Diversity and are aimed at the implementation of the 2010 Biodiversity target. Appendix 4 analyses the interconnection between the 2010 target and the main targets and actions of the strategic documents of the country: a brief summary thereof is given below:

GOAL 1: Promote the conservation of the biological diversity of ecosystems, habitats and biomes.

Target 1.1 At least 10% of each of the world's ecological regions effectively conserved.

Several directions and actions in the BSAP and the other strategic documents are immediately aimed at the solution of the given global target. They are mainly aimed at the conservation of wetland and forest ecosystems, as well as the restoration of the biodiversity of degraded landscapes and areas damaged by economic activity.

Target 1.2 Areas of particular importance to biodiversity protected.

Five sub-directions and more than 35 actions of the BSAP are dedicated to this target.

The total area of the specially protected nature areas of Armenia is 308 thousand hectares (including the surface of Lake Sevan), which forms about 10% of the total area of the Republic. At present, the PA system of Armenia includes 3 State Reserves, 25 State Reservations, 2 National Parks and 230 Natural Monuments, where around 70% of the biodiversity of the country is conserved. Lake Sevan and Lake Arpi are included in the List of Wetlands of International Importance ("Ramsar List"). "Khor Virap" State Reservation was founded in 2007, for the conservation of wetland ecosystems; afforestation work and development of forest management plans is being carried out, forest rehabilitation and afforestation activities are under way. The creation of "Lake Arpi", "Jermuk", "Gnishik" and "Arevik" National Parks and "Zangezur" State Reservation is currently under way.

The works to identify and register "Important Plant Areas" and "Significant Biodiversity Areas" ("Emerald" network) are currently underway. 18 Important Bird Areas have been identified where all the threatened bird species of the Republic are being protected.

GOAL 2: Promote the conservation of species diversity.

Target 2.1 Restore, maintain, or reduce the decline of populations of species of selected taxonomic groups.

The primary issue is the restoration of the populations of the Armenian moufflon, the bezoar goat, the panther, several birds of prey and endemic fish species.

Target 2.2 Status of threatened species improved.

A congruent target in the BSAP is the issue of conservation and improvement of the status of large mammals, endemic fish species, and crop wild relatives.

With the support of WWF, inventorization of the Armenian moufflon, the bezoar goat and the panther has been carried out in the territory of Armenia, strategies of conservation of these species have been developed, and their monitoring is being carried out in their main habitats and migration routes. Owing to these actions, the state of the populations of these species has been stabilized and

their quantities have increased. For the effective conservation of these species, there are groups combating poaching in different marzes of the Republic.

Thanks to the black griffon vulture conservation program implemented by the "Armenian NGO for bird study and conservation" since 2002, the continuous and alarming reduction in the quantity of the only population in Armenia has stopped and the situation has been stabilized (if there were 4 pairs of the bird in Armenia in 2002, there were 6 is 2003, 7 in 2004, and 7-8 more pairs in 2005-2008). There has been restoration of populations of several valuable plant species in the alpine zone, which is accounted for by undergrazing in these areas. Four plant species – Sternbergia colchiciflora, Glycirriza echinata, Nufar luteum, and Cyclamen vernum, which were thought to have disappeared totally, have been found in different regions of the Republic during the last few years.

For the restoration of the populations of endemic fish species, replenishment of fish supplies of Lake Sevan is being carried out since 2003 as a result of which larvae and young fish of endemic fish species (summer bakhtak, gegharkuni and koghak) have been released into the lake. A sustainable stock of threatened sub-species has been created in artificial conditions, thanks to which their status has been greatly improved. Although serious steps are being taken for the reproduction of endangered fish species, results can be considered to have been obtained only after their natural reproduction in the lake, which has not been noted yet.

Since 2007 the Red Book of Armenia is being amended by state budget resources, the species being assessed in accordance with IUCN criteria. Presumably about 600 plant and 300-350 animal species will be included in the Red Book of Armenia. The amended version of the Red Book will be published in 2009-2010.

GOAL 3: Promote the conservation of genetic diversity.

Target 3.1 Genetic diversity of crops, livestock, and harvested species of trees, fish, and wildlife and other valuable species conserved, and associated indigenous and local knowledge maintained.

The conservation of genetic diversity is viewed mainly from the point of view of conservation of crop wild relatives.

The "In situ conservation of crop wild relatives through enhanced information management and field application" program is being realised with the support of UNEP/GEF since 2005; the aim of the program is to support the improvement of efficient conservation of genetic resources and particularly of crop wild relatives by means of creating an international information system.

Within the framework of the program the CWR DCS information system of crop wild relatives has collected data on around 100 plant species.

The 15 taxons included in the CWR list have been assessed in accordance with IUCN categories and criteria, their status has been clarified; the assessment process of the other 84 taxons is under way. Information on the program can be found at www.cwr.am.

Within the framework of the "Creation of national information sharing mechanism on Plant Genetic Resources for Food and Agriculture (PGRFA) and preparation of a national report on the state of PGRFA" program, the PGRFA national program was developed and a database was created (www.pgrga.org/gpa/arm).

GOAL 4: Promote sustainable use and consumption.

Target 4.1 Biodiversity-based products derived from sources that are sustainably managed, and production areas managed consistent with the conservation of biodiversity.

Target 4.2 Unsustainable consumption of biological resources, or consumption that has an impact on biodiversity, reduced.

These targets are related to around 25 actions stipulated in the BSAP which are aimed at sustainable use and restoration of bioresources, including forest biodiversity and agrobiodiversity.

Forest management plans for about 46 000 hectares have been developed, and the approval of forest management plans for 1 789 000 hectares is under way. The forest management plans of about 89 000 hectares will have been developed by 2011. During the last few years, the volume of illegal forest loggings has been reduced. According to official data, 42 236 trees were subject to illegal logging in 2003, while in 2008 that number reduced to 2080.

The sustainable use of bioresources largely depends on the monitoring of their state, for which there is still no permanent system. As a result, it is difficult to correctly assess the volume of the consumption influencing biodiversity.

Target 4.3 No species of wild flora or fauna endangered by international trade.

Armenia ratified the “Convention on International Trade in Endangered Species of Wild Fauna and Flora” (CITES) on April 4, 2008. A scientific body is currently being formed which will include representatives of different scientific organizations of the Republic.
[10]

GOAL 5: Pressures from habitat loss, land-use change and degradation, and unsustainable water use reduced.

Target 5.1 Rate of loss and degradation of natural habitats decreased.

The actions in the BSAP related to this target are those aimed at the conservation and rehabilitation of forest and wetland ecosystems, as well as restoration of landscapes and their biodiversity degraded as a result of industrial activity.

The alarming state of the Lake Sevan ecosystem is firstly conditioned by the decrease in the water level and the lake capacity, the disturbance of the balance of biogenic elements in the water and food chains, and the disappearance of the components of biodiversity. Owing to complex activities organized by the Government of Armenia, the level of the lake rose by 252 cm, and a bed area of about 2000 hectares was restored in 2002-2008. Alongside with an increase in the water stock, the degraded ecosystems and their biocenoses are restored too.

For the last few years, there has been a reduction in the rate of disintegration of forest ecosystems and of degradation of natural habitats, due to structural changes in the forest sector (the functions of forest conservation and use have been separates from the field of forest control), stronger control of logging, higher living standards of the staff of forest enterprises, as well as higher volumes of forest rehabilitation work.

Within the framework of the “ICARDA- Highland Regional Program” new technologies of natural grasslands surface and radical improvement have been developed, with the aim of improving fodder diversity and overexploited grasslands. The surface improvement technology is applied in Gegharkunik and Tavush marzes, for the improvement of the worst pastures.

GOAL 6: Control threats from invasive alien species.

Target 6.1 Pathways for major potential alien invasive species controlled.
Target 6.2 Management plans in place for major alien species that threaten ecosystems, habitats, or species.

The occurrence of alien species and their impact on natural ecosystems is stipulated in the BSAP as an important issue of scientific studies. The Government of Armenia Resolution N18400 (2004) provides for an assessment of the impact of introduced and invasive alien species on ecosystems, natural habitats and biodiversity and determination of measures regulating their use.

Research was carried out in 2006-2007 to discover alien plant species and to assess their impact on natural ecosystem. The occurrence and the current state of populations of alien plant species in the whole territory of the Republic has been studied, the sustainability of their habitat natural ecosystems has been assessed. For the discovery and study of occurrence of alien invasive species the environmental approach is applied: alongside with the geobotanical description of plant communities, the study has separated the areas threatened by invasive species and studied the animal species in these areas, and particularly the insects in detail. Limited risk assessment of several invasive insect species has been carried out in agroecosystems. A list of invasive animal species has been made for Armenia.

GOAL 7: Address challenges to biodiversity from climate change and pollution.

Target 7.1 Maintain and enhance resilience of the components of biodiversity to adapt to climate change.

The issue of discovery of the connection between climate change and the state of biodiversity and that of elimination of negative consequences is stipulated in the Government of Armenia resolution N1840-N (02.12.04) on “Confirming the list of activities to meet the Armenia’s obligations under a number of international environmental conventions” and in the National Forest Program of Armenia (2005). Within the framework of the “Creation of favorable conditions for the preparation of the second national report of Armenia on UN Framework Convention on Climate Change” program, an assessment of the water resources of Armenia under climate change was carried out in 2008.

Target 7.2 Reduce pollution and its impacts on biodiversity.

In 2005-2006 within the framework of state programs and with the assistance of international organizations, considerable aid was given to the improvement of state water surface monitoring. The network of water monitoring observation points, and the quantity and list of defined indeces has been enlarged.

At present the monitoring of surface waters is carried out in 83 observation points of 35 water bodies, and 43 indeces are defined in surface waters. Center for Ecological-Noosphere Studies of the Armenian NAS has comprehensively studied the concentration of heavy metals and their impact on the biodiversity of cities and near-city areas.

GOAL 8: Maintain capacity of ecosystems to deliver goods and services and support livelihoods.

Target 8.1 Capacity of ecosystems to deliver goods and services maintained.
Target 8.2 Biological resources that support sustainable livelihoods, local food security, and health care, especially of poor people, maintained.

The support to product and service delivery of ecosystems on the national level is reflected both in the environmental actions plans and in the socio-economic development plans of the country. The actions aimed at the improvement and restoration of aquatic ecosystems, forests, as well as hayfields and pastures, immediately contribute to capacity development of ecosystems from the point of view of product (fish products, fodder and medicinal plants, wood, non-timber forest products, etc) and service (recreation, ecotourism, climate abatement, etc) delivery. Afforestation work is under way in

the forest enterprises of the Republic. Licensing of the use of bioresources is being carried out since 2003.

Within the framework of the "Natural resources management and poverty reduction" program, preconditions have been created for sustainable management of natural resources in the Gegharkunik and Tavush marzes, aiming at poverty reduction. The actions of the program include conservation of mountain, forest, meadow, steppe and aquatic biodiversity and improvement of consumption mechanisms, as well as rehabilitation of forests and natural grasslands and hayfields. In particular, improvement (fertilization) of natural grasslands in about 100 communities of Tavush and Gegharkunk marzes has been carried out, as well as work to rehabilitate irrigation systems: rehabilitation of on-farm canals, installation of drainage pipes, construction of animal watering sites, installation of gabions to prevent water erosion, etc. Management plans for 100 communities have been developed, inventorization of flora of grasslands of these communities and determination of productivity has been carried out.

Forest management plans have been developed for five forest enterperises. During their preparation, forest inventorization and stock evaluation has been carried out. Management plans of "Sevan" and "Dilijan" national parks were developed and approved by the Government of Armenia in 2007. A visitor centre has been constructed in Dilijan National Park.

GOAL 9: Maintain sociocultural diversity of indigenous and local communities.

Target 9.1 Protect traditional knowledge, innovations, and practices.

With small grants given within the framework of the "Natural resources management and poverty reduction" program (WB) programs of sustainable use of bioresources are being implemented in the communities of two marzes, with the application of traditional knowledge and experience.

GOAL 10: Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources.

Target 10.1 All access to genetic resources are in line with the Convention on Biological Diversity and its relevant provisions.

Within the framework of the "Biodiversity Primary Capacity Creation Need Assessment" project (UNDP/GEF, 2002) the "Access to genetic resources and strategy of fair and equitable sharing of benefits arising out of their use" was developed which in accordance with the basic principles of Bonn Agreement defines the main principles of access to and use of genetic resources.

Within the framework of the "Development of integrated strategy to raise food security of Armenia through improved use of genetic resources" project (ICARDA) research has been done about capacity development on the national level, and efficient management and use of plant genetic resources, contributing to the development of food security and agriculture development in the country. The present state of plant genetic resources management in Armenia has been revised, the rising challenges have been identified and decisive suggestions have been presented to develop a national policy through comprehensive integrated approach to conservation and use of plant genetic resources.

The "Creation of national information sharing mechanisms on Plant Genetic Resources for Food and Agriculture (PGRFA) and preparation of a national report on the state of PGRFA" project is currently being implemented in the Ministry of Agriculture, with the support of the Food and Agriculture Organization.

The "Development and introduction of mechanisms of availability of genetic resources and fair and equitable sharing of the benefits arising out of their use" action has been included in the Second National Environmental Action Programme which was approved by the Government of Armenia in 2008.

GOAL 11: Parties have improved financial, human, scientific, technical, and technological capacity to implement the Convention.

Target 11.1 New and additional financial resources are transferred to developing-country Parties to allow for the effective implementation of their commitments under the Convention, in accordance with Article 20.

For the implementation of Article 20 of the Convention, financial resources are allotted by the World Bank, the Government of Norway, the Government of Germany, World Wild Fund for Nature, Global Environment Facility, as well as CEPF and MAVA funds. On the initiative of the Government of the Federal Republic of Germany, a Caucasus Protected Areas Fund (a trust fund) is being founded which will assist the conservation and enhancement of specially protected nature areas in the Caucasian ecosystem (Armenia, Georgia, Azerbaijan). In December 2008, a declaration of cooperation was signed between the Ministry of Nature Protection and the IUCN. At present, negotiations are under way with the organization, in order to receive financial assistance for the amendment of the Red Book of Armenia.

* * *

Thus, summarizing the information on the state of biodiversity in Armenia, the trends and the threats, as well as the course of implementation of the Convention towards the 2010 targets, we can underline those problems the urgent solution of which can ensure progress in the conservation and sustainable use of biodiversity.

1. Development and official approval of the second Biodiversity Strategy and Action Plan for the years 2010-2015, in congruence with the economic and social needs of the country,
2. Creation of state inventorization and state cadastre of biodiversity,
3. Creation of a biodiversity monitoring system and database,
4. Development of Armenian Ecological Network concept: creation of preconditions for identification of biosphere conservation sites and for joining the Pan-European Ecological Networks,
5. Creation of new specially protected nature areas, ensuring their financial, technical and human capacities,
6. Assessment of stocks of most useful plant and animal species and the possibilities of their sustainable use, determination of their use quotas,
7. Formation of mechanisms to assess the impact of different sectors of economy and natural factors on natural ecosystems and biodiversity,
8. Development and introduction of mechanisms of availability of genetic resources and of fair and equitable sharing of the benefits arising out of their use,
9. Creation of mechanisms of efficient inter-sector cooperation in the field of biodiversity conservation,
10. Raising public awareness about biodiversity conservation, involving local population in conservation actions.

Appendix 1 Information concerning reporting Party and Preparation of the Fourth National Report on Biodiversity of Armenia

A. Reporting Party

Contracting Party	Republic of Armenia
NATIONAL FOCAL POINT	
Full name of the institution	**Ministry of Nature Protection**
Name and title of contact officer	***Tatyana Danielyan*** Head of Biodiversity Conservation Division
Mailing address	***#3 Government Building, Yerevan, 0010, Armenia***
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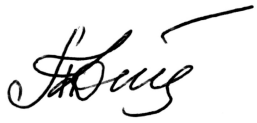
CONTACT OFFICER FOR NATIONAL REPORT (IF DIFFERENT FROM ABOVE)	
Full name of the institution	
Name and title of contact officer	
Mailing address	
Telephone	
Fax	
E-mail	
SUBMISSION	
Signature of officer responsible for submitting national report	
Date of submission	***27.04.2009***

B. Process of preparation of national report

The working group for the preparation of the report includes the following national experts and consultants:

- H. Khachatrian, Ph.D. in Biology (Center of Zoology and Hydroecology of the Armenian NAS),
- E. Ghoukasian, Ph.D. in Biology (Center of Zoology and Hydroecology of the Armenian NAS),
- K. Tamanian, Ph.D. in Biology (Institute of Botany of the Armenian NAS),
- Zh. Vardanian, Ph.D. in Biology (Institute of Botany of the Armenian NAS),
- A. Pahlevanian, Ph.D. in Biology (Armenian State Agrarian University),
- A, Gevorgian, Ph.D. in Biology (Yerevan State University),
- A, Asatrian, Ph.D. in Biology (Institute of Botany of the Armenian NAS),
- M, Kalashian, Ph.D. in Biology (Center of Zoology and Hydroecology of the Armenian NAS),

- I. Bazookian, Ph.D. in Biology (Yerevan State University),
- A. Avagian, Ph.D. in Biology (Armenian State Agrarian University),
- G. Fayvush, Ph.D. in Biology (Institute of Botany of the Armenian NAS).

The information was collected by experts and consultants from the following sources:

- Materials prepared and published by the Ministry of Nature Protection in 1999-2008,
- Materials published by the relevant institutes of the Armenian National Academy of Sciences, the Yerevan State University, the Armenian State Agrarian University, different scientific centres and NGOs,
- Reports of state structures and international programs,
- 2002-2007 statistic yearbooks on environment and bioresources in Armenia
- data collected during field trips, scientific monographs and articles,
- meetings with representatives of NGO and individuals,
- official bulletins of the Republic of Armenia,
- websites www.nature-ic.com and www.mnp.am,
- other websites.

Appendix 2 - Progress towards Targets of the Global Strategy for Plant Conservation and the Programme of Work on Protected Areas

A. Progress towards Targets of the Global Strategy for Plant Conservation Targets

Target	Inclusion in BSAP	Inclusion in NEAP-2	BSAP indicators	Implementation
Target 1. A widely accessible working list of known plant species, as a step towards a complete world flora.	Carry out targeted research programs to study the state and occurrence of less studied taxons. Carry out research programs to assess the occurrence of economically significant species and the state of populations.	Creation of state inventorization and state cadastre of biodiversity by marzes of the Republic including the making of annotated lists of animal and plant species and main ecosystems.	The total number of studied species; quantitative changes in the flora; change of natural habitats of species.	Publication of "Flora of Armenia" (12 volumes) has been concluded. The composition of the flora of Armenia has been discovered by no less that 90%.
Target 2. A preliminary assessment of the conservation status of all known plant species, at national, regional and international levels.	Review and republish the new Red Books of Armenia, taking in to account the updated information and the new criteria. Improve the assessment of economically valuable species populations with a view to defining the use quotas and including them in the state cadastre.	Inventorization and assessment of state of rare and endangered plant and animal species,amendment and republication of the Red Book of Armenia. Discovery of most useful plant and game animal species for separate marzes of the Republic, assessment of the stock of most important plant and animal species, determination of the quantity of their gathering/ hunting.	The total number of studied species quantitative changes in the flora,change of natural habitats of separate species.	Work is being carrying out to assess the state of rare and endangered plant species populations (for the preparation of the Red Book of Armenia and the Red List of Caucasus). Within the framework of the "Creation of cadastre of specially protected nature areas" program, inventorization of flora of reserves and national parks of Armenia has been carried out, and within the framework of the "Management of Specially Protected Nature Areas and Biodiversity Conservation" subcomponent of the "Natural Resources Management and Poverty Reduction" project, the floristic diversity of "Sevan" and "Dilijan" national parks has been inventorized through field study.
Target 3. Development of models with protocols for plant conservation and sustainable use, based on research and practical experience.	Develop and adopt use quotas for bioresources (including medicinal and edible plants). Develop the regulations of use of more vulnerable communities. Develop and realize pilot projects about new agricul-	Discovery of most useful plant and game animal species for separate marzes of the Republic, assessment of the stock of most important plant and animal species, determination of the quantity of their gathering/ hunting.	The number of plant species for which existing stocks and sustainable quantities of use have been assessed. The number of plant species for which sustainable use models have been developed.	Within the framework of the "Community-based management of water basins" subcomponent of the "Natural Resources Management and Poverty Reduction" project (WB) pilot projects have been implemented in Tavush and Gegharkunik marzes of the Republic for the conservation of plant communities of pastures and preven-

Target	Inclusion in BSAP	Inclusion in NEAP-2	BSAP indicators	Implementation
	tural methods and sustainable use of agrobiodiversity.			tion of soil erosion. Demonstration and training of community population in terms of wheat and barley cultivation in dry-farming lands, application of crop rotation of leguminous plants, and sustainable irrigation system has been carried out. Management plans have been developed in 100 communities,inventorization and assessment of productivity of grassland flora has been carried out.The communities are allotted the necessary amount of seeds for the cultivation of fodde rplants.Treeplanting work is carried out.
Target 4. At least ten percent of each of the world's ecological regions effectively conserved.	Ensure the conservation of landscape diversity and biodiversity of Armenia, sustainable use and restoration for sustainable human development. Create a new "Jermuk" national park which will include two existing reserves. Create a new "Arpi/Gnishik" national park for the protection of the unique biosystems and caves of Vayk.	Analysis of PAs of Armenia from the point of view of presentation of biodiversity and valuable ecosystems, development of proposals about the improvement of the system, creation of new protected areas including biospheric protected areas and ecological corridors.	Area of PAs the number of plant species in PAs, including rare, endangered and endemic species.	The Government of Armenia approved the "National Strategy and Action Plan of the Development of Specially Protected Nature Areas of Armenia" in 2002, within the framework of which the state budget ensures the implementation of activities for the creation of new specially protected areas. Within the framework of that program, the PA system is being improved, their borders are being clarified and defined, and new reserves and national parks are being designed. From the point of flora and vegetation conservation, the establishment of "Gnishik" and "Jermuk" national parks is most important, especially for the protection of Vayots Dzor marz biodiversity, in particular crop wild relatives and protection of unique natural monuments
Target 5. Conservation of fifty percent of the most important areas for plant diversity assured.	Create a number of new specially protected areas which will include different landscape types–alpine meadows, steppes, semideserts, wetland habitats and	Inventorization and assessment of the state of rare and endangered plant and animal species, amendment and publication of the Red Book of Armenia.	The number of areas assessed from the point of view of the wealth of plant diversity the number of endemic species in specially protected nature areas.	By the resolution N1044 of 15.07.04 of the Government of Armenia, the Plane-tree Grove which was created for the conservation of the only natural plane-tree grove in the Caucasus was included in the Shikahogh State Re-

Target	Inclusion in BSAP	Inclusion in NEAP-2	BSAP indicators	Implementation
	saline marshes. Create a new "Arpi/Gnishik" national park for the protection of the unique biosystems and caves of Vayk.	Analysis of PAs of Armenia from the point of view of presentation of biodiversity and valuable ecosystems, development of proposals about the improvement of the system, creation of new protected areas including biospheric protected areas and ecological corridors.		serve, with the aim of improvedprotection of unique species Platanus orientalis (Oriental plane) and reduction of anthropogenic influence. The Khor Virap State Reservation was founded in 2007, with the aim of conservation of wetland biodiversity. With the support of international donor organizations, regions in South Armenia with rich biodiversity have been studied, with the aim of founding "Zangezur" reserve and "Arevik" national park and corresponding Government resolutions have been developed which are currently being discussed. Research has started for inventtorization of Important Plant Areas of Armenia.
Target 6. At least thirty percent of production lands managed consistent with the conservation of plant diversity.	Define the optimal ratio of pastures to hayfields for different types of landscapes, in order to best balance production and diversity. Define the mountainous mining sites and carry out environmental impact assessment. Register the organizations influencing biodiversity and the spheres of their activity. Develop mechanisms to control agricultural use in forests (including specially protected areas).		Area of sustainably managed lands.	Within the framework of the "State forest management" component of the "Natural resource management and poverty reduction program", forest management plans have been developed for 5 forest enterprises in accordance with sustainable forest management principles and taking into account biodiversity issues. Within the framework of the "Management of protected areas and biodiversity conservation" component of the same program, the management plans of Sevan and Dilijan national parks have been developed and approved by the Government, where plant diversity conservation has been chosen as the most important goal. Within the framework of the "Community-based management of water basins" component of the same program, sustainable management methods are being used in 9500 hectares

Target	Inclusion in BSAP	Inclusion in NEAP-2	BSAP indicators	Implementation
				of pastures in 59 communities of two marzes of the Republic, owing to which flora conservation in highmountain subalpine and alpine belts will be ensured.
Target 7. Sixty percent of the world's threatened species conserved *In-situ.*	The BSAP does not define the target of conservation of 60% of plant species; however, that document and the "National Strategy and Action Plan of the development of Specially Protected Nature Areas of Armenia" reflect the principles of their in-situ conservation.	Analysis of PAs of Armenia from the point of view of presentation of biodiversity and valuable ecosystems. Development of proposals about the improvement of the system, creation of new protected areas including biospheric protected areas and ecological corridors. Inventorization and assessment of the state of rare and endangered plant and animal species, amendment and publication of the Red Book of Armenia.		387 rare and endangered plant species in Armenia which are included in the "Red Book of Armenia" are protected by the corresponding articles of the " Law On Flora" (1999). The list of plant species of "Khosrov forest" and "Shikahogh" state reserves and Sevan and Dilijan national parks has been revised. New PAs are being founded; the foundation of a national park in the Vayots Dzor marz and a state reservation in the Zangezur region are important from the botanic point of view. According to preliminary data, there are at least 20 endemic plant species in the area of the national park to be founded, and the flora of the whole area includes more than 1100 species of vascular plants. There are about 30 endemic plant species in the Zangezur state reservation, as well as a number of medicinal and otherwise economically valuable plants. 387 species are included in the "Red Book of Armenia: Plants" (1989) which form about 12% of the vascular plants in Armenia (about 3500 species). About 70% of the species composition of vascular plants is being conserved in the PAs.
Target 8. Sixty percent of threatened plant species in accessible *Ex-situ* collections, preferably in the country of origin,	Improve the mechanisms of ex-situ conservation. Create and maintain seedplots and plant collections. Create and maintain seeds		The number of ex-situ grown plant species in Armenia; the number of reintroduced rare and endangered species in nature	A gene bank of crop wild relatives has been created; work is under way to disseminate crop wild relatives and to create a seeds bank. In particular, there are short-term

Target	Inclusion in BSAP	Inclusion in NEAP-2	BSAP indicators	Implementation
and 10 percent of them included in recovery and restoration programmes.	banks and gene banks			seed conservation collections of crops and crop wild relatives in Armenia (Armenian State Agrarian University – 3460 samples), melons and gourds (Scientific Center of Vegetables and Industrial Crops – 519 samples), selective species of crops and leguminous plants (Scientific Center of Agronomy and Plant Protection – 6840 samples). For the rehabilitation of logged forests, the "National Forest Program" provides for the use of mainly local plant species, for which rehabilitation and restoration of seed economies and forest seed-plots, as well as growing of seedlings in open and closed ground is being carried out. The state of botanic gardens and dendroparks has not been improved.
Target 9. Seventy percent of the genetic diversity of crops and other major socio-economically valuable plant species conserved, and associated indigenous and local knowledge maintained.	Create and disseminate guidebooks about the gathering and storage of medicinal and other plants for local communities and factories, based on traditional approaches. Create and support the plantation growing of economically valuable plant species in different regions of the country. Carry out assessment of the opportunities of local traditional use and define the potential mechanisms of the application of those approaches. Develop pilot projects to disseminate traditional approaches to the use of biodiver-		The number of agricultural crops, including ancient species and crop wild relatives, kept in seeds collections. The number of socioconomically valuable plant species grown in specially protected nature areas. The number of samples of agricultural crops, including ancient species and crop wild relatives kept in seeds collections.	Within the framework of different projects, plant gene pool conservation actions are being taken, both in-situ,where privilege is given to rare and endangered representatives of flora, and ex-situ, where privilege is given mainly to selective and local ancient species of berries, grapes and main agricultural crops, as well as to wild species collections

Target	Inclusion in BSAP	Inclusion in NEAP-2	BSAP indicators	Implementation
	sity.			
Target 10. Management plans in place for at least 100 major alien species that threaten plants, plant communities and associated habitats and ecosystems.	Carry out research to determine and control the occurrence of introduced species and their impact on biodiversity. Include restricting measures for invasive species in departmental projects and species conservation action plans.		The number of alien species studied; number of the species threatening natural ecosystems and biodiversity. Change of natural habitats of alien species known in the Republic.	Scientific research is under way. No plans have been developed.
Target 11. No species of wild flora endangered by international trade.	Develop a project for the ratification and implementation of the CITES.			Armenia ratified the "Convention on International Trade in Endangered Species of Wild Fauna and Flora" in 2008. At present the creation of an interdepartmental working team for the implementation of the Convention is under way.
Target 12. Thirty percent of plant-based products derived from sources that are sustainably managed.		Discovery of most useful plant and game animal species for separate marzes of the Republic, assessment of the stock of most important plant and animal species, determination of the quantity of their gathering/hunting.		Within the framework of the "Sustainable use of medicinal plants resources in the Caucasus ecoregion" project, WWF implemented work for plantation growing of most used and highly demanded medicinal plants in the Gegharkunik region in 2002. The results are encouraging and testify that the production of plant raw materials from sustainably managed sources reduces anthropogenic influence on natural ecosystems.
Target 13. The decline of plant resources, and associated indigenous and local knowledge, innovations and practices that support sustainable livelihoods, local food security and health care, halted.	Promote the application of the methods of sustainable use in agriculture. Promote the sustainable use of forest resources. Promote sustainable use by local communities. Develop mechanisms of sustainable use of resources near specially protected nature areas by local communi-			The development of the management plans of specially protected nature areas and forest enterprises is a participatory process where the population of local communities is actively involved. In the meetings and training organized for them, importance is attached to the analysis of traditional methods and experience of natural resources that support sustainable livelihoods.

Target	Inclusion in BSAP	Inclusion in NEAP-2	BSAP indicators	Implementation
	ties. Create mechanisms of restoration of forest resources and reduction of impact on them. Develop and implement projects to promote sustainable ecotourism			
Target 14. The importance of plant diversity and the need for its conservation incurporated into communication, educational and public-awareness programmes.	Provide schools with textbooks, guidebooks, books and practical materials about biodiversity conservation. Provide higher educational institutions with amended supporting materials (textbooks, guidebooks) about biodiversity conservation. Introduce the subject of "Biodiversity conservation" in the Yerevan State University and provide the University with the necessary supporting materials.	Development of the procedure of on-demand granting of information and its availability, as well as an awareness program. Development of a program to raise the efficiency of the environmental education system.		The attainment of this target is carried out on several levels: - with secondary education syllabi (Natural Sciences, Botany and other subjects) and corresponding specialized secondary educational institutions syllabi, - specialized chairs of higher educational institutions (botany, forest science, ecology, etc) - with different components of the "Natural resource management and poverty reduction program", in Sevan and Dilijan national parks, in the regional educational centre of Zikatar forest, - in Yerevan and in the regions, by the National Institute of Education, - in the Institute of Botany and Botanical Garden of the National Academy of Sciences, - in Environmental museums (Yerevan, Gyumri, Sevan, Dilijan), in nature. A lot of informative and educational material (booklets, textbooks, guidebooks) has been published, which contains information on the Convention on Biological Diversity and the signifycance and conservation of plant diversity.
Target 15. The number of trained people working with appropriate facilities in plant conservation in-	Organize trainings for teachers and lecturers, to improve their environmental educational abilities.	Development and implementtation of an efficient program of training of environmental specialists.		

Target	Inclusion in BSAP	Inclusion in NEAP-2	BSAP indicators	Implementation
creased, according to national needs, to achieve the targets of this Strategy.	Provide educational and training institutions (including the zoological and botanic gardens and the state museum of nature of Yerevan) with support and resources.			

B. Progress towards Targets of the Programme of Work on Protected Areas

Goal 1.1 . To establish and strengthen national and regional systems of protected areas integrated into a global network as a contribution to globally agreed goals.

The "Supporting Country Action on the CBD programme of Work on Protected Areas " was developed and approved by the GEF; the aim of this program is to analyse the gaps in the existing protected areas system, based on the requirement of the representative systems of the protected areas and taking into account the issues of biodiversity and ecosystem conservation. The "Development of the system of specially protected areas of Armenia" program has been launched (UNDP/GEF), which is aimed at the improvement of the state of specially protected areas (particularly the reservations), raising managment efficiency and creation of new reservations. Clarification of borders and mapping of state reserves and reservations has been carried out; a list of RA natural monuments was confimed in 2008, and the RA Government resolutions about the establishment of "Gnishik" and "Jermuk" national parks, "Vorotan" national reserve, as well as "Arevik" national park and "Zangezur" state reserve with CEPF financing have been developed and are being discussed. Two new r reservations were established in 2007 – "Guilan" and "Khor Virap". Work is under way for the establishment of "Lake Arpi" transboundary national park (KfW-financed)

For the implementation of the "2012 Protected areas program in the Caucasian ecoregion" (with MAVA fund financing) a national coordinating committee and a working group have been created. The priorities for the actions of the protected areas work plan have been determined, as well as an analysis of the legal and institutional framework and detection of gaps and obstacles in the field of specially protected nature areas of Armenia has been carried out. Within the framework of the same program, a capacity development program for the specially protected nature areas has been developed.

Goal 1.2 To integrate protected areas into broader land- and seascapes and sectors so as to maintain ecological structure and function.

The Transboundary Joint Secretariat has developed the "National Park Management Planning in the South Caucasus" document which is aimed at giving corresponding orders to regulate the planning process for the creation of national parks. The above mentioned document has been discussed during a working meeting in the educational centre of Zikatar, in order to disseminate adaptive management principles and to introduce them on the practical level.

The project of establishing Jermuk-Gnishik national park has been developed with the applicatiom of ecosystem approaches and is currently being discussed. The planned national park will include the existing two state reservations and will ensure the connection with Khosrov Forest state reserve through an ecological corridor.

In order to conserve the structure, peculiarities and the biodiversity of landscapes of the Syunik marz of Armenia, it is envisaged to create three new protected areas: "Arevik" national park, and "Zangezur" and "Vorotan" reservations which will create an ecological network with each other and with "Shikahogh" state reserve.

On the basis of the study of biodiversity, protected area border clarification and mapping for "Arevik" national park and "Zangezur" reservation carried out with the support of WWF/CEPF, corresponding RA Government resolutions have been developed and are currently being discussed.

A protected area is being established in Javakhk region with the application of ecosystem approaches; it will later be connected with a corresponding protected area in Georgia.

Goal 1.3 To establish and strengthen regional networks, transboundary protected areas (TBPAs) and collaboration between neighbouring protected areas across national boundaries.

The " Ecoregional Conservation Plan for the Caucasus" (2005) includes actions about the creation of a regional network of protected areas. A Biodiversity conservation regional council has been established for the introduction of the above mentioned program.

With the aim of establishing a transboundary protected area between Armenia and Georgia, study of biodiversity of the envisaged area, collection of data on land use, and preliminary design

of the national park borders have been carried out within the framework of the “Establishment of protected areas in Javakhk (Ashotsq) region of Armenia” program. All the information has been submitted to a database with the help of GIS. Working seminars on participatory planning have been organized about land use planning in the national park protection zone, as well as about tourism development.

Goal 1.4 To substantially improve site-based protected area planning and management.

The “Landscape planning in Countries in the Southern Caucasus” program was implemented in 2007-2008, with the assistance of KfW ; it aimed at introducing a widely applied landscape planning tool into the Caucasian region, in order to develop and offer environmentally oriented measures for different physical-geographic, administrative, specially protected and other areas. Taking part in this program, Armenia has made the landscape planning project of the Sevan basin. After legal substantiations, the results of the program will be used in regional planning and in the making of PA management plans.

Management plans for “Sevan” and “Dilijan” national parks were developed and approved by the Government of Armenia in 2007; those for “Shikahogh”, “Khosrov Forest” and “Erebuni” state reserves have been planed and are currently being agreed upon.

Goal 1.5 . To prevent and mitigate the negative impacts of key threats to protected areas.

The Government of Armenia has approved the resolution “On defining the procedure of organizing and implementing the monitoring of specially protected nature areas” (30.08.2007, N 1044-N). By the decree of the Minister of Nature Protection (14.02.2008, N62), the “Activities ensuring the implementation of the program of introducing a biodiversity monitoring system in “Sevan” and “Dilijan” national parks and ensuring GIS exploitation” has been confirmed. The Government of Armenia draft resolution on “Defining the procedure of using the specially protected nature areas of Armenia” has been developed and is currently being discussed.

Clarification of borders and mapping for all the protected areas of Armenia is being carried out in order to ensure the ecological integrity of the protected areas.

During the development of the management plans of “Khosrov Forest” and “Shikahogh” state reserves, the main threats to those protected areas and the means to eliminate them have been discovered.

With a view to studying the dynamics of change of natural ecosystems affected with invasive plant species, most important alien plant species have been studied in all the protected areas of Armenia and their impact on natural ecosystems has been assessed.

Goal 2.1 To promote equity and benefit-sharing.

In December 2006, the National Assembly adopted the RA Law “On Specially Protected Nature Areas” which has provisions about different ways of management of protected areas, including protected areas of local (community) importance, as well as defines mechanisms for passing the authorities of protected area management to other bodies.

Goal 2.2 To enhance and secure involvement of indigenous and local communities and relevant stakeholders.

The “Establishment of protected areas in Javakhk (Ashotsq) region of Armenia” program is implemented by the process of participatory planning, thanks to which planning of integrated land use, processing of tourism development activities, as well as processing of a buffer zone devlopment program have been realized. Representatives of local communities and stakeholders are involved in all the activities (planning, establishment, and management of protected areas).

Goal 3.1 To provide an enabling policy, institutional and socio-economic environment for protected areas.

Within the framework of the “2012 Protected Areas Program in the Caucasian ecoregion” program, analysis has been done and a report has been made on “Legal and institutional issues of Specially protected nature areas of Armenia and the possibilities of their improvement”. The legislation about protected areas in environmental and inter-branch fields (RA Laws “On Specially Protected Nature Areas of Armenia”, “On Flora”, “On Fauna”, “On the Tariffs of Accounting the Size of Compensation Caused to the Fauna and Flora as a Result of Environmental Legal Offences”, “On Environmental Supervision” and “On Environmental Impact Assessment”, the Land, Forest and Water Codes, the National Forest Program, the National Water Program, etc), as well as the institutional system of PA management have been analysed. Working discussions have been organized with the participation of all the stakeholders during which proposals have been put forward and discussed about the improvement of PA manageemnt.

Goal 3.2 To build capacity for the planning, establishment and management of protected areas.

The Government of Armenia has adopted the Resolution “On the procedure of establishment of specially protectd nature areas” (22.01.2009, N 72-N) which provides for standards for the establishment of protected areas of different categories and designation. Within the framework of the “2012 Protected Areas Program in the Caucasian ecoregion” program, the financial, human and technical capacities of thee protected areas of Armenia have been studied, and working meetings have been organized for their discussion. “The Capacity development action plan for the protected areas of Armenia” has been developed and is currently being discussed.

Within the framework of the “Natural resources management and poverty reduction” program, a number of short-term courses have been organized for the staff of national parks, about the determination of biodiversity monitoring indicators and introduction of the preliminary phase of the monitoring program.

Goal 3.3 To develop, apply and transfer appropriate technologies for protected areas.

Biodiversity inventorization and creation of a database with the introduction of GIS has been carried out in national parks and reserves. Within the framework of the “Ammendment of the Red Book of Armenia” program, mapping of the occurence of rare and endangered plant and animal species has been carried out and digital maps have been made. Forest assessment and fire-hazardous area maps have been made for “Sevan” and “Dilijan” national parks, as well as forest plans for each area.

Goal 3.4. To ensure financial sustainability of protected areas and national and regional systems of protected areas.

For the development of protected areas, financial resources are allotted by the World Bank, the Government of Norway, the Government of Germany, World Wildlife Fundation as well as CEPF and MAVA funds. On the initiative of the Government of the Federal Republic of Germany, a Caucasus Protected Areas Fund (a trust fund) is being founded which will assist the conservation and enhancement of specially protected nature areas in the Caucasian ecosystem (Armenia, Georgia, Azerbaijan).

The state budget allots the following financing for protected areas management (AMD million): 2000 -126.2, 2001 - 260.2, 2002 – 253.8, 2003 – 302.2, 2004 -331.2, 2005 – 410.5, 2006 - 367.4, 2007 – 401.6 , 2008 – 419.4. (Exchange rate - 1 USD = 304 AMD)

The following gives information about other sources of financing to protecte areas:

1. “Ecoregion environmental program in the Southern Caucasus region: Establishment of protected areas in Javakhk (Ashotsq) region of Armenia” program (2007-2010). This program is implementad by WWF and financed by KfW; budget - 2200000 Euros,

2. “Biodiversity Protection and Community Development: Implementing Ecoregional Conservation Plan Targets in South Armenia” (2007-2008). This program has been implementad by WWF and financed by the Government of Norway; budget - 300750 Euros,
3. “2012 protected areas program in the Caucasus ecoregion” (2007-2011). This program is being implementad by WWF and financed by MAVA; budget – 185100 Swiss francs,
4. “Support for the establishment of “Arevik” protected area in Southern Armenia” (2006-2008). This program was implementad by “Ecotourism association” NGO and financed by CEPF; budget - 150000 USD,
5. “Support for the establishment of “Zangezur” protected area in Southern Armenia” (2006-2008). This program was implementad by “Khustup” NGO and financed by CEPF; budget - 174000 USD,
6. “Exploration of the possibilities to establish “Gnishik” national park” (2006-2007). This program was implementad by the “Landscape and biological diversity Conservation Union” NGO and financed by CEPF; budget - 17000 USD,
7. “Biodiversity conservation and protected areas management” component of the “Natural resources management and poverty reducion” program. This program was financed by the World Bank and the Global Environment Facility; budget – 3670000m USD.

Goal 3.5 To strengthen communication, education and public awareness.

According to the requirements of the Aarhus Convention, work is being carried out to raise public awareness about the environment. There are 13 environmental information centres in Armenia (in Yerevan and the regions); negotiations are under way to enlarge the public centre network. Raising public awareness in Gegharkunik and Tavush marz communities was an important target for the “Natural resources management and poverty reducion” program which was implementad during the development of national parks management plans. A lot of scientific and educational booklets and brochures on protected areas have been published.

Raising public awareness is one of the components of almost all the international projects in this field.

Within the framework of the “2012 Protected areas program in the Caucasian ecoregion”, a “Public relations and publis awareness raising regional strategy and action plan” (for the period 2008-2011) has been developed and approved by the Ministry of Nature Protection. According to this action plant, the “An Action Guide to Implement the Convention on Biological Diversity Programme of Work on Protected Areas” was published in Armenian in 2008 and a copy was sent to every stakeholders.

Goal 4.1 To develop and adopt minimum standards and best practices for national and regional protected area systems.

The “Methodological guidelines to developing management plans for specially protected nature areas” was adopted by the decree of the Minister of Nature Protection (27.10.2008, N364-A).

The Government of Armenia has adopted the Resolution “On the procedure of establishment of specially protectd nature areas” (22.01.2009, N 72-N) which provides standards for the establishment of protected areas of different categories and designation, in accordance with the guidelines of the IUCN.

A declaration of cooperation has been signed between the IUCN and the Ministry of Nature Protection which provides for enhanced cooperation in the fields of standard development and transfer of best practice.

The Transboundary Joint Secretariat has developed the “National Park Management Planning in the South Caucasus” document which is aimed at giving corresponding orders to regulate the planning process for the creation of national parks. The above mentioned document has been discussed during a working meeting in the educational centre of Zikatar, in order to disseminate adaptive management principles and to introduce them on the practical level.

On the initiative of the Transboundary Joint Secretariat, a guide to developing management plans for protected areas is being developed for Armenia.

Goal 4.2 To evaluate and improve the effectiveness of protected areas management.

The efficiency of management of “Sevan” and “Dilijan” national parks has been assessed during the development of the 2005-2006 management plans, using WWF/WB methodology. Proposals have been developed about institutional changes and capacity development. Management efficency assessment has been defined as one of the priorities for the country for the development of protected areas.

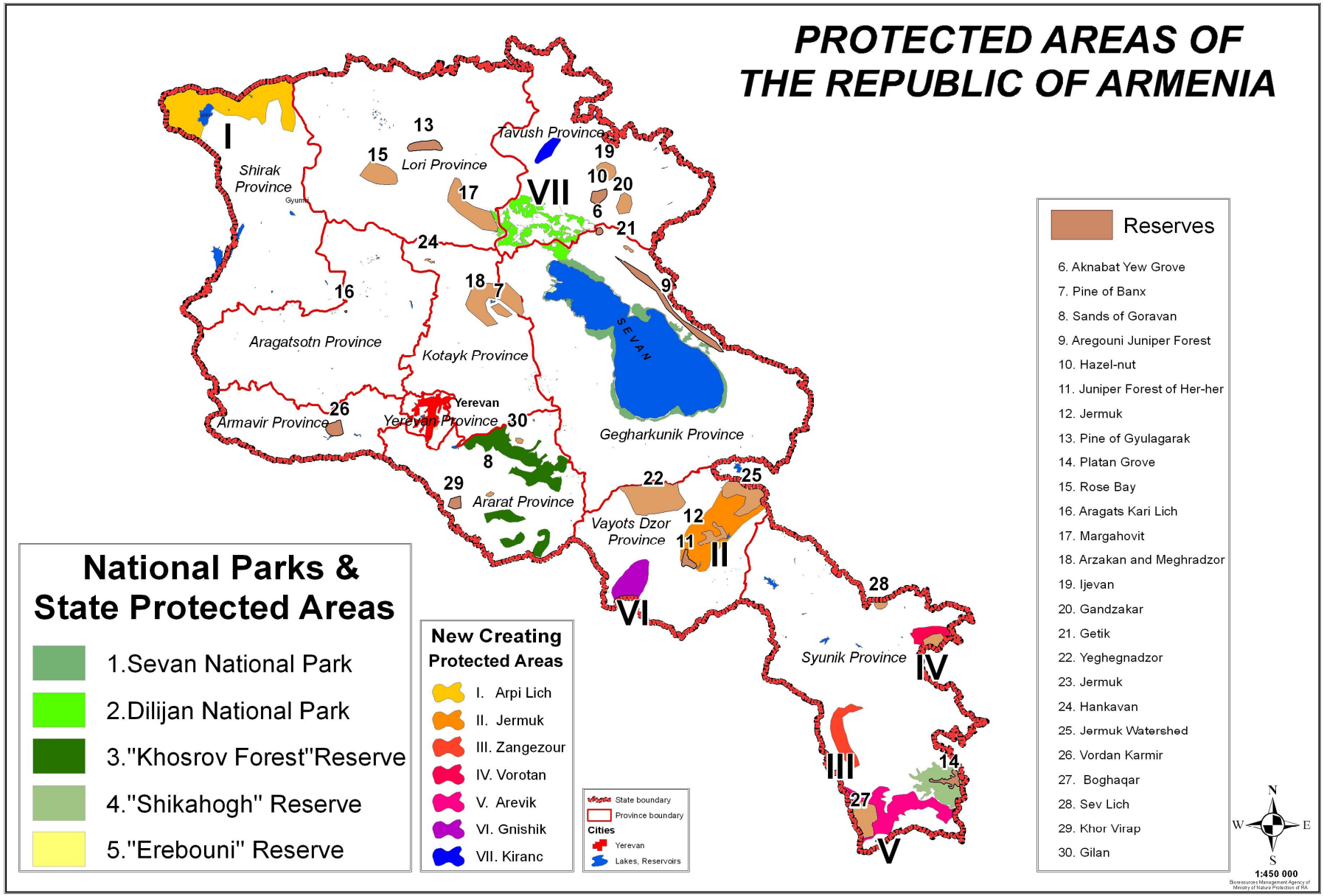
Goal 4.3 To assess and monitor protected area status and trends.

The priorities of the Programme of Work on Protected Areas for Armenia were defined during the national seminar in 2006. The national priorities were confirmed by the national coordinating committee of the “2012 Protected areas program in the Caucasian ecoregion” in 2008. The monitoring program in “Sevan” and “Dilijan” national parks which was approved by the Ministry of Nature Protection is currently being introduced.

Target 4.4 To ensure that scientific knowledge contributes to the establishment and effectiveness of protected areas and protected area systems.

The Resolution “On the procedure of establishment of specially protectd nature areas” (22.01.2009, N 72-N) adopted by the Government of Armenia defines that scientific research through which the compliance of the proposed area with national and international standards is assessed shall serve as basis for the establishment and identification of PAs.

Determination of species composition and occurence of rare and endangered vertebrates and invertebrates was carried out in 2006, with a view to establishing two new protected areas in Southern Armenia (within the framework of CEPF small grants).


PROTECTED AREAS OF
THE REPUBLIC OF ARMENIA
Shirak Province
Lori Province
Tavush Province
Aragatsotn Province
Kotayk Province
Armavir Province
Yerevan Province
Yerevan
Ararat Province
Gegharkunik Province
Vayots Dzor Province
Syunik Province
SEVAN
I
II
III
IV
V
VI
VII
National Parks & State Protected Areas
1.Sevan National Park
2.Dilijan National Park
3."Khosrov Forest"Reserve
4."Shikahogh" Reserve
5."Erebouni" Reserve
New Creating Protected Areas
I. Arpi Lich
II. Jermuk
III. Zangezour
IV. Vorotan
V. Arevik
VI. Gnishik
VII. Kiranc
State boundary
Province boundary
Cities
Yerevan
Lakes, Reservoirs
Reserves
6. Aknabat Yew Grove
7. Pine of Banx
8. Sands of Goravan
9. Aregouni Juniper Forest
10. Hazel-nut
11. Juniper Forest of Her-her
12. Jermuk
13. Pine of Gyulagarak
14. Platan Grove
15. Rose Bay
16. Aragats Kari Lich
17. Margahovit
18. Arzakan and Meghradzor
19. Ijevan
20. Gandzakar
21. Getik
22. Yeghegnadzor
23. Jermuk
24. Hankavan
25. Jermuk Watershed
26. Vordan Karmir
27. Boghaqar
28. Sev Lich
29. Khor Virap
30. Gilan
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