Biodiversity Assessment for Armenia

Task Order under the Biodiversity & Sustainable Forestry IQC (BIOFOR)

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SECTION I

Introduction

This biodiversity assessment for the Republic of Armenia fulfills three interlinked objectives:

- Summarizes the status of biodiversity and its conservation in Armenia; and analyzes threats, identifies opportunities, and makes recommendations for the improved conservation of biodiversity. This information will help USAID/Armenia and other organizations and individuals make decisions related to biodiversity conservation.

- Meets the requirements stipulated under Section 119 (d) of the Foreign Assistance Act (see Annex A, FAA Sections 117 and 119), required when USAID missions are developing new strategic programs. The assessment also prepares the Mission to address issues arising under Sections 117 and 119 of the FAA by providing information on biodiversity and natural resources.

- Analyzes the impact of current and future USAID activities in Armenia on biodiversity conservation, suggests actions that USAID could support that promote biodiversity conservation and that are consistent with current and future USAID programs, and identifies special opportunities for the Mission in the area of biodiversity conservation.

The assessment was funded by USAID's Bureau of Europe and the New Independent States under a contract to Chemonics International through the Biodiversity and Sustainable Forestry (BIOFOR) IQC (see Annex B, Scope of Work). A two-person team consisting of Spike Millington and Ramaz Gokhelashvili visited Armenia from November 4 to 19, 1999.

The approach used in the assessment was to collect and analyze information on biodiversity and related areas through documentation searches, interviews with key individuals and organizations concerned with biodiversity, both in Armenia and Washington, D.C. (see Annex C, List of Contacts), and field trips. Because of the short time in Armenia, the team was able to carry out only one field trip outside of Yerevan. This was focused on Lake Sevan and Lake Gilli.

Rather than duplicate research already undertaken and presented in strategy and project documents, this assessment has borrowed freely from these documents, and synthesized and adapted information where appropriate. The principal sources are the Biodiversity Working Group Report for the National Environmental Action Plan (NEAP), the Biodiversity Country Report, and the draft Biodiversity Strategy and Action Plan (BSAP).

SECTION II

Status of Biodiversity

A. Overview

The Caucasus region has been identified by the World Wide Fund for Nature as a Global 200 Ecoregion, based on selection criteria such as species richness, levels of endemism, taxonomic uniqueness, unusual evolutionary phenomena, and global rarity of major habitat types. Moreover, Conservation International has identified the region as a global "hotspot"—that is, one of the 25 most biologically rich and *most endangered* terrestrial ecosystems in the world.[1] These hotspots have been identified based on three criteria: the number of species present, the number of those species found exclusively in an ecosystem, and the degree of threat they face. The Caucasus region is an Endemic Bird Area, with several bird species and subspecies endemic to the region.

The Republic of Armenia is a relatively small, mountainous country with a total area of 29,740 km^2, located in the South-Central Caucasus, and bordering with Georgia, Azerbaijan, Iran, and Turkey. Armenia is located at the junction of the biogeographic zones of the Lesser Caucasus and the Iranian and Mediterranean zones and exhibits both a great range of altitudinal variation (from 375 m to the 4,095 m peak of Mt. Aragats) and a diversity of climatic zones. Together this has resulted in a diversity of landscapes and ecological communities with a distinct flora and fauna, including many regionally endemic, relict, and rare species. Armenia is of particular importance as a center of endemism for wild relatives of economically important crop and livestock species.

While encompassing only 5 percent of the Caucasus area, Armenia incorporates nearly all types of the vegetation ecosystems found in the southern Caucasus, reflecting the great altitudinal variation and consequent juxtaposition of distinct ecosystems within limited areas.

B. Landscape Zones

Six distinct landscape zones have been described in Armenia: deserts, semi-deserts, steppes, forests, subalpine, and alpine lands. These have been modified by a long history of different land use practices. The representation of the principal landscape types is indicated below (Table 1), along with a more detailed description of each landscape zone

[1] 1) Tropical Andes; 2) Mediterranean Basin; 3) Madagascar/Indian Ocean Islands; 4) Mesoamerica; 5) Caribbean Islands; 6) Indo-Burma; 7) Atlantic Forest of Brazil; 8) Philippines; 9) Cape Floristic Region of South Africa; 10) Mountains of South Central China; 11) Sundaland; 12) Brazilian Cerrado; 13) Southwest Australia; 14) Polynesia and Micronesia; 15) New Caledonia; 16) Choco/Darien/Western Ecuador; 17) Western Ghats & Sri Lanka; 18) California Floristic Province; 19) Succulent Karoo; 20) New Zealand; 21) Central Chile; 22) Guinean Forests of West Africa; **23) Caucasus;** 24) Eastern Arc Mountains, Coastal Forests of Kenya and Tanzania; 25) Wallacea.

Table 1. Coverage of Landscape Types in Armenia

Landscape Type	Altitude (meters above sea level)	Percent Cover in Armenia
Deserts and semi-deserts	700-1300	10%
Mountain steppes	1300-2400	37%
Forests, woodlands, shrubs	600-2500	20%
Alpine and subalpine meadows	> 2100	28%

B1. Deserts

These habitats are found at altitudes of 400 to1300 m, in the Ararat valley and adjacent hills, in extremely arid climatic conditions. Soils are characterized by gypsum, clay, and sand. The main feature of desert habitats is a scarce vegetation cover (25 to 30 percent) composed mostly of xerophytic and turf-forming plants. According to the dominant soil type, the floristic composition of desert vegetation shows significant changes, and three main types can be identified:

- Halophytic (on soils rich in salts and minerals) desert vegetation: characterized by Salsola ericodes, S. dendroides, S. nitraria, Halostachus caspica, Halocnemum spp. and Sueda spp. An additional 217 halophytic species are known from the Ararat valley.

- Psammophytic (on sandy soils) desert vegetation: characterized by *Caligonium polygonoides, Achillea tenuifolia, Salsola tamamschiani*. An additional 220 species of psammophytic plants have been recorded from Armenia.

- Gypsophytic (on soils rich in gypsum): characterized *by Gypsophila aretioides, G. bicolor, Lactuca takhtadzhianii, and Gundolia spp*. Two hundred and sixty species have been recorded from these soils.

The Meghri region in the extreme southeast supports several sub-tropical fruit tree species, such as pomegranate, fig tree, olive tree, and almond tree, as well as by tropical grasses and herbs such as *Imperata cylindrica*, *Erianthus purpurascens,* and *Citrulus colocintis*.

The fauna of these habitats is characterized by the occurrence of several species of reptiles, such as *Eremias arguta*, several endemic subspecies of the lizards *Lacerta* and *Agama* , as well as the Armenian viper (*Vipera raddei*). Mammals include the weasel (*Mustela nivalis*), and red fox (*Vulpes vulpes*). Typical birds are the long-legged buzzard (*Buteo rufinus),* pallid harrier (*Circus macrourus*), and the globally threatened lesser kestrel (*Falco naumanni).*

B2. Semi-Deserts

This habitat is characteristic of the dry and rocky lowlands of the Ararat valley, Zangezur, Meghri, and Vaik regions, at altitudes of 900 to 1500 m. In contrast to deserts, the vegetation of semi-

deserts consists mostly of ephemeral plants, such as *Artemisia fragrans*, *Capparis spinosa*, *Kochia prostrata*, and *Poa bulbosa*.

Semi-deserts are the original habitat of several important wild ancestors of domestic crops, such as *Triticum araraticum*, *T. urartu*, *Secale vavilovii*, *Aegilops spp.* and many others. In recent history, natural semi-deserts have been disappearing, being largely converted to agricultural land. These habitats show particularly rich floristic composition, with 437 plant species belonging to 57 families and 272 genera recorded.

The fauna includes the long-eared hedgehog (*Erinaceus auritus)*, the local subspecies of European badger (*Meles meles canescens*) and several species of bats, of which some are typical of these habitats. Semi-deserts support important reptile populations and many of these are now severely fragmented and in decline. Some characteristic species of the semi-deserts, such as the striped hyena (Hyena hyena), the great bustard (*Otis tarda*), and the houbara bustard (*Chlamidotis undulata*) appear to have been extirpated in Armenia.

The generally poor soils of deserts and semi-deserts have been managed for cultivation for centuries, but cultivation has required intensive irrigation, and these areas now support fruit, vegetable, flower, and wine production. However, natural habitats have suffered major impacts from human activities.

B3. Mountain Steppes

Mountain steppes are the dominant landscape for most of the country, particularly at altitudes above 1,500 m (and at altitudes up to 2,000 m in the north, 2,400 to 2,500 m in the south). Meadow steppes occur in the highlands, while patches of forest also occur on ridge tops among steppes in the northeast and Sjunik regions. Vegetation cover is varied, and important species include fescue (*Festuca sulcata*) and feather grass (*Stipa spp*). Steppes are used for agriculture (including cultivation of crops and vegetables). At lower altitudes, frost-tolerant fruit trees are grown, and in highland areas fodder plants are cultivated. In the north (Shirak and Lori regions), mountain steppes are characterized by dry climatic conditions, high vegetation cover, and rich floristic composition (e.g., 1,248 species belonging to 468 genera and 93 families have been recorded from the Shirak district). In the south, it is mostly distributed on the rocky and dry mountain ranges and adjacent hills. Mountain dry vegetation is hardly visible among rocks, being characterized by very small and inconspicuous plants. The topsoil is almost absent so that these areas are often defined mountainous deserts or *frigana*. Vegetation is mostly formed of grasses and dwarf bushes, with small leaves and pillow-like shape. This habitat is surprisingly rich in plant species and harbors important wild relatives of domestic fruit trees, including several types of wild pear and almond trees.

Chamois *(Rubicapra rupricapra)*

The fauna of these habitats is characterized by the presence of brown bear (*Ursus arctos)*, wolf (*Canis lupus*), red fox (*Vulpes vulpes*), weasel (*Mustela nivalis*), stone marten (*Martes foina*),

and marbled polecat (*Vormela peregusna.*). Rocky areas support wild goat *(Capra aegagrus aegagrus)* and the threatened mouflon (*Ovis ammon gmelini*). Among reptiles are several species of lizards of the genus *Lacerta*. Birds include several species of raptors, including peregrine falcon (*Falco peregrinus*) and golden eagle (*Aquila chrysaetos*).

B4. Subalpine and Alpine Meadows

Subalpine meadows. This habitat, found at altitudes from 2,300 to 2,800 m, supports a distinct assemblage of grasses, particularly in northern regions and is extremely important for the local economy. These lands are used as summer pastures, and several plants are collected and used as a source of vitamins and medicines. Almost 500 plant species have been recorded from this habitat.

Alpine meadows. Alpine meadows occupy the highest altitudes above subalpine meadows (up to 3,200 m in the north and 3,400 m in the south) and represent the principal pasture lands of the country, covering about 28 percent of its territory. The gradual increase of grazing pressure over the past decades has caused significant changes in both vegetation cover and species composition. For example, significant areas of alpine meadows are today facing an overall decline of productivity, and disappearance of important and desirable plant species such as *Campanula tridentata*, *Poa araratica*, and *Plantago saxatilis*. Climatic conditions are severe, with long, cold winters. Snow cover lasts up to nine months, and permanent snows may occur in some areas.

High-altitude bird species include lammergeier (*Gypaetus barbatus*), Caspian snowcock (*Tetraogallus caspicus*), alpine chough (*Pyrrhocorax graculus*), wallcreeper (*Tichodroma muraria*) and snowfinch (*Montifringilla nivalis*). Wild goats survive in the less accessible areas.

B5. Forests

Forests generally cover the mid-zone of mountains, occurring at altitudes between 500 m and 2,100 m in the north (up to 2,500 m in the south). Armenian forests are predominantly broad-leaved (97 percent).

Oak forests represent about a third of forest cover and are widely distributed across the country. The frost-tolerant broad-leaved oak (*Quercus macranthera*) is found throughout Armenia, at altitudes of up to 2,600 m. In contrast, the Georgian oak (*Quercus iberica*) is typically restricted to altitudes between 500 and 1,400 m, principally in the north and southeast. Other species of the oak forests are ash (*Fraxinus excelsior*), hornbeam (*Carpinus betulus*), Georgian maple (*Acer ibericum*), cork elm (*Ulmus suberosus*), and field maple (*Acer campestre*).

Beech forests, dominated by Oriental beech (*Fagus orientalis*), also represent about a third of forest cover. They are widespread in northern Armenia, particularly on north-facing slopes at altitudes of 1,000 to 2,100 m. Other species of the beech forests include Caucasian lime (*Tilia cordata*), Litinov birch (*Betula litwinow*), and spindle tree (*Euonymus europaeus*).

Hornbeam forests are less widespread than oak and beech forests and occur at altitudes of 800 to 1,800 m. Other trees found in these forests include oak, ash, field maple, Caucasian pear (*Pyrus caucasicum*), and Oriental apple (*Malus orientalis*).

Dry scrub forests are found in both the north and south of the country, occuring at altitudes of 900 to 1,000 m in the north, but at much higher altitudes in the south (1,800 to 2,000 m). These forests support around 80 species of xeric trees and scrubs. Juniper (*Juniperus spp*.) and broad-leaved forests occur, the latter characterized by species such as pistachio (*Pistachia mutica*), and Georgian maple and almond (*Amygdalus fenzlianum*). A variety of shrubs are supported by these forests, including buckthorn (*Rhamnus catharticus*), cherry (*Prunus spp*.), and jasmine (*Jasminium fruficans*).

The fauna of these habitats includes large mammals such as wolf (*Canis lupus*), brown bear (*Ursus arctos*), red fox (*Vulpes vulpes*), red deer (*Cervus elaphus*), and roe deer (*Capreolus capreolus*). Other mammals include the introduced wild boar (*Sus scrofa*), European badger (*Meles meles*), stone marten (*Martes foina,* weasel (*Mustela nivalis*), wild cat (*Felis silvestris caucasicus*) and lynx (*F. linx*). Small mammals are also abundant, including the mole (*Talpa orientalis),* the shrews *Sorex minutus* and *S. araneus*), the hedgehog,(*Erinaceus europaeus*), and two species of bats (*Vespertilio pipistrellus* and *V. serotinus*). Forest avifauna is characterized by large raptors such as buzzard (*Buteo buteo*), goshawk (*Accipiter gentilis*), sparrowhawk (*Accipiter nisus*), lesser spotted eagle (*Aquila pomarina*), eagle owl (*Bubo bubo*), tawny owl (*Strix aluco*), and several species of woodpeckers.

B6. Wetlands

Approximately 10 percent of the country is covered by wetlands and saline and alkaline lands. The latter cover about 25,000 ha, including areas in the Ararat Valley where the underground waters are close to the earth surface, resulting in water vaporization and salt precipitation. Permanent upland wetlands contrast with lowland wetlands (particularly those around the River Arax), which are usually drained in summer, resulting in high salinity.

Wetlands are among the most threatened habitats in the country. The ecological crisis associated with Lake Sevan has been well documented. Vegetated wetlands around the lake have disappeared. In the Ararat valley alone, 1,500 km^2 of swamps have been drained and transformed into agricultural land. The principal wetlands remaining in Armenia are Lake Arpi and the fishponds of the Ararat valley along the Turkish border (Armash area).

Typical emergent wetland vegetation is characterized by common reed (*Phragmites australis*), (*Typha spp.*), sedges (*Carex aguta* and *C. diluta*), rush (*Scirpus tabernaemontani*), and (*Bolbolshoenus maritimus*). There are also a number of submerged species.
Among mammals which are closely linked to wetlands are the otter (*Lutra lutra*) and water vole (*Arvicola arvensis*). Threatened duck species in Armenia include white-headed duck *(Oxyura leucocephala)*, ferruginous duck (*Aythya nyroca)*, and marbled teal (*Marmaronetta anguirostris*). The Armenian gull *(Larus (argentata) armenicus)* nests at Lake Sevan and the endangered Dalmation pelican *(Pelecanus crispus)* has bred at Lake Arpi. In addition, wetlands form important habitat for migratory species including wildfowl, such as red-crested pochard (*Netta rufina*), Bewick's swan (*Cygnus bewickii*), and cranes (more than 1,000 of the globally declining demoiselle crane (*Anthropoides virgo*) passed through the Lake Gilli area in early September 1995, even though the lake itself has been drained.

In addition to ecosystems broadly represented by the seven landscape types, specific sites have been identified that support ecosystems of global or regional significance and that are rich in endemic, relict, or rare species. These include:

- A unique assemblage of species of wild relatives of crops occurring near Yerevan
- Stands of plane trees (*Platanus orientalis*) near the Tzav river valley
- Psammophile desert on the banks of the Vedi river
- The habitats supporting the endemic species of insect 'vordan karmir' (*Porphyrophora hamelii*) in the Ararat valley
- The open woodland and semi-desert ecosystems of central Armenia, with its unique and rich associated fauna and flora
- Relict wetland meadows in the Lori area
- Stands of yew (*Taxus baccata*) and hazel (*Corylus colurna*) in the Agstev river basin and Zangezour
- Rhododendron habitats in sub-alpine regions of the Pambak and Tsaghkunyats ranges.
- Habitats of the sub-Arax mountain ridges where populations of Armenian mouflon (*Ovis orientalis gmelinii*) occur

C. Species Diversity

For a small country, Armenia has a high species diversity, reflecting the variety of ecosystems and landscapes. More than 3,500 species of higher plants and more than 4,000 species of fungi have been recorded. Among vertebrates, Armenia counts 83 mammal, 349 bird, 53 reptile, 8 amphibian, and 30 fish species. About 17,000 invertebrate species are known, but more certainly remain to be discovered. Globally, Armenia is important as representing part of the Caucasian biogeographical region, which is an important center of endemism. Many rare, endemic, and threatened species are shared with neighboring countries, including Georgia, Azerbaijan, southern Russia, and part of Turkey. However, the degree of threat is probably higher in Armenia compared to neighboring countries. Because of natural and human impacts, almost half the plant species present in Armenia face some threat of extinction. To date, 35 plant species of economic importance are known to have become extinct in Armenia. An additional 386 species (12 percent of the flora) are listed in the Armenian Red Data Book (produced in 1988). At a regional level, 61 plant species are listed in the Red Data Book of the former Soviet Union (produced in 1984). Of critical concern are species such as sweet flag bulrush (*Acorus calamus*), a valuable medicinal herb, and the Judas tree (*Cercis griffithii*), which is endangered because of agricultural use of the land. Other examples of endangered plants include a newly discovered endemic species of saltwort (*Salsola tamamschjanae*), threatened as a result of sand processing, and the regionally endemic iris, (*Iris grossheimii*). In addition, the status of lower plants has not been fully assessed, but at least 15 species of mushrooms are considered to be under threat.

Caucasian Black Grouse (*Tetrao mlolosiwiczi*)

Of around 17,500 species of invertebrate and vertebrates recorded in Armenia, approximately 300 are considered to be rare or declining. A total of 99 vertebrates are currently listed in the Armenian Red Data Book, of which 39 are also listed in the Red Data Book of the former Soviet Union, and a number are considered globally threatened (according to the IUCN Red List of Threatened Animals; see Table 2). Among the vertebrate species listed in the Armenian Red Data Book are 12 amphibians and reptiles, and 18 mammal species — many of these species are critically endangered. Among the mammals listed, six species are at particular risk of extinction: Armenian mouflon *(Ovis orientalis gmelinii),* wild goat (*Capra aegagrus),* marbled polecat (*Vormela peregusna),* European otter (*Lutra lutra),* brown bear *(Ursus arctos),* and manul (*Felis manul).* The striped hyena *(Hyaena hyaena)* and the Caucasian birch mouse *(Sicista caucasica)* are probably extinct in Armenia.

Table 2. Number of Higher Plants and Vertebrate Species Listed in the Red Book of Armenia, and Regional and International Red Lists

Group	No. in Armenian Red Book	No. in USSR Red Book	No. in IUCN Red List
Fish	2	1	-
Amphibians	1	1	-
Reptiles	11	7	2
Birds	67	19	3
Mammals	18	11	1
Higher Plants	386	61	-
Total	485	100	6

Individual details of Red Data Book species can be found in Annex D.

D. Agrobiodiversity

Armenia is an important center for agrobiodiversity. The diversity of wild relatives of crop plants found in Armenia (22 species, and 218 subspecies) has been used to develop new varieties through selection. The ancestors of wheat, barley, rye, and oats, and several fruit trees such as grape and wild pear, are found in Armenia. A wide range of species is currently grown in Armenia, including six species of cereals, 366 fodder plants, 62 berry species, and 65 types of vegetable. In total, these 521 plant species represent 16 percent of those found in Armenia. Sites such as Erebuni have particular significance for agrobiodiversity — this reserve was set up to protect the genetic diversity present in wild relatives of crops — and supports 3 species and 100 subspecies of wheat.

Armenia is an ancient center for the breeding of livestock, and also supports wild relatives of domestic breeds. Endemic breeds of sheep were recognized as early as the 9th Century B.C., which had been selected from their wild ancestors, the Armenian mouflon. Today, mouflon are still found in the southern parts of the country, particularly in Khosrov reserve, although their numbers are declining due to habitat loss and illegal hunting. As well as sheep, endemic races of goats and horses also originated from the Armenian Plateau, and the genetic variety in livestock in Armenia has resulted in improved varieties of cows, sheep, pigs, chickens, and rabbits over the last 50 years (from BSAP, 1999) (See box).

Uses of Wild Plants in Armenia (from BSAP, 1999)

- Over 200 species of **edible plants** are collected in Armenia, and are used fresh, cooked, pickled, or dried. Commonly used plants include longleaf (*Falcaria*), asparagus *(Asparagus),* and chervil (*Chaerophyllum*).
- Around 120 species of **wild berries and nuts** are collected, including walnut (*Juglans*), hazelnut (*Corylus*), pear (*Pyrus*), apple (*Malus*), dogwood (*Cornus*), blackberry and raspberry (*Rubus*), and currant (*Ribes*).
- A great variety of plants are used for **animal fodder** (around 2,000 species), including clover (*Trifolium*), sainfoin (*Onobrychis*), and alfalfa (*Medicago sativa*).
- Around 10% of plants found in Armenia have some **medicinal use,** and species of hawthorn (*Crataegus*), buckthorn (*Rhamnus*), juniper (*Juniperus*), barberry (*Berberis*), rose (*Rosa*), and St John's wort (*Hypericum*) are collected for traditional remedies.
- Around 150 species of plants are known to produce **essential oils**, mainly species of thyme (*Thymus*), helichrysum (*Helichrysum*), and wormwood (*Artemisia*).
- Plants used in **producing dyes** (120 species) include spurge (*Euphorbia*), buckthorn (*Rhamnus*), elder (*Sambucus*), and madder (*Rubia*).
- A number of plants (c. 350 species) have an important role in **attracting bees**, including representatives of aster (*Acer*), sainfoin (*Onobrychis*), alfalfa (*Medicago*), lime (*Tilia*), and clover (*Trifolium*).
- A number of species are also used for their vitamin, tannin, or resin contents.

E. Threats to Biodiversity

The principal direct threat to biodiversity in Armenia is habitat loss and degradation as a result of human activities, including intensive agricultural and livestock development on marginal lands, and urban and industrial development, and associated pollution of soil and water.

Forests are one of the most seriously threatened ecosystems in Armenia. Archaeological data indicates that around 40 percent of the land was originally forested. Since then, forest cover has declined significantly as a result of human impact. The expansion of the human population has led to increased pressure on land for grazing and agriculture, resulting in forest clearance. In addition, two intensive periods of deforestation have occurred. Between the 1930s and 1950s, approximately 450,000 m^3 of wood was extracted annually from Armenian forests for industrial use. Extensive deforestation for fuelwood needs also took place from 1992 to1995, during the period of economic blockade and energy crisis. A combination of poor forest management and illegal felling resulted in damage to some 27,000 ha of forest (more than 8 percent of the total forest area), including the total clearance of approximately 7,000 ha. Today, forests cover at most 10 percent of the land surface of Armenia. Forests are now concentrated mostly in the northeast of the country, with some stands in the south.

The threats to wetlands in Armenia are clearly illustrated by the changes in Lake Sevan. Beginning in the 1930s, the development of the industrial, agricultural, and energy sectors has depended on the water resources of Lake Sevan. Water from the lake irrigated approximately 100,000 ha and

generated more than 2.5 million kW of electricity, thus providing an important contribution to the socioeconomic development of the country. However, such extensive off-take of water also resulted in a serious ecological disaster, with a significant decline in the level of the lake. During this time, the level of the lake has fallen by 19 m, and its overall volume decreased by 42 percent. As a result, the average temperature of the lake has increased and oxygen content has decreased, resulting in eutrophication and algal blooms. The first signs of the lake's eutrophication were recorded in 1964, when green and blue algae blossomed in the lake.

The decline in water levels also affected the whole of the Sevan watershed. Approximately 10,000 ha of surrounding wetland and semi-wetland areas have dried out, and neighboring Lake Gilli was drained in the 1960s, with significant effects on biodiversity, including the disappearance or decline of at least 60 wetland plant species. The principal spawning grounds for Sevan trout have been destroyed, and populations of this and other endemic fish species have declined. The Sevan wetlands were previously used by up to 160 species of migratory birds, only 50 of which are now recorded. Today, the numbers of birds using the whole Sevan watershed are lower than those recorded on Lake Gilli alone in 1939, and waterbird populations continue to decline. Similar trends have been observed in other lakes of Armenia.

Cultivated lands represent 80 to 90 percent of the area of the semi-desert zone, and natural ecosystems have been extensively damaged as a result of uncontrolled irrigation and agricultural intensification, which has resulted in increased soil erosion, salinity, and pollution.

Uncontrolled grazing by livestock threatens many of the natural pastures of the mountain steppes and alpine and sub-alpine meadows. Natural pastures have declined by more than 40 percent in the last 50 years, with serious degradation now affecting remaining pastures and meadows. Plant species diversity has decreased, notably of valuable fodder species, which have been replaced by unpalatable weed species. Species diversity may only be a fifth of that of the original habitats as a result of overgrazing, particularly in lower subalpine meadows and steppe areas.

Soil erosion is a severe and increasing problem caused by poor agricultural practices, overgrazing, and uncontrolled deforestation. It affects approximately 60 percent of agricultural land. Total soil loss in Armenia is estimated to be about 8 m tons/year (0.3 tons/ha/year) varying from 40 tons/ha/year for denuded lands to 1 ton/ha/year for closed forests and well-managed pasture lands.

Public awareness of biodiversity is relatively low in Armenia. Little information on this issue is broadcast on state radio or television, although articles about the environment appear regularly in the press. The only television program about nature is broadcast twice a month, but generally presents foreign documentary films rather than describing the problems facing biodiversity and its protection in Armenia. A popular science magazine (*Armenian Nature*) discussed many issues relating to biodiversity conservation until 1995 when it folded due to financial difficulties. The Ministry of Nature Protection (MNP) has published a newsletter (*Nature*) since 1998, which includes many articles on environmental protection. However, the print run and distribution of this publication is very limited.

SECTION III

Status of Biodiversity Conservation

A. Protected Areas

The Armenian network of protected areas was established to conserve the national natural and cultural heritage, including important habitats and species, as well as landscapes, cultural and natural monuments, and important geological formations. In particular, several protected areas were created to preserve the habitat of unique, rare, and endemic species listed in the Armenian Red Data Books.

The recent Law on Protected Areas defines the following categories of protected areas. This system follows the former Soviet system of strict nature reserves ("zapovedniks") and conservation areas, which permit broader use. Sevan National Park is a departure from this system.

Category of Protected Area	Number	Total Area (km^2)	% of National Territory
State Reserves (*Arkelotz*)	5	685	1.5
State Conservation Areas (*Arkelavai*)	22	870	3.5
National Parks (*Asgain Park*)	1	1500	5.0
Natural Monuments (*Bnakan Ushrazan*)	-	-	-

The protected area network of Armenia covers a total area of approximately 1.416 km^2, representing 5 percent of the national territory (see map in Annex E). Including Sevan National Park, the total area covered reaches 3.116 km^2, or more than 10 percent of the national territory. Although these figures reflect the area defined as protected, only a small proportion of the state reservations have been actually established.

The responsibility for coordination of the protected area network was recently assigned to the Ministry of Nature Protection (MNP), the agency responsible since 1991 for the conservation, management, use, and regeneration of all Armenia's natural resources. Current management structures and lines of responsibility are not yet clear to most of the staff. It is critical that the roles and responsibilities of the MNP, as well as the Forestry Department (Hayantar), which is part of the MNP and shares direct responsibility for management of protected areas with MNP, be clarified.

The absence of an adequate legislative framework significantly hampers the effectiveness of the entire system of protected areas, and many reserves have not been formally established. In addition, activities are taking place within existing protected areas that are not consistent with the sites' management objectives.

On the other hand, some notable Armenian protected areas, such as the Khosrov and Erebuni state reserves, have enjoyed a significant degree of protection throughout the Soviet era as well as into present times.

The establishment of the first protected areas dates to 1958 when the first three state reserves — Khosrov, Dilijan, and Shikahogh (Bartazi) — and several state reservations were created. Khosrov reserve is one of the oldest conservation areas in the world, its establishment dating as far back as the fourth century A.D.

The Lake Sevan National Park was first created in 1978 in recognition of the global conservation importance of this unique alpine lake ecosystem. Its status and management have since been revised several times, and effective management of the park has started only in recent years.

Despite the extent and coverage of the protected areas network, there are problems with its design and management that reduce the areas' effectiveness for biodiversity conservation. Problems include:

- Many important and characteristic ecosystems are not represented within the protected areas network.
- The borders of the protected areas have not been designed appropriately to take into account factors such as topography, altitudinal variation, and distribution patterns.
- The protection status of state reserves and conservation areas is not generally enforced, and human activities such as farming and recreation occur in reserves.
- Protected areas lack effective administration and conservation management regimes, and have insufficient staff and resources.
- The legal framework for protected areas management is poor or totally lacking, and regulations or limits on use of natural resources do not exist.
- Natural monuments have not yet been officially registered and an inventory of sites has not been completed.

The different categories of protected areas are discussed in the following subsections.

A1. State Reserves

Five state reserves have been established in Armenia, covering a total of approximately 685 km^2 (or 1.5 percent of the national territory) as shown in the box on the next page.

State Reserves

State Reserves	Agency Responsible	Area (km^2)
Khosrov	(MNP - Hayantar)	292
Dilijan	(MNP - Hayantar)	290
Shikahogh	(MNP - Hayantar)	100
Sev Lich	(MNP)	2.4
Erebuni	(MNP)	0.9

All state reserves fall under the overall responsibility of the MNP. However, Erebuni and Sev Lich are under the direct management responsibility of the protected areas

department of the MNP, while the other three reserves, Dilijan, Shikahogh, and Khosrov, are under the responsibility of Hayantar, the forestry department of the MNP.

Only three state reserves (Dilijan, Sev Lich, and Khosrov) have a defined regulatory and administrative structure. The Shikahogh reserve thus far has no separate legal status and has been incorporated into the administrative structure of the Kapan forest reserve.

According to the MNP, "State Reserves are established to ensure the highest degree of protection to important habitats and species. Human activity within state reserves is limited to scientific research." This statement indicates that Armenian state reserves should be considered as IUCN "category Ia" (IUCN 1994) protected areas. However, the actual situation and management practices are not consistent with stated objectives.

In many cases, only a small portion of state reserves have enjoyed a significant degree of protection, while large areas have been negatively affected by human activity, including exploitation of natural resources, grazing, industrial development, urban settlements, and tourism. This is the case in particular in Dilijan State Reserve, where a large settlement and industrial area was developed in the core zone of the protected area and only a few habitats are still relatively undisturbed. Other human activities negatively affecting the forests of Dilijan include illegal livestock grazing, collection of non-timber forest products, and illegal hunting.

Another example is Erebuni State Reserve, a site of high international importance for the conservation of endemic wild relatives of domestic crops. Here urban development has reached the boundary of the reserve, and the lack of a buffer zone is resulting in significant loss of natural habitat. The boundary fence that used to protect this tiny reserve from illegal grazing has now disappeared, making the protection of this important site almost impossible.

Some protected areas are in better condition due to lower pressure from human activity along their boundaries. These include Khosrov Reserve, a site of high regional conservation importance, where more than 50 percent of all plant species in Armenia have been recorded.

A case-by-case review and redefinition of the status, boundaries, and principal management objectives of state reserves is urgently needed. Such a review would probably result in significant readjustment of existing boundaries, and the identification of comprehensive zoning schemes defining the limits of prescribed activities, including strict conservation, but also including other uses and management regimes.

Despite the efforts of committed personnel, the present situation in most state reserves is critical. The chronic lack of adequate financial resources for the past 10 to 15 years has severely constrained all conservation activities. According to the BSAP, the most urgent problems emerging from site visits and discussions with the staff at all levels on site include the following:

- Irregular payment of salaries (sometimes for up to one year)
- Lack of even the most basic equipment (such as maps, uniforms and radios)
- Lack of adequate office facilities and other basic infrastructure (ranger outposts, patrol traisls, gates etc.)

- Lack of adequate conservation training for reserve staff, including conservation awareness work with local communities and tourism management

A2. State Conservation Areas

Twenty-two State Conservation Areas (SCA) have been declared in Armenia, covering a total area of approximately 870 km^2 (or 3.5 percent of the national territory). A specific legislative act defining boundaries, management responsibility, and organizational structure is required for each reserve. However, almost none of the SCAs identified for establishment has actually been created.

Fifteen (15) of the 22 SCAs are under the direct management responsibility of the MNP and six are currently under the jurisdiction of the Ministry of Agriculture (one is under the Institute of Physics).

The MNP is responsible for promoting and coordinating the legal establishment of each reserve, in close collaboration with local authorities and other relevant ministries.

According to an MNP statement, "State Conservation Areas are established to protect areas where unique natural habitats, ecosystems, and species occur. In contrast to State Reserves, a strictly regulated economic and sustainable use of natural resources is among the management objective of state reservations." According to this statement, conservation areas should be considered as IUCN "category VI" (IUCN 1994) protected areas.

Because the establishment of SCAs has largely remained on paper — only a general government resolution on their establishment has been approved, with no boundaries identified nor regulations prepared for any of the 22 SCAs — these protected areas do not enjoy any type of special protection. Although they were established for the purpose of protecting important habitats and species, at present they are subject to uncontrolled exploitation, including agricultural development and deforestation.

Important sites that have been identified and officially gazetted as SCAs (although no measures have actually been implemented) include the Akhnabat Yew Grove, the Rose Bay (Rhododendron), and the Plane forests. Habitats covered ("on paper") by state reservations include well-preserved islands of alpine grassland, salt-marshes, sand deserts, and wetlands, with their peculiar flora and fauna.

A3. National Parks

The sole national park in Armenia is the Sevan National Park. The park has several management categories, with a core protection zone consisting of the lake and its immediate environs (125,200 ha) and extending to different use zones, including recreation and industrial development, in the broader watershed (24,800 ha).

Management objectives of Sevan National Park are the following:

- Protection of its unique alpine lake ecosystem, and its littoral habitats

- Mitigation of the current negative impact of industrial, agricultural, and tourism activities on the natural resource base
- Preservation of the lake's natural resources, particularly fish stocks, and the regulation of their sustainable use, to ensure long-term economic benefits and employment to local communities

A4. Natural Monuments

The MNP states that "Natural Monuments are established to protect nationally and internationally important natural and historical landscapes and special features of Armenian culture and natural history." According to this statement, natural monuments should be considered as IUCN "category III" (IUCN 1994) protected sites. These protected sites would normally cover limited areas, and the responsibility for their management would lie with local authorities. However, no natural monuments have yet been created in Armenia; no regulatory instruments on their establishment have been developed; nor have any inventory, conservation, or management guidelines been produced.

As a result of this situation, several unique natural monuments of national and international importance are currently subject to uncontrolled exploitation in Armenia, and many are being degraded at an alarming pace. It is therefore critical to establish a network of natural monuments and ensure their effective management consistent with the recent pan-European biodiversity and landscape conservation strategy. The MNP is currently preparing a prioritized list of sites to be proposed for the establishment of natural monuments.

B. Conservation Outside Protected Areas

Prior to the collapse of the former Soviet Union, a number of laws regulated biodiversity conservation outside protected areas, including human activities around rivers, water catchments, and resorts; use of pastures; and collection of species. Many of these regulations are now out of date and do not take account of the new economic situation. Three regulations are implemented by the Ministry of Nature Protection: 1) licensing of hunting and fisheries; 2) licensing for the collection and storage of wild medicinal plants; and 3) ecological assessment of any new business activity.

By law, hunting and fishing can only be conducted under licence and with a special contract. Each season a range of expert bodies is consulted for guidance on populations, hunting methods, and likely impacts. On the basis of this information, the MNP issues the appropriate number and limits of permits for hunting or fishing. Similar assessments are made of populations of wild medicinal plants before permits are issued. However, the lack of accurate data severely hampers the ability of the relevant authorities to effectively set quotas and assess impact.

C. Ex-situ Conservation

Live collections of plants and animals are supported by the Institute of Botany (of the National Academy of Sciences), Yerevan Zoological Garden, and a number of recently developed private zoos and collections. An extensive plant collection has been established at the Institute of Botany for more than 60 years, and now includes about 1,650 species of plants from 75 families. These

are maintained in botanic gardens in Yerevan, Vanadzor, and Sevan and in a number of tree parks. Although no captive breeding facilities are currently operating, the collection of animals at Yerevan Zoo includes 164 species (14 fish, 9 amphibians, 40 reptiles, 57 birds, and 47 mammals) among which are a number of endemic and threatened species from Armenia. A collection of micro-organisms established at the National Bacteriological Research Centre currently maintains some 6,000 species of bacteria and fungi.

In general, the conditions of ex-situ collections are relatively poor, and these have been undermined by the economic crisis and energy shortages. Museum research collections have been similarly affected. Further, ex-situ institutions have developed in isolation without coordination between existing collections.

SECTION IV

Strategic and Policy Framework

A. Policy Framework

Armenia's National Environmental Action Plan (NEAP) was approved in December 1998 and provides a strategic framework for policy and investment. The box at right highlights, by program area, activities directly pertinent to biodiversity conservation. Six broad objectives were prioritized in the action program developed by the Biodiversity Working Group of the NEAP (see Annex F).

In 1999, the Ministry of Nature Protection (MNP) produced a Biodiversity Country Study as Armenia's first national report to the Convention on Biodiversity (CBD). This was the basis for further development of a national Biodiversity Strategy and Action Plan (BSAP), a draft of which has recently been completed. The BSAP outlines a detailed set of 242 activities grouped under 14 programmatic areas (strategic approaches). Activities are assigned to one of three broad categories of budgets and priorities. A resume of the proposed BSAP activities is presented in Annex G.

NEAP Biodiversity Conservation Activities

Policy and Program Development

Program: Development of an Integrated National Land Use Master Plan
Program: Development of a Forestry and Biodiversity Management Plan. Activities include:

- A forest inventory
- Design of a biodiversity survey and monitoring system
- Preparation of national and local forest management plans
- Preparation of watershed management plans
- Development of an urban forestry management system

Legal and Regulatory Reforms

Program: Development of a National Protected Area System. Activities include:

- Review of existing law for protected areas
- Development of legal basis for demarcation and gazettement of protected areas
- Design and implementation of integrated planning and zoning systems

Institutional Strengthening and Capacity Building

Programs:

- Strengthening the Ministry of Nature Protection
- Strengthening monitoring and enforcement agencies
- Strengthening of protected area management
- Strengthening the Center for Environmental Information
- Establishment of National Gene Bank for the conservation of plant genetic resources

Priority Investment Programs

Programs: Integrated watershed and land management.
Programs: Forestry and biodiversity management. Activities include:

- Biodiversity inventory and monitoring
- Improved forest management and rehabilitation

Environmental Awareness and Education

Programs:

- Institutional capacity building for managing environmental awareness
- National environmental awareness survey
- National communication program for biodiversity and sustainable forestry development
- Environmental education
- Environmental awareness media fund
- Environmental awareness NGO fund

B. Institutional Framework

B1. Government of Armenia

Since 1991, the responsibility for the conservation, management, use, and regeneration of all natural resources of Armenia has been with the MNP and with the Ministry of Agriculture. The Ministry of Agriculture is responsible for agricultural development on state lands

and coordinates assistance and extension services to farmers on recently privatized lands. Six of the existing 22 state reservations are currently under the jurisdiction of the Ministry of Agriculture.

Through its relevant departments and in collaboration with external experts, the MNP is also responsible for:

- Organizing and implementing ecological surveys and natural resource inventories
- In-situ conservation of habitats and species
- Provision of guidelines for their sustainable management of habitats and species, including ex-situ conservation

The MNP is responsible for the supervision of all protected areas in Armenia. The direct management of protected areas is either:

- Carried out by MNP directly (as in the case of Lake Sevan National Park, and Erebuni and Sev Lich state reserves)
- Assigned to the Hayantar (Forestry Department, part of the MNP), which is directly responsible for the management of 3 state reserves and 16 of the 22 state conservation areas
- Currently under the jurisdiction of the Ministry of Agriculture, as in the case of 6 state conservation areas

It should be noted that actual management of state conservation areas is practically nonexistent.

B2. Enforcement of Legislation

The MNP, through its functional divisions, including Hayantar, is also responsible for control and enforcement of environmental legislation. The MNP is one of four ministries entrusted by the Armenian Government with this power (others are the Ministry Finance, Ministry of Interior, and Ministry of Justice). MNP undertakes this responsibility using its own staff and financial resources. However, in many cases inspections and patrols are carried out in close collaboration with the police.

MNP is also responsible for overseeing and advising on the activities of other relevant ministries to ensure coordination and compliance with current environmental legislation.

Under the current legislation, all new industrial enterprises are required to obtain clearance from the MNP through the satisfactory performance of an obligatory Environmental Impact Assessment (EIA). The MNP has a role in monitoring, advising, and potentially vetoing proposed investments based on the EIA.

The MNP intends to issue licenses for the use of natural resources to reflect the payment of resource use fees. These fees, as well as all associated regulations, (i.e., payment procedures, user rights and obligations, timing and methods of use, etc.) will be defined by MNP and approved by the government. A first “experiment” is currently being implemented with the regulated collection of medicinal plants.

B3. Academic Institutions

The various institutes of the National Academy of Sciences (e.g., Institute of Zoology and Institute of Botany) have seen severe budgetary cutbacks in recent years. The focus is largely academic research, and not conservation *per se*. However, the Institute of Zoology is currently updating the Red Data Book of Animals for Armenia, with Japanese support.

B4. NGOs

Historically, environmental NGOs in Armenia have been created and run by scientists and academic experts with an interest and training in environmental issues. Many NGOs still fit this model and members of the principal environmental NGOs have informally provided technical input and advice to government policies and decisions on environment and conservation issues in their capacity as individual experts in specific fields.

Recently there has been a shift toward greater involvement in environmental awareness and advocacy, as NGOs seek a more active role in civil society development and greater transparency and accountability in environmental decision-making. They also promote increased public participation in environmental activities, including the formulation and implementation of environmental policy and legislation. Most NGOs remain small, have very few resources, and rely on the initiative (and economic support) of a few individuals. In the last few years, financial assistance from international organizations has enabled some NGOs to receive training and capacity building support, as well as to participate in specific conservation projects. More than 50 NGOs are now involved in environmental activities, principally awareness raising and information dissemination.

C. Legislative Framework

Key Laws and Regulations Relating to Biodiversity Conservation and Natural Resource Use in Armenia

- Law on Principles of Environmental Protection (1991)
- Law on Protected Areas (1991)
- The Land Statute (1991)
- The Water Statute (1992)
- Law on Protection of the Atmosphere and Air Quality (1994)
- The Forest Statute (1994)
- Law on Environmental Impact Assessment (1995)
- Government decree on Fishing activities in Lake Sevan (1996)
- Law on Nature Protection and Payments for Use of Natural Resources (1998)
- Law on Flora (draft)
- Law on Fauna (draft)

The Forest Statute regulates the protection and use of forest, including the conservation of biodiversity within such areas. The statute stipulates that all the forests are state property, and the government is responsible for their use. However, the economic situation, including private land ownership, is not addressed by this law, and thus the development of forest-based enterprises by the private sector or local communities is prohibited. The Forest Statute is currently being revised by the MNP. This revision is aimed at harmonizing regulations with respect to biodiversity conservation, protection, and regeneration.

The *Law on Protected Areas* outlines procedures for the establishment and management of protected areas and their relationship with other sectors. Under this law, state reserves, state conservation areas, national parks, and natural

monuments are considered protected areas. The law is modeled on those developed elsewhere in the former Soviet Union, and does not account for the changing socioeconomic and political situation, particularly with regard to land privatization and the establishment of the private sector. A number of issues need to be clarified under the existing law, particularly the rights and responsibilities of the public and private sectors, and the role and participation of local communities and NGOs in protected areas. In addition, the law does not include clear plans for conservation regimes and opportunities for sustainable use, nor does it consider the status of different protected areas. The current system is restrictive and would benefit from the recognition of a broader range of types of protected areas.

The *Draft Laws on Flora and Fauna* are being developed to provide scientifically determined regulations on the conservation, management, and regeneration of natural populations of plants and animals. These laws will regulate both the conservation and use of many wild species. These laws have had their first reading in Parliament and are expected to be approved soon.

The *Law on Nature Protection and Payments for Use of Natural Resources* defines payments made for use of biological and natural resources, including who needs to pay, types of payments, levels and methods of payment, and control mechanisms. This law was adopted at the end of 1998, and specific regulatory acts have not yet been developed.

C1. International Conventions

During the 1990s, Armenia has joined a number of international conventions that pertain to biodiversity conservation:

- *Convention on Wetlands of International Importance Especially as Waterfowl Habitat* (Ramsar Convention, 1971). Armenia ratified the Ramsar Convention in 1993. But despite the international importance of Lake Sevan and Lake Arpa, little has been done to implement this convention.

- *Convention on Biological Diversity* (UNCBD, Rio de Janeiro, 1992). This convention was ratified by Armenia in 1993, and the first stage of implementation is currently being undertaken, including the production of the first National Report earlier in 1999, along with the development of this *National Biodiversity Strategy and Action Plan* to meet reporting requirements to the convention.

- *Convention Concerning the Protection of the World Cultural and Natural Heritage* (World Heritage Convention, Paris, 1972). Although this convention was ratified in 1993, little information is available on its implementation.

- *Convention to Combat Desertification* (UNCCD, Paris, 1994). The UNCCD was ratified by Armenia in 1997. A project is currently being developed to meet obligations under this convention.

- *Framework Convention on Climate Change* (UNFCCC, Rio de Janeiro, 1992). The UNFCCC was ratified by Armenia in 1993, and production of a Country Study on Climate Change is underway.

International recognition of the importance of public awareness and participation has resulted in the development of the UN Convention on Access to Information, Public Participation Decision-Making, and Access to Justice in Environmental Matters. Armenia signed this convention at Aarhus in 1998; once the government ratifies the document, the dissemination of environmental information and mechanisms for public participation will be clarified. However, the MNP feels that the capacity of the ministry for gathering, analyzing, and disseminating information needs to be developed before the convention can be ratified. Other conventions include:

- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, Washington 1973)

- Convention on the Conservation of Migratory species of Wild Animals (Bonn Convention, 1979)

- Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, 1979)

D. International Biodiversity Conservation Projects

Various projects, funded through international sources, have been undertaken in Armenia, and underline the global significance of biodiversity conservation. Such projects include:

- A review of *Forest Sector Development*, financed by FAO (1993-1995).

- The *Country Study on Climate Change*, financed by GEF (1997-1999).

- A *Forest Resources Assessment*, funded by the Swedish International Development Agency (1998).

- The *Lake Sevan Action Plan*, funded by the World Bank.

- The *National Environmental Action Plan (NEAP)* includes a review of issues relating to biodiversity conservation and sustainable use of biodiversity, and a number of priority areas for action were identified. The data and priorities identified by the NEAP have been incorporated into the BSAP to ensure the plans are compatible and mutually reinforcing.

The matrix at the end of this section indicates focus areas for current or planned donor-supported projects in Armenia.

The World Bank is currently supporting the development of an Environmental and Natural Resource Management Program, which aims to “establish a coherent framework for sustainable

economic development and mainstreaming of natural resource management into sectoral policies." Outputs from Phase I are:

- Improved environmental laws
- Coherent and effective institutional arrangements for MNP at the central and regional levels
- An operational environmental information center
- National Water Resources Management Board established
- Integrated national land use management plan developed
- Pilot management plans for a) communal water supply in Lake Sevan watershed, b) protected areas, c) forests, d) range and farm soil conservation
- Media-specific public communications programs

EU-TACIS is currently developing a Scope of Work for a regional water management initiative for the Kura River. Details were unavailable at the time of writing.

Matrix of International Environment Projects in Armenia

	Protected Areas	Institutional Strengthening	Awareness Raising	Policy	Wetlands	Forests	Species Conservation	Research/ Monitoring
WB/GEF Env.Prog	X	X	X	X		X		
Tacis EAP			X					
Tacis Kura Basin		X		X	X			X
GEF Agrobiod.			X	X			X	X

SECTION V

Summary of Findings

1. Armenia has made impressive progress in developing an extensive policy framework, based on the NEAP and the BSAP. While the BSAP has developed a comprehensive list of activities, a more effective prioritization and subsequent detailing of several priority projects would be beneficial. Greater attention needs to be paid to integrating biodiversity conservation concerns into sectoral and economic policies, such as privatization.

2. Although some progress has been made in developing a legislative framework for biodiversity conservation, legislation is still based on a rigid and prescriptive Soviet-type model. This model relies heavily on increased enforcement capacity of government agencies, which, given current budgetary priorities and constraints, is probably not realistic. Consideration should be given to moving away from command-and-control mechanisms to incentive-based systems that involve public participation.

3. Environmental awareness and education has improved in recent years, primarily due to the efforts of environmental NGOs. However, much remains to be done, particularly with respect to biodiversity conservation. This extends from improving the understanding of biodiversity conservation and its importance in economic and social development by decision-makers and politicians, to linking biodiversity conservation to the immediate, day-to-day needs of local populations.

4. During the Soviet period, unplanned and poorly managed development coincided with almost complete disregard for environmental impacts and consequences. The time since Armenia's independence has seen a marked decrease in agricultural and other inputs, as well as industrial decline. This provides an opportunity for more sustainable development that integrates environmental concerns, including biodiversity conservation. Well-planned agriculture, forestry, and water management programs have significant potential to favor improved biodiversity conservation.

5. The "academic" information base on biodiversity is good, but current data on distribution and abundance needs updating for most groups. Detailed information exists on birds, and this can be used as a model. Habitat and ecological community data urgently need updating. Related to this is the need to move from an academic approach to biodiversity conservation to a more development-oriented approach.

6. Coordination, including better definition of roles and responsibilities, information sharing, and streamlining of procedures and operations between government agencies offers significant potential for more effective planning, policy, and monitoring.

7. Government systems remain highly centralized in terms of authorities. Yet significant numbers of regional and local staff exist on the ground, e.g., protected area authorities. However, these people have meager resources, lacking even basic equipment and receiving irregular and

low salaries. Improved support to decentralized authorities, including new partnerships with local groups and communities, needs to be developed.

8. An effective and representative protected area system that includes different management categories is critical to conserving biodiversity. The current system needs a complete overhaul. At the same time, a better understanding is needed of the pressures on protected areas, and management plans need to be developed that address these pressures.

9. Environmental NGOs are very active in Armenia and have an important role to play. In terms of biodiversity conservation, they should be supporting efforts to increase awareness and education, advocacy and lobbying, information gathering and sharing, and developing on-ground initiatives supporting community-based organizations (CBOs), local communities, and others. NGOs will have different capacities and interests in these areas.

10. Much of the discussion and activity related to biodiversity conservation has focused on broad frameworks for action, has been government driven (with input and support from NGOs and donors), and mostly confined to the capital. There is an urgent need to move this process "downward" to involve local authorities, communities, and CBOs in dialogue, and to develop local initiatives that can demonstrate success and inform the ongoing policy discussion.

11. Armenia has much to learn, as well as to offer, regarding biodiversity conservation in the Caucasus. Relationships exist with Georgia in terms of information sharing and regional cooperation. Because biodiversity conservation is a transboundary issue and because it is politically less sensitive than other sectors, efforts need to be encouraged for greater regional cooperation with Azerbaijan. There are many lessons to be learned by all three countries.

12. The private sector has had a very limited role in biodiversity conservation in Armenia. Opportunities for private sector involvement in biodiversity conservation include ecotourism development, sustainable forest management initiatives, hunting reserves, and protected area management.

SECTION VI

Recommendations for Improved Biodiversity Conservation

The following recommendations have been developed from existing studies and documentation, notably the NEAP and BSAP (see Annex H, Opportunities and Constraints for Biodiversity Conservation), and are consistent with recommendations from these processes. They represent a shorter and more focused set of recommendations based on the findings of the present study, as well meetings and interviews carried out during the study.

1. Review, analyze, propose, and develop revised protected area system, including forest reserves, for representativeness, effectiveness, and management regimes.

The current protected area network should be reviewed to:

- Assess the status of individual protected areas, because some have been severely degraded; boundaries may need to be revised to reflect the distribution of original natural ecosystems

- Assess the appropriateness and effectiveness of current management categories in protecting the reserves and propose alternative management categories that may increase effectiveness, e.g., through the provision of incentives for community involvement

- Review the extent to which the variety of different ecosystems and species is represented in the current protected area system and propose changes to the network to ensure improved representativeness

- Review the protected areas network within a broader landscape framework that links areas under different land use and management regimes, such as forest lands, and identifies pressures and threats, to develop a more holistic and integrated approach to biodiversity conservation

2. Identify status and develop management guidelines for fragile or vulnerable habitats, and incorporate into EIA legislation

Armenia, like many other former Soviet Union countries, has been slow to reorient its approach from one based on individual species conservation to one that focuses on protecting habitats. Funding has been provided to update the Armenia Red Data Book, which details the status and threats of endangered species, but perhaps more urgent and useful is the proposed “Green Book,” which identifies habitats on which those species depend. Identification and distribution of fragile and vulnerable habitats, such as alpine meadows and wetlands, should be the first step in developing management guidelines for the conservation and sustainable use of such areas. This

should then be incorporated into environmental guidelines and legislation concerning different types of planned investment projects potentially affecting these habitats.

3. Develop pilot initiatives in community-based natural resource management and biodiversity conservation, e.g., for forestry, grazing, wetlands, and tourism

Although the development of environmental programs and action plans provide an important framework for investment in the sector, very little exists in the way of local biodiversity conservation initiatives that can inform the policy and planning process. Examples of innovative approaches need to be developed that promote the sustainability of natural resource management and biodiversity conservation on the ground. Given the harshness of the current economic situation, local communities and other stakeholder groups will need incentives to better manage their resources. Management plans that clearly detail the rights, responsibilities, and benefits to local groups should be developed for improved management. In the absence of such incentives, it is clear that natural resources will continue to be depleted in an unsustainable fashion. Community-based management of forests, grazing lands, and wetlands should be encouraged on a pilot basis, and carefully monitored for sustainability. Opportunities for community involvement in protected area management, for example, through ecotourism development and biodiversity monitoring, should be encouraged.

4. Develop and build on mechanisms to bring together government, donors, academic, and NGO groups for awareness raising, information sharing, and coordination of activities

There is confusion regarding the most appropriate and effective roles for government agencies at both the national and local levels, academic institutions, and NGOs. For biodiversity conservation to be effective, the comparative advantages and roles of these groups and how they interact with communities and the public at large need to be understood, internalized, and developed. A good basis exists for coordination and communication, but this still needs to be improved, and capacity building efforts need to be appropriately targeted. It is important that scarce resources be used optimally.

5. Support NGOs in awareness raising and local initiatives

Environmental NGOs in Armenia have the potential to be powerful agents of change. A substantial number of NGOs are already active in awareness raising, education, advocacy, and lobbying, often in the face of very limited resources. Efforts to develop organizational capacity need to continue and paired with building technical and implementation capabilities. Awareness raising and environmental education are areas where NGOs can be especially effective. But there is also a need to work with local communities to support field-based conservation initiatives (see No. 3 above). Training, skills transfer, small grants, and partnerships with regional and international NGOs can significantly increase the ability of Armenian NGOs to be effective local development partners. Participatory monitoring of capacity building efforts is another important focus.

6. Develop monitoring systems and capacity for biodiversity conservation

Data gathering on biodiversity has been sporadic and monitoring systems for biodiversity conservation are not in place. The BSAP proposes a monitoring unit be set up in the Ministry of Nature Protection, but concern has been expressed about the objectivity of a system set up in the ministry as well as concerns about access to information. These concerns may be allayed by ratification of the Aarhus Convention on Access to Information, Public Participation, Decision-Making and Access to Justice in Environmental Matters, and by involving different stakeholder groups in developing and utilizing monitoring systems. It is important that monitoring systems not be based simply on inventories of species and habitats, but are also linked to planning and implementation initiatives, especially on the ground.

7. Promote regional collaboration, through information sharing, exchange visits, study tours, conferences, and transboundary initiatives

Broadly speaking, Armenia's progress in biodiversity conservation exceeds that of Azerbaijan, but lags behind that of Georgia. Lessons and experiences shared among these three countries, which together represent many of the biological resources unique to the Transcaucasus region, have the potential to significantly improve capacity in the region, as well as to promote broader cooperation. Armenia can benefit from the experience of Georgian organizations, particularly NGOs, in information sharing, community-based initiatives, and policy development. Georgia is the only one of the three countries with representation of international conservation NGOs (World Wildlife Fund [WWF]) and with experience implementing a major donor-funded biodiversity project (the World Bank-supported Protected Area Development). Several organizations with "Caucasus" programs have offices in Georgia, which, while causing occasional resentment, has generally led to increased cooperation. The proposed Regional Environmental Center in Tbilisi has the potential to be an important institution in this respect.

SECTION VII

USAID Programs

A. Impact of USAID Program on Biodiversity

The USAID program in Armenia does not currently include an environmental Strategic Objective, nor a direct focus on environment issues. However, environmental issues are indirectly addressed through activities related to public awareness and advocacy, and NGO strengthening, because these are areas in which environmental organizations are relatively prominent. Specifically, USAID supports the Environmental Policy and Advocacy Center (EPAC) in promoting awareness, coordination, advocacy, and access to justice in the environmental field, including biodiversity conservation. The center provides legal advice and has contributed to the development of legislation on wild plants and animals that is currently before Parliament. In addition, it has established a regular roundtable activity bringing together NGOs, government organizations, and other stakeholders to discuss environmental issues and coordination. The other principal activity supporting the environment is NGO strengthening through the NGO Center. Many of the most active Armenian NGOs are to be found in the environmental sector, and have benefited from the NGO Center's training, awareness, and small grants programs.

A potential area of concern for biodiversity relates to the land privatization process. The focus is currently on urban and agricultural lands, but it appears that environmental considerations have not been integrated into the process. As privatization continues, more vulnerable lands such as forests and wetlands risk being affected unless clear land use guidelines are incorporated into the process. While privatization of agricultural lands is supposedly focused on cultivated areas, in fact, more than 60 percent of hay meadows have been privatized and pasturelands leased, leading to severe overgrazing.

At the time of this assessment, a concept paper was presented to the Mission by an environmental team from USAID/W, proposing a more strategic focus on the water sector. This follows from an environmental assessment of the Mission's program carried out in 1998. The concept paper highlights issues of overexploitation in the Lake Sevan watershed, waterlogging and salinization in the Ararat valley, and management of transboundary waters, notably the Kura and Araks rivers. It proposes a regional Caucasus water resources management and policy initiative to include sustainable natural resources management (including forests and wetlands) and biodiversity conservation.

B. Recommendations for USAID/Armenia

The following recommendations stem from the USAID/Armenia three-year Strategic Plan and meetings with USAID/Armenia staff. It is proposed that environmental activities be integrated into the plan (including the recommendations of the environmental concept paper) and build on existing or proposed activities. Recommendations made here are low cost with potentially relatively high impact and provide opportunities to leverage other funds, e.g., from World Bank- and EU-TACIS-supported programs.

1. *Strengthen support and opportunities for environmental NGOs.* This could build on support currently provided through the NGO Center in organizational development to focus more on technical support to environmental NGOs to build capacity and develop local natural resource management and biodiversity initiatives. The current project is scheduled to end in early 2000. The capacity of environmental NGOs has been significantly strengthened by the project, and several NGOs may be ready to develop larger initiatives. The small grants program should include larger grants to give some NGOs the opportunity to develop environmental initiatives. This may require a more detailed technical focus, including technical assistance, training, and support. This kind of support is not readily available under the current USAID program, but could be provided through an international conservation NGO or a combination of NGOs that provide civil society strengthening and technical conservation expertise. This will provide an opportunity to support pilot community-based natural resource management and biodiversity conservation initiatives. Partnerships between international conservation NGOs and Armenian environmental organizations offer one option to build capacity and incorporate best practices from elsewhere. The restoration of Lake Gilli, at the southern end of Lake Sevan, currently being developed by an Armenian NGO through a GEF PDF grant, could be co-financed (see box at right). The project has the dual benefit of biodiversity conservation and improved water quality through wetland filtering. Other similar, though smaller, initiatives can be supported around Lake Sevan, building on the willingness of certain communities and groups to address environmental and health issues. This supports the recommendations of the recent environmental concept paper developed for the Mission.

   Restoration of Lake Gilli

   Lake Gilli, located in the southeast corner of Lake Sevan, was formerly an important wetland complex supporting many rare and endangered wetland species, including breeding waterfowl and migratory bird species. In 1960, the area was drained for agricultural land by redirecting the Masrik river that fed into it. However, the soil turned out to be very poor and unsuitable for agriculture, and the land has remained unused. Local populations that formerly obtained benefits from the wetland have called for Lake Gilli's restoration, and have offered their own labor to contribute to the project. Restoration of the lake and the participatory development of a management plan was highlighted in the Armenia BSAP and is the subject of a GEF PDF-A proposal from the Government of Armenia, in conjunction with an Armenian NGO, Khazer. Co-financing is being sought to support this initiative, which also has important implications for improving water quality and supply for local populations.

   Other areas for community-based initiatives include sustainable forest management, protected area management, including ecotourism development, community grazing initiatives, and restoration of degraded lands.

2. *Complement the environmental legal, advocacy, and awareness goals currently supported through EPAC, with technical environmental support in environmental awareness and education.* EPAC is widely respected in Armenia and has made a significant contribution to environmental awareness. Staff are mostly lawyers. The environmental goals of the activity could be significantly advanced by the provision of increased technical support and training in the environment.

3. *Support the study, development, and promotion of environmental guidelines in the land and resource privatization process.*

4. *Review and analyze the options for supporting information gathering, dissemination, and monitoring systems that benefit all stakeholder groups.* This is an important area and a more detailed review of options is needed, including the appropriateness and feasibility of the proposed system for MNP. Good capability currently exists at the American University of Armenia, supported by USAID, and this could be an independent starting point for such an activity, which offers the opportunity for leveraging other funds. While the development of a comprehensive environmental monitoring system is beyond the scope of USAID/Armenia's program, limited input and analysis can have a strategic impact on the development of transparent, accountable, and accurate systems.

5. *Share information with other donors and organizations supporting environment in Armenia.* The MNP's International Relations Department has highlighted the need for such nformation sharing. USAID has an opportunity to propose and participate in a regular (e.g., three per month) donor meeting with MNP to discuss and harmonize existing and upcoming environmental activities. This will ensure that proposed USAID interventions complement (and potentially leverage) other donor programs, notably the World Bank-supported Environmental Program. It also offers the opportunity for USAID to promote and participate in a policy dialogue process, a position that will be further strengthened in the event that a regional water initiative is approved.

6. *Promote regional cooperation through information sharing, exchange visits, conferences, joint studies, partnerships, and perhaps transboundary projects (e.g., within the context of Kura basin initiative).* Environment is an area that presents significant opportunities for cooperation between Armenia and the neighboring states of Georgia, Azerbaijan, and Turkey because there are many shared resources and it is politically less sensitive than other sectors. Armenia and Azerbaijan have already agreed to discuss water issues, notably in the context of downstream pollution of the Kura and Araks rivers. Watershed protection, including sustainable forest management, wetland protection, and biodiversity conservation, is an important element of improved water supply and quality and can be supported in the context of a broader, multidonor initiative. This activity has already been proposed in the recent environmental concept paper presented to the Mission, and opportunities should be pursued to incorporate and promote biodiversity conservation as an integral component of a regional water initiative, through policy and stakeholder discussions, awareness raising, and community-based, multiple-use natural resource management activities. One area of particular importance relates to wetlands throughout the Caucasus, which are extremely important for biodiversity conservation and in a very threatened state. USAID could usefully support an analysis of wetland distribution, management and importance in the region, with a goal of identifying key areas of focus for future activities (either through USAID or other donors). In addition, information sharing and environmental education cooperation offers a low-cost option for increasing awareness and promoting environmental initiatives, both nationally and regionally, based on the experiences of the different countries. The Caucasus Environmental NGO Network is one example of regional information sharing among NGOs. The role of the proposed REC also needs to be reviewed in this context.

ANNEX A

Sections 117 and 119 of the Foreign Assistance Act

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ANNEX B

Scope of Work

Country Biodiversity Assessments

Azerbaijan, Armenia, and Georgia

I. Objective

To conduct a country-wide assessment of biodiversity resources and their status for the purposes of complying with USAID Environmental Procedures described in Title 22 CFR, Section 216.

II. Background

A. Policies Governing Environmental Procedures

The Foreign Assistance Act (FAA) of 1961, Sec. 498C states that funds made available for assistance to the New Independent States (NIS) shall be subject to the provisions of Section 117 relating to Environment and Natural Resources (FAA Sec. 498C, footnote e). Section 117 requires that the President take fully into account the impact of foreign assistance programs and projects on environment and natural resources (Sec 117(c)(1)). Current USAID Legislation which guides environmental impact and monitoring is Title 22 of the Code of Federal Regulations, Part 216 ("Reg. 216"). In complying with the law, USAID provides its Environmental Procedures under ADS 204.5 to ensure accordance with the requirements of Title 22 CFR 216.

Section 119 of the FAA relates to Endangered Species. It states that "the preservation of animal and plant species through the regulation of the hunting and trade in endangered species, through limitations on the pollution of natural ecosystems and through the protection of wildlife habitats should be an important objective of the United States development assistance (FAA, Sec. 119 (a))." Furthermore it states that "Each country development strategy statement or other country plan prepared by the Agency for International Development shall include an analysis of (1) the actions necessary in that country to conserve biological diversity and (2) the extent to which the actions proposed for support by the Agency meet the needs thus identified(FAA, Sec. 119(d)."

In order for USAID Missions to be in compliance with the above, and in order to USAID Missions to effectively determine impact on natural resources and endangered species and incorporate mitigation measures in their programs, a biodiversity assessment is needed to inform Mission planning. The purpose of this Task Order is to provide USAID/ENI Missions in Azerbaijan, Armenia and Georgia with this critical information.

B. Overview on USAID programs in the Caucasus

Congress has created a $250 million "Southern Caucasus" earmark for FY 1988- up from $143 million in FY 1997. **Armenia** is a strategically important republic in the Caucasus which is in the early stages of a transition to achieve a democratic market-oriented economy. It was the first

former Soviet Republic to register real economic growth in 1994. Between 1992-1996, USAID primarily focused its resources on humanitarian assistance which will still be required, but at diminishing levels. Greater emphasis will now be directed to the restructuring of the energy and financial sectors; creating a legal, regulatory and policy framework for broad-based competition and economic growth; and promoting a democratic transition through better-informed citizen participation in political and economic decision-making. USAID and other USG support to **Azerbaijan** is severely restricted at this time due to political issues related to offensive use of force against Armenia and Nagrno-Karabakh. USAID provides humanitarian assistance that is channeled through international organizations and limited training to private citizens, including to farmers and agribusiness entrepreneurs in areas such as agricultural marketing. Since 1992, USAID's program in **Georgia**, has been primarily in the form of emergency humanitarian assistance. USAID has been the largest bilateral donor, providing more than half of the country's emergency needs. USAID is gradually shifting its emphasis toward economic and social sector restructuring and democratization to meet the changing nature of the development challenge there. USAID is establishing two finance programs intended to support private sector development and growth. USAID also has a program to support the restructuring and organization of corporate enterprises in the electric power and oil and gas subsectors, including legislative and regulatory reform, and aims to mobilize private/public financing for selected energy projects to rehabilitate energy infrastructure.

III. Statement of Work

The Contractor shall perform the following activities:

A) Hold meetings with the Bureau Environmental Officer (BEO)of USAID's ENI Bureau in Washington, to ensure full understanding of ENI's program in the Caucuses, USAID Environmental Procedures and purpose of this assignment. This would include policy decisions and approaches which the BEO and Agency Environmental Advisor are taking as per their authority under Reg. 216, which may not be explicit in general legal documentation.

B) Field a team to conduct an overview and general analysis of each country's biodiversity and its current status. The documentation should include descriptions of:

- Major ecosystem types highlighting important, unique aspects of the country's biodiversity, including important endemic species and their habitats.

- Natural areas of particular importance to biodiversity conservation, such as key wetlands, remaining old-growth forests or coastal areas critical for species reproduction, feeding or migration, if relevant.

- Plant and animal species which are endangered or threatened with extinction. Endangered species of particular social, economic or environmental importance should be highlighted and described, as should their habitats. An updated list, such as the IUCN red list should be included as an annex.

- Current and potential future threats to biodiversity including a general assessment of overall health of ecosystems and major factors affecting ecosystem health such as land use, pests, and/or contamination, etc. or major institutional or policy failures or transboundary issues as appropriate.

- Conservation efforts including national policies and strategies, the status of financing for conservation, the status of country participation in major international treaties, the country's protected area system, and botanical gardens/gene banks (if relevant) and their status, and monitoring systems. This section should also include recent, current and planned activities by donor organizations which support biodiversity conservation, an identification of NGO's, universities and other local organizations involved in conservation, and a general description of responsible government agencies. A general assessment of the effectiveness of these policies, institutions and activities to achieve biodiversity conservation should be included. Priority conservation needs which lack donor or local support should be highlighted.

- USAID's program in general and, if relevant, 1) any perceived potential areas of concern related to biodiversity impacts with current or planned program activities, or 2) any potential opportunities for USAID to support biodiversity conservation consistent with Mission program objectives.

C) For each country specified, prepare a report, which incorporates the points above, on the status of biodiversity and conservation efforts and implications for USAID programming and environmental monitoring to ensure compliance with 22 CFR 216.

IV. Methodology

The contractor shall field a two-person team for this assignment. One team member should be a biodiversity specialist with international, regional or in country experience. The second team member should be a natural resources institutional/policy specialist with international or in-country experience. The team leader may have either of these specialties; however, the team leader should be a senior-level professional with USAID experience with significant experience in international conservation programs and environmental impact assessments. Experience in the region or country is preferred. The second team member should be a mid-level or qualified junior level professional. USAID/ENI encourages the use of local professionals for the second team member as appropriate for this assignment.

V. Deliverables

The primary deliverable under this task order is a report for each of the three countries, addressing the points specified in the statement of work, not to exceed 30 pages, excluding annexes. Each report will contain at a minimum one map which provides a broad picture of key ecosystems, habitats and protected areas, one annex containing IUCN lists for endangered and threatened species, and one annex containing Sections 117 and 119 of the Foreign Assistance Act.

The second set of deliverables are in-country Mission exit briefings.

Two hard copies and one electronic copy in Word format of this assessment shall be provided to the USAID Mission in each country as well as to the ENI Bureau Environmental Officer.

VI. Reporting Requirements

The Contractor shall report to the Bureau Environmental Officer in Washington for this overall assignment. While in each country, the contractor shall report to the Mission Environmental Officer or his/her designee.

ANNEX C

List of Contacts

Name	Occupation
Barry Primm	Director, Office of Economic Restructuring and Energy, USAID/Armenia
Benjamin Allen	Rule of Law Advisor, USAID/Armenia
Michael Boyd	Senior Energy Policy Advisor, USAID/Armenia
Carl Maxwell	Natural Resources Officer, USAID/ENI/ENR
Alexandra Burke	Environmental Specialist, USAID/ENI/ENR
Simon Papyan	First Deputy Minister, Ministry of Nature Protection
Samvel Baloyan	Deputy Minister, Ministry of Nature Protection
Sergey Shashikya	Head, Department of Bioresources Conservation, Ministry of Nature Protection
Nuneh Darbinyan	Head, Department of International Cooperation, Ministry of Nature Protection
Aram Gabrielian	Head, Department of Atmosphere Protection, Ministry of Nature Protection; President, NGO "Khazer"
Robert Petrosyan	Deputy Head, Department of Forestry, Ministry of Nature Protection
Hosnic Kirakosyan	Project Coordinator, Integrated Water Resources Management Plan, Ministry of Nature Protection
Tigran Yeghyan	Deputy Project Coordinator, Integrated Water resources Management Plan, Ministry of Nature Protection
Erik Zigterman	Advisor, IWACO/Ministry of Nature Protection
Jan Timmerman	Team Leader, IWACO/Ministry of Nature Protection
Arusyak Alaverdyan	Operations Officer, The World Bank
Anahit Simonian	Programme Officer, UNDP
Paul Tibbs	Team Leader, TACIS Coordination Unit
Nazely Vardanyan	Coordinator, TACIS Environmental Awareness Raising Program
Aram Saghatelyan	Director, Center for Ecological-Noosphere Studies, National Academy of Sciences
Zhirair Vardanian	Vice Director, Institute of Botany, National Academy of Sciences
Ashot Asatryan	Deputy Director, Institute of Zoology, National Academy of Sciences
Charles Dunlap	Director, Environmental Research and Management Center, American University of Armenia
Martin Adamian	Team Leader, Birds of Armenia Project, American University of Armenia
Vardan Hovanesyan	President, Bars-Media, Association of UNESCO Clubs
Aida Iskoyan	President, Environmental Public Advocacy Center
Janet Katz	Environmental Public Advocacy Center
Hakob Sanasaryan	President, Greens' Union of Armenia
Zhana Galyan	President, Armenian Ecotourism Association
Nuneh Doudoyan	Director, NGO Training and Resource Center

Name	Occupation
Narine Karamyan	NGO Sustainable Development
Mihran Bareghyan	NGO Sustainable Development
Anna Hovanesyan	Coordinator, Caucasus Environmental NGO Network

ANNEX D

Endangered Species in Armenia

Table 1. List of Endangered Birds of Armenia
(from Red Data Book of Armenia (1988) and IUCN Red List of Animals (1996)

Common Name	Scientific Name	ARDB	IUCN
White Pelican	*Pelecanus onocrotalus*	+, U	
Dalmatian Pelican	*Pelecanus crispus*	+, U	VU
Eurasian Spoonbill	*Platalea leucorodia*	+	
Pygmy Cormorant	*Phalacrocorax pygmaeus*	+	Lr/nt
Great Cormorant	*Phalacrocorax carbo*	+	
Mute Swan	*Cygnus olor*	+	
Whooper Swan	*Cygnus cygnus*	+	
Greylag Goose	*Anser anser*	+	
Shelduck	*Tadorna tadorna*	+	
Gadwall	*Anas strepera*	+	
Shoveler	*Anas clypeata*	+	
Common Scoter	*Melanita nigra*	+	
Ferruginous Duck	*Aythya nyroca*		VU
Marbled Teal	*Marmaronetta angustirostris*	+, U	VU
White-headed Duck	*Oxyura leucocephala*		VU
Great Egret	*Ardea alba*	+	
Osprey	*Pandion haliaetus*	+, U	
Red Kite	*Milvus milvus*	+	
White-tailed Eagle	*Haliaeetus albicilla*	+, U	Lr/nt
Lammergeier	*Gypaetus barbatus*	+, U	
Eurasian Griffon Vulture	*Gyps fulvus*	+	
Black (Monk) Vulture	*Aegypius monachus*	+	Lr/nt
Short-toed Eagle	*Circaetus gallicus*	+, U	
Hen Harrier	*Circus cyaneus*	+	
Pallid Harrier	*Circus macrourus*	+	Lr/nt
Montagu's Harrier	*Circus pygargus*	+	
Levant Sparrowhawk	*Accipiter brevipes*	+	
Imperial Eagle	*Aquila heliaca*	+, U	VU
Steppe Eagle	*Aquila rapax*	+, U	
Golden Eagle	*Aquila chrysaetos*	+, U	
Saker Falcon	*Falco cherrug*	+, U	

Common Name	Scientific Name	ARDB	IUCN
Peregrine Falcon	*Falco peregrinus*	+, U	
Lesser Kestrel	*Falco naumanni*		VU
Red-footed Falcon	*Falco vespertinus*	+	
Merlin	*Falco columbaris*	+	
Lanner	*Falco biarmicus*	+	
Caucasian Black Grouse	*Tetrao mlokosiwiczi*	+, U	Lr/nt
Caspian Snowcock	*Tetraogallus caspius*	+, U	
Oystercatcher	*Haematopus ostralegus*	+	
Sociable Plover	*Chettusia gregaria*	+, U	
Black-winged Stilt	*Himantopus himantopus*	+	
Avocet	*Recurvirostra avosetta*	+	
Armenian Gull	*Larus (argentatus) armenicus*	+	
Corncrake	*Crex crex*		VU
Great Bustard	*Otis tarda*		VU
Little Bustard	*Tetrax tetrax*	+, U	Lr/nt
Boreal (Tengmalm's) Owl	*Aegolius funerus*	+	
Blue-cheeked Bee-eater	*Merops persicus*	+	
Black Woodpecker	*Dryocopus martius*	+	
Woodchat Shrike	*Lanius senator*	+	
White-throated Robin	*Irania gutturalis*	+	
Bluethroat	*Luscinia svecica*	+	
Red-tailed Wheatear	*Oenanthe xanthopryna*	+	
Finsch's Wheatear	*Oenanthe finchii*	+	
Rock Thrush	*Monticola saxatillis*	+	
Blue Rock Thrush	*Monticolla solitarius*	+	
Orphean Warbler	*Sylvia hortensis*	+	
Menetries Warbler	*Sylvia mystacea*	+	
Penduline Tit	*Remiz pendulinus*	+	
Sombre Tit	*Parus lugubris*	+	
Rock Nuthatch	*Sitta tephronata*	+	
Wallcreeper	*Tichodroma muraria*	+	
Grey-necked Bunting	*Emberiza buchnami*	+	
Trumpeter Finch	*Rhodopechys gitadineus*	+	
Pale Rock Sparrow	*Carpospiza petronia*	+	
Snowfinch	*Montifringilla nivalis*	+	
Alpine Chough	*Pyrrhocorax graculus*	+	
Raven	*Corvus corax*	+	

Table 2. List of Endangered Mammals of Armenia
(ARDB – Armenian Red Data Book; U – Red Data Book of USSR)

Common Name	Scientific Name	ARDB	IUCN
Long-Eared Hedgehog	*Hemiechinus auritus*	+	
Mediterranean Horseshoe Bat	*Rhinolophus euryale*	+, U	VU
Greater Horseshoe Bat	*Rhinolophus ferrumequinum*		Lr/cd
Lesser Horseshoe Bat	*Rhinolophus hipposideros*		VU
Mehely's Horseshoe Bat	*Rhinolophus mehelyi*	+	VU
Eastern Babastelle	*Barbastella leucomellas*	+	
Western Barbastelle	*Barbastella barbastellus*		VU
Natterer's Bat	*Myotis nattereri*	+	
Geoffroy's Bat	*Myotis emarginatus*		VU
Lesser Noctule	*Nyctalus leiseri*		Lr/nt
European Free-Tailed Bat	*Tadarida teniotis*	+, U	
Schreiber's Long-Fingered Bat	*Miniopterus schreibersi*	+, U	Lr/nt
Striped Hyaena	*Hyaena hyaena*	+, U	
Brown Bear	*Ursus arctos syriacus*	+, U	
Leopard	*Felis pardus tullianus*	+, U	
Wild Cat	*Felis silvestris caucasica*	+	
Red Manul	*Felis manul*	+, U	Lr/nt
Marbled Polecat	*Vormela peregusna*	+, U	
European Otter	*Lutra lutrameridionalis*	+, U	
Wild Goat	*Capra aegagrus aegagrus*	+, U	VU
Armenian Mouflon	*Ovis orientalis gmelinii*	+	VU
Caucasian birch mouse	*Sicista caucasica*	+	
Snow Vole	*Chionomys nivalis*		Lr/nt
Midday gerbil	*Meriones meridianus*	+	

Table 3. List of Endangered Reptiles and Amphibians of Armenia
ARDB – Armenian Red Data Book (U – Red Data Book of USSR)

Reptiles	ARDB	IUCN	Amphibians	ARDB	IUCN
Testudo graeca	+, U	VU	*Pelobates syriacus*	+, U	
Emys orbicularis		Lr/nt	*Hyla arborea*		Lr/nt
Phrynocephalus persicus	+, U				
Eremias arguta	+				
Eumeces schneideri	+				
Mabuya aruata	+				
Ablefarus chernovi	+, U				
Lacerta parva	+, U				
Elaphe hohenackeri	+, U				
Phyncolamus melanocephalus	+, U				
Telescopus fallax	+				
Vipera raddei	+, U				

ANNEX E

Armenia Maps

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ANNEX F

Prioritized Action Program of NEAP Biodiversity Working Group (1997)

A set of recommended actions is presented below to address the most urgent issues and problems of biodiversity conservation in Armenia. Objectives and actions are listed in order of priority.

Objective 1. Improve Legal and Institutional Framework For the Conservation and Management of Biodiversity and Natural Resources

Increased commitment of funding and resources to biodiversity conservation will only be effective to the extent that responsible institutions have the capacity to act effectively. Current efforts to conserve biodiversity are restricted by policies, legislation and institutional weaknesses. The NEAP Biodiversity Working Group wishes therefore to underline that all objectives outlined in the present Action Plan can only be attained through an integrated programme of institutional, legal and policy reforms, coupled with increased investments. The following actions are therefore listed as priority no.1 of the present plan.

1.1 Institutional Framework

A thorough review is needed of the management capabilities, personnel and financial resources available at the principal institution charged with managing biological resources (MNP). The review should deal with such issues as: overall budgets; personnel numbers and division into technical and administrative staff; number and size of areas under the responsibility of different MNP functional divisions (including Hayantar); general assessment of performance; constraints and limiting factors (e.g. recruitment procedures, etc.) and recommendations for overcoming constraints, e.g. improved training, revised mandates, redistribution of manpower and resources.

Actions

- An *ad hoc* task force should be set up to review the current institutional framework of biodiversity and natural resources and conservation, with particular focus on:

    - Internal organisation of MNP functional divisions, clarifying the roles and responsibilities of MNP and Hayantar.
    - Management and administration of Protected Areas
    - Improvement of MNP overall coordination and planning capacity
    - Creation of new functional divisions, such as public awareness and environmental education, legal, and health issues.
    - Mechanisms for coordination with other relevant ministries
    - Review and adjust the roles, organisation and reporting mechanisms of relevant functional divisions and field offices of MNP for better coordination of field programmes.

1.2 Legal Framework

A review is needed of all existing legislation relevant conservation of biodiversity with a view to reform and more effective implementation. All national laws and regulations relating to biodiversity should be based on sound ecological principles.

Actions

- Review existing legislation on the conservation and management of biodiversity (Flora and Fauna Laws are already close to completion, while the Forest Act, the law on protected area and the hunting law would require revision), and suggest amendments if required. Focus should be on ensuring protection to important species and habitats outside protected areas.

- Prepare all necessary by-laws, normative acts and regulations, which are instrumental for effective law implementation. The role and functions of local authorities should also be taken into consideration, and measures for law implementation at local level should be developed.

- Ensure that all necessary mechanisms for effective law implementation and enforcement are set-up, i.e. clear lines of responsibility, a legal department of MNP, administrative structures at central and local level, etc.

- Ensure that regulations under the new laws on flora and fauna provide a framework for controlling exploitation and stress conservation of biological resources.

Objective 2. Increase Conservation and Environmental Awareness At All Levels of Armenian Society

The support and collaboration of all the people of Armenia will be essential to conserve biodiversity and foster the sustainable management of natural resources. Current efforts of relevant government institutions, NGOs and committed individuals to raise the public awareness on conservation and environmental issues is severely constrained by the lack of financial resources and adequate support materials.

It is recognised that, in order to reach effectively all levels of society, and throughout all Armenia, MOE will have to rely largely on the initiative of NGOs at local level. Several NGOs have shown interest in developing environmental education and awareness programmes, albeit limited by available funds. The approach suggested is two-fold, and it aims at (a) strengthening the MNP coordination and support capacity for the development of awareness programmes, and (b) direct support and capacity building for relevant NGOs.

Actions

- Design and implement a capacity building programme on Environmental Awareness (EA) and environmental Education (EE) for relevant MNP sections and NGOs. The principal objectives of the programme should include:

  - Upgrading the capacity of NGOs to develop and implement EA and EE programmes, targeting all levels of society, with emphasis on teachers, school children, and university students.
  - Upgrading the capacity of MNP to coordinate and provide technical support to NGOs, for the development and implementation of EE and EA activities at national and local level.

- Investigate the feasibility of creating a national environmental education centre for the training of government and non-government professionals working in environment and protected areas.

Provide adequate financial resources for (a) the translation of relevant publications and other support material for environmental education and awareness, and (b) the production of new specific material for Armenia (i.e. books, videos, CDs, posters, TV programs, etc.)

Objective 3. Upgrade National Capacity for Biodiversity Conservation and Ecological Monitoring

Information currently available on the status of species and habitats in Armenia is largely out of date. Red books on endangered species, and reports on the status of the environment are not an adequate base for MNP decisions, nor for the implementation of environmental law.

A comprehensive review and update of information available on the conservation status of endangered species and important habitats is thus urgently required. This information base will be instrumental for the development of appropriate conservation policies and regulations by MNP in the future.

The approach suggested entails two principal lines of action: (a) the set-up of a national centre for biodiversity and natural resources data management within MNP, and (b) the design and implementation of national surveys to update the information base on biodiversity, and train a new generation of conservation professionals and researchers.

3.1 Upgrade information management capacity of MNP

The proposed establishment of an Ecological Monitoring Unit (EMU) within the MNP aims at providing and adequate framework for information management. The EMU should oversee the set-up of a national ecological monitoring system, which should build upon existing infrastructure and network of field stations, which require substantial upgrading and renovation. The creation of a central EMU is suggested in full agreement with other technical working groups of the NEAP.

Action

- Create a central Ecological Monitoring Unit within MNP (as suggested by UNEP-GRID 1996), whose main functions could include, but not be limited to:

  - Design and implement a national long-term ecological monitoring programme, building upon the existing permanent network of monitoring stations, and in coordination with existing protected areas.

- Natural resources, ecological and biodiversity data storage and management through computer databases and associated GIS.
- Assist in the design and implementation of the national biodiversity survey (see following paragraph), and supervise subsequent data management.
- Publishing a State of the Environment Report at regular intervals.

3.2 Updating the Information Base on Biodiversity

The design and implementation of biodiversity surveys on a national scale appears as a necessary process in order to generate an adequate information base for government decision-making and policy development.

Proposed activities are closely connected with the set-up of the proposed new Ecological Monitoring Unit (EMU) of MNP (see previous paragraph). All proposed actions envisage collaboration between relevant departments of the Armenian National Academy of Science (NAS), Yerevan State University (YSU), the MNP, and other relevant institutions. The role of newly created EMU of MOE would be to coordinate and facilitate the design and implementation of national surveys, and manage the resulting data.

The NAS and YSU could also maximise benefits from proposed activities by providing extensive training opportunities, for university graduates, on field survey techniques and computer database management.

Actions

- Update existing information on biodiversity in Armenia by assessing the present status and distribution of key species of flora and fauna. Define past population changes and suggest future trends.

- Assess the present status and expected trends of main natural habitats found in Armenia, and suggest measures for their effective conservation.

- Re-define the conservation status of known rare, endemic and threatened species.

- Review and update the Red Books of Flora and Fauna, ensuring full consistency with international standards (scientific nomenclature and conservation categories).

Objective 4. Upgrade Protected Area Network

Most Armenian protected areas, some of which are of high international conservation importance, are currently in a critical situation. Action is urgently required to prevent irreversible degradation of key sites, and to address some of the main problems identified during the preparation of the present report, such as the loss of natural habitats and drainage of important wetlands. The network of protected areas requires a comprehensive review in order to balance the current bias in favour of forest habitats. Many sites that have long been gazetted as state reservations require further lagislative and administrative measures for their actual set-up on the ground. In order to achieve this objective, a two-fold approach is suggested, entailing (a) a comprehensive review of the

national system of protected areas, and (b) immediate support to priority sites to prevent irreversible damage to important habitats and species.

4.1 Review the National System of Protected Areas

A comprehensive review of existing categories of protected areas, and a clear definition of management objectives for each category, is a matter of high priority. The concepts of integrated management planning and development of zoning schemes should be introduced, and the status and design of existing reserves should be reviewed accordingly. New categories of protected areas should be defined to preserve sites of high cultural, educational , recreational or aesthetic value.

A significant amount of field work will be required for the identification of further protected areas. However, in some cases, recent authoritative studies exist, which can provide initial guidelines:

> With regard to Armenian avifauna, three priority conservation sites have been identified for protection of migrating and resident water birds: (a) Lake Sevan and the Gilli basin, (b) the Armash reservoirs in the Ararat Valley, and (c) Arpi reservoir in north-western Armenia. Armenia is a signatory to the Ramsar Convention, and has therefore an obligation to ensure the protection of these habitats in the future.
>
> The Lake Sevan Environmental Action Plan includes a specific set of recommendations with regards to the conservation of biological diversity in the lake ecosystems and its watershed basin. Priority sites for the establishment of protected areas have been identified within the wider “National Park” Management area.
>
> Priority areas for the creation of wildlife corridors and new protected areas were tentatively identified during the preparation of the present report, on the basis of consultations with relevant national experts. These include: (a) the creation of a trans-boundary wildlife corridor between Armenia and Georgia, in the Noemberian Region. The corridor would protect forest areas between the Dilijan State Reserve in Armenia and the Borjomi state reserve in Geogia. (b) important portions of the habitat of *Ovis ammon gmelini* are located across the national boundaries between Armenia, Turkey and Nahkhijevan (part of Azerbaijan). When political situation will allow it, these areas should be protected in order to conserve the last significant populations of this important species and its habitat.

Actions

- Assess the present status of existing protected areas. Identify and implement the most urgent specific measures to conserve each site.

- Establish on the ground those State Conservation Areas which have only been created “on paper”, and assign clear management responsibilities for each site.

- Review the existing set of categories of protected areas, and design a new classification system. This new system should ensure that:
  - Protected Areas are classified according to their principal management objectives

- Clear management responsibility is assigned for each PA category
- Important habitats (i.e. among others, migration pathways, wetlands, unique desert habitats, sites where a high concentration of wild relatives of domestic crops is known to occur, etc.) are assigned an adequate degree of protection
- Categories are consistent with international standards

- On the basis of the new system, define a prioritised list of new sites which should be protected. Focus should be on:

  - Balancing the current bias in favour of forest habitats, by protecting other important habitats in all Armenia (i.e. migration pathways, wetlands and unique desert ecosystems).
  - Creating wildlife corridors in critical areas, to ensure the survival of viable populations of species of larger mammals.

- Strengthen the Protected Area management capacity of MNP at central level (see 1.1 and 1.2).

4.2 Provide Support to State Reserves

All existing state reserves are facing significant financial constraints, and the operational capacity of staff on site is severely limited. All existing sites require therefore urgent intervention to ensure regular payment of staff salaries, and to upgrade and maintain infrastructure, equipment and vehicles. A comprehensive training and capacity building programme is required to upgrade management, administration and planning skills of staff at all levels.

Three key sites have been identified as a top priority for intervention. This reflects their international conservation importance, and their training, educational and tourism potential. These sites have also the highest potential for the development of pilot programmes on revenue-generating mechanisms, in collaboration with local communities. They present therefore an optimal combination of factors for the development of model management plans, which may then serve as example and guideline for other protected areas in Armenia.

The situation of Lake Sevan is not discussed in detail in the present report, as a specific Environmental Action Plan for the lake has been developed by MNP, including recommendations for the conservation of its biodiversity.

Actions

- Provide adequate financial resources and essential equipment to all State Reserves, in order to allow the continuation of basic conservation activities.

- Design and implement a comprehensive training and capacity building programme for Protected Area staff at all levels.

- Increase the income-generating capacity of protected areas, through the development of eco-tourism and sustainable use of natural resources.

- Develop mechanisms for sharing benefits deriving from protected areas with local communities.

- Ensure that priority assistance is provided to Erebuni state reserve, in recognition of its global importance for the conservation of wild relatives of domestic crops.

- Concentrate efforts in Khosrov Reserve, which should be developed into a national model Protected Area. This should entail the design of a comprehensive management plan and associated zoning scheme, i.e. including eco-tourism development strategy, intrepretation and visitor management plan, local community involvement strategy and benefit-sharing mechanisms. Khosrov should serve as a national field training and education centre, where state-of-the-art Protected Area management practices are applied.

- Re-design the lay-out and zoning scheme, and review the conservation status of Dilijan State Reserve, to reflect changes in land use occurred since its establishment. Prepare a reserve Management Plan, identifying strict biodiversity conservation and multiple-use (including timber harvesting) areas. The plan should focus on ensuring the conservation of important habitats and species, and on maximising the tourism and educational potential of the site. Areas designed for sustainable timber harvesting should be de-gazetted and assigned to the management of Hayantar.

- Take the necessary steps for the implementation of the Lake Sevan Environmental Action Plan.

Objective 5. Ensure Long-Term Financial Support to *Ex-Situ* Conservation of Plant Genetic Resources

The occurrence of a significant number of species of wild relatives of domestic crops in Armenia represents an invaluable resource for the country. Conservation efforts in this field should therefore be aimed at (a) ensuring the long-term conservation of the genetic resource, and (b) maximising the national research and management capacity in this field, in order to increase the rate of national appropriation of potential economic benefits deriving from these resources in the future.

The establishment of a gene-bank would represent an important integration of *in-situ* conservation efforts, in Reserves such as Erebuni and Khosrov.

Actions

- Create a national agrobiodiversity genebank with the principal objectives of integrating *in-situ* conservation efforts and maximising national know-how in this strategic sector.

- Ensure long-term government financial support to the national genebank, and foster integration with the international plant genetic resources conservation network.

Objective 6. Ensure that Biodiversity Concerns are Incorporated In Agricultural and Rangeland Management Practices

The level of environmental awareness, and particularly the recognition and understanding of the importance and implications of biodiversity conservation, is currently rather limited among MNP and MOA staff at all levels. However relevant divisions of both ministries have shown concern and interest in this subject. A joint effort has therefore been suggested, envisaging (a) provision of specific training to relevant divisions of MNP and MOA, and (b) fostering the incorporation of biodiversity concerns into new regulations, laws and policies developed by MOA and MNP.

Such an effort will be instrumental for the development of an adequate human resource base, within MOA and MNP, which should be capable of join forces for the preparation and implementation of a national Land Use Plan which will adequately incorporate biodiversity concerns. This appears as an effective approach to address the most serious challenges facing Armenian biodiversity, such as the widespread loss of natural habitats, uncontrolled grazing, drainage of wetlands and air and water pollution.

Actions

- Organise a series of seminars and workshops on the incorporation of biodiversity conservation measures into land-use and agricultural development plans, for relevant MOA and MNP staff. International experts should be brought in to illustrate how this issue is addressed in other countries, through mechanisms of economic incentives and disincentives.

- Foster cooperation between MOA and MNP towards the development and implementation of sustainable forage production and rangeland management practices.

- Ensure the incorporation of biodiversity conservation concerns in the development of agricultural policies, regulations and by-laws. This should be achieved by ensuring close collaboration between relevant functional divisions of MOA and MNP during the process of developing new land-use policies and national strategies.

Summary of Proposed Investment Projects

Project Title	Priority	Responsible Agency	Time Frame	Budget (USD)
1. Review of environmental legislation and production of bye-laws	1	MNP	2	800.000
2. Improvement of institutional framework for biodiversity conservation	1	MNP	3	1.500.000
3. Environmental awareness and education programmes	1	MNP/NGOs	3	3.000.000
4. Biodiversity inventory and monitoring	1	MNP/Other Institutions	4	4.000.000

5. Assistance to key protected areas	1	MNP	4	5.000.000
6. Incorporation of biodiversity concerns into land-use and agricultural policies	1	MNP/MOA	3	1.500.000
7. Review of the national protected area system	2	MNP	1	600.000
8. Improvement of ex-situ conservation	2	NAS/MNP	2	1.000.000

ANNEX G

Biodiversity Strategy and Action Plan (BSAP) Activities

A. In Situ Conservation

A.1 Improvement of protected area system management
A.2 Clarification of the protected areas network
A.3 Build capacity of protected areas staff
A.4 Directly support conservation activities in protected areas
A.5 Extend the protected areas network
A.6 Conservation and rehabilitation of landscapes and ecosystems
A.7 Conservation and rehabilitation of species and assemblages

B. Ex Situ Conservation

B.1 Improvement of mechanisms for ex-situ conservation
B.2 Develop and mainatain nurseries and plant collections
B.3 Develop and maintain captive breeding centers
B.3 Maintenance and development of seed banks and genetic banks

C. Sustainable Use

C.1 Improve the assessment and enforcement of limits on the use of biological resources
C.2 Promote methods of sustainable use of biodiversity in agriculture
C.3 Promote sustainable use of forest resources
C.4 Promote sustainable fisheries
C.5 Promote sustainable approaches to use of biodiversity
C.6 Promote sustainable use by local communities
C.7 Develop mechanisms for sustainable use by local communities near protected areas
C.8 Develop mechanisms to regenerate forest resources and reduce pressure on forests
C.9 Develop and implement projects on promotion of sustainable ecotourism

D. Institutional Strengthening and Capacity Building

D.1 Improve biodiversity within the state system
D.2 Improve integration of natural resource management across different sectors
D.3 Build capacity for biodiversity conservation

E. Environmental Education and Public Awareness

E.1 Improve the level of environmental education
E.2 Increase public awareness related to biodiversity conservation
E.3 Increase public awareness about legislation relating to biodiversity conservation

F. Identification and Monitoring

F.1 Identify priority species and habitats for conservation
F.2 Define appropriate indicators for monitoring
F.3 Develop and implement biodiversity monitoring system

G. Research

G.1 Conduct applied research to inform conservation management
G.2 Research on biotechnology and biosafety

H. Information Access and Exchange

H.1 Strengthen the role of NGOs in biodiversity conservation and sustainable use
H.2 Develop mechanisms for exchange of information on biodiversity conservation
H.3 Develop mechanisms for international exchange of information

I. Cooperation

I.1 Support international cooperation on biodiversity conservation
I.2 Develop mechanisms for regional cooperation and information exchange

J. Impact Assessment

J.1 Develop mechanisms to improve environmental impact assessment
J.2 Ensure enforcement of environmental impact regulations

K. Incentive Measures

K.1 Develop direct measures to promote environmental protection
K.2 Apply disincentive mechanisms to ensure biodiversity conservation

L. Legislation

L.1 Develop and revise laws and regulations relating to biodiversity

M. Financial Resources for BSAP Implementation

M.1 Review financing from state budget for biodiversity
M.2 Source financing for biodiversity projects through grants and loans
M.3 Develop mechanisms to stimulate external investment in biodiversity conservation

N. BSAP Implementation

N.1 Establish BSAP steering committee
N.2 Establish BSAP technical working group
N.3 Establish coordinating (focal) point within MNP
N.4 Develop mechanisms for technical assistance

N.5 Conduct monitoring of BSAP implementation

ANNEX H

Opportunities and Constraints for Biodiversity Conservation in Armenia

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