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BIODIVERSITY ANALYSIS UPDATE FOR ARMENIA FINAL REPORT

PROSPERITY, LIVELIHOODS AND CONSERVING ECOSYSTEMS (PLACE) IQC TASK ORDER #4

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This "Armenia Biodiversity Update" was completed in reference to the task order. The views expressed and opinions contained in this report are those of the Armenia Biodiversity Assessment Team and are not intended as statements of policy of either USAID or the contractor.

PREPARED BY:

ARMENIA BIODIVERSITY UPDATE TEAM ASSEMBLED BY ECODIT, INC.

ECODIT, Inc.

1800 N. Kent Street, Suite 1260
Arlington, VA 22209
USA
Tel: +1 703 841 1883
Fax: +1 703 841 1885
Web: www.ecodit.com

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DISCLAIMER

The authors' views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

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EXECUTIVE SUMMARY

This Biodiversity Analysis update responds to requirements of Section 119(d) of the FAA of 1961 (as amended) and ADS 201.3.8.2 regarding biodiversity analysis for country strategic plans. The analysis is intended to assist USAID/Armenia during the strategic planning process by identifying necessary actions in the county to conserve biodiversity, and recommending measures USAID can take to benefit biodiversity conservation.

In accordance with the Task Order, this Biodiversity Analysis update includes a review of any threats to biodiversity and forests from activities proposed for USAID support, and suggests mitigating actions; and identifies opportunities for cross-cutting, cross-sectoral linkages with proposed activities, especially those that are low cost and/or would enhance the effectiveness of the proposed activities.

The Country Assistance Strategy

According to the Country Assistance Strategy (CAS), "U.S. policy seeks to transform Armenia into a stable partner, at peace with its neighbors, that respects principles of democracy and where all members of society share the benefits of sustained economic growth." The CAS intends to assist Armenia to end its isolation from its neighbors, and believes this will significantly contribute to Armenia's economic growth, its democratic development, and its overall political stability. The CAS states that the U.S. Government (USG) seeks to help resolve Armenia's regional conflicts by encouraging business growth, civil society interaction, and other people-to-people ties.

Over the five-year period, from 2009 to 2014, the USG intends to accomplish the CAS by focusing on the following priority goals:

Priority Goal 1: *Developing Armenia's ability to be a constructive and peaceful regional neighbor*
Priority Goal 2: *Bolstering those institutions that effectively promote democracy*
Priority Goal 3: *Improving Armenia's justice sector institutions and structure*
Priority Goal 4: *Increasing Armenia's private sector competitiveness and economic sustainability*
Priority Goal 5: *Enhancing Armenia's health and human services through innovative institution building to assist the Armenian people*

While the CAS includes no specific biodiversity goal, Priority Goal 4 includes activities supported by the USG that will promote a clean productive environment. Other priority goals may include activities that indirectly promote biodiversity conservation.

Current Status: Biodiversity Conservation in Armenia

Armenia is located at the junction of the Lesser Caucasus biogeographic zones and the Iranian and Mediterranean zones and has great altitudinal variation (from 375 meters to the 4,095 meter peak of Mt. Aragats) and a diversity of climatic zones. Together, this has resulted in a diversity of landscapes and ecological systems with distinct flora and fauna, including many regionally endemic, relict, and rare species. While encompassing only six to seven percent of the Caucasus area, nearly all vegetation types found in the southern Caucasus can be found in Armenia. This reflects the great altitudinal variation and consequent juxtaposition of distinct ecosystems.

The fauna of Armenia is also very rich and diverse. There are over 500 species of vertebrates, which includes 350 bird species (as a comparison, the United States has approximately 550 species). The position of

Armenia, and its varied ecosystems and climate, result in relatively high bird diversity. Bird species of Europe, the Mediterranean, and the Middle East are represented in Armenia, and the country is on a major migratory pathway. Mammals represent the second largest vertebrate class in Armenia, after birds, with 83 species recorded. The number of invertebrate species is about 17,000.

Armenia is located in two "biodiversity hotspots," the Irano-Anatolian and the Caucasus Hotspots. "Biodiversity hotspots" are areas identified by Conservation International that have important biodiversity that is also highly threatened. World Wildlife Fund developed the Global 200, a list of ecoregions that are priorities for conservation. WWF assigns a conservation status to each ecoregion in the Global 200: critical or endangered; vulnerable; and relatively stable or intact. Armenia is located in the Caucasus-Anatolian Hyrcanian Temperate Forest Global 200, which is considered a critical/endangered Global 200 ecoregion.

Since the original Biodiversity Analysis (2000), several laws have been enacted to protect biodiversity. While there are still some legislative gaps and inconsistencies, much of Armenia's policy framework governing biodiversity conservation is strong. Implementation has, however, been limited.

Soon after independence, the Ministry of Nature Protection (MNP) was created on the basis of the former State Committee on Nature Protection. Its current responsibilities include conservation of all resources in Armenia, as well as management, use, and regeneration of biological and water resources. However, in practice, this is shared with the Ministry of Agriculture (MoA). The MoA is the authorized management body for forest maintenance, protection, reproduction, and use. The Ministry of Energy and Natural Resources is charged with management and use of natural resources other than biological and water resources.

At the time the original Biodiversity Analysis and update were prepared, most local NGOs were small, had very few resources, and relied on the initiative and economic support of a few individuals. This is still the case today. However, international environmental NGOs have given a boost to the local NGO community. WWF was established in Armenia in 2001; and the World Conservation Union (IUCN) is now working closely with MNP and local NGOs. In 2003, more than fifty NGOs were involved in environmental activities, principally awareness raising and information dissemination. Today there are approximately 106 environmental NGOs, the majority, located in Yerevan (Directory of Environmental Non-Governmental Organisations in Armenia, Azerbaijan and Georgia**,** 2004, REC Caucasus).

The strategic goal of Armenia's Specially Protected Nature Areas' (SPNA) policy is biodiversity conservation. The policy provides for the protection and conservation of national, natural, and cultural heritage, including important habitats and species, as well as landscapes, cultural and natural monuments, and important geological formations. An important step forward in Armenia's PA development was the production of the "Strategy on Developing Specially Protected Areas and National Action Plan 2003-2010," which was approved in 2002.

According to the FAO Global Forest Resources Assessment (2005) and the State of the World's Forests (2005, 2003, 2001), between 1990 and 2000, Armenia lost an average of 4,100 hectares of forest annually. This amounts to an average annual deforestation rate of 1.18 percent. Measuring the total rate of habitat conversion (defined as change in forest area plus change in woodland area minus net plantation expansion) for the 1990-2005 interval, Armenia lost 15.7 percent of its forest and woodland habitat.

Major Findings

Through interviews, research, and site visits, the Biodiversity Analysis update team identified the following direct threats to Armenia's biodiversity:

1. Unsustainable use of resources: unsustainable fuel wood collection and commercial timber harvesting; inappropriate grazing practices; mining, and other industrial and commercial construction/development; and poaching of fish and wildlife.

2. Climate change regimes indicate that Armenia's ecosystems are at great risk of desertification.

3. Invasive species are affecting species composition and ecosystem functions, and are thereby, degrading biodiversity.

4. The protected area system does not adequately protect ecosystems with significant and threatened biodiversity.

The Biodiversity Analysis update team identified the following root causes of the threats:

1. Poverty leads to unsustainable use of natural resources.

2. Government decisions over the use and protection of natural resources are often poorly informed: they are hampered by a lack of good quality data, including data from regular monitoring of biodiversity resources, and because they may fail to take into account civil society concerns and recommendations. In addition, there is limited transparency in government decision making on biodiversity issues.

3. Biodiversity legislation has been revised and updated over the last several years, but legislative and institutional gaps and weaknesses remain. This reflects a lack of political will to protect and conserve natural resources.

4. There is a low level of public awareness of biodiversity and environmental education remains limited.

5. Biodiversity is under-valued in the country's accounts; and environmental fees/fines do not provide an incentive for conservation.

The following are the actions needed to conserve biodiversity, which the Biodiversity Analysis team developed through interviews and literature review. The "actions needed" correspond to the direct threats identified above, and also address root causes of the threats. They are listed in order of priority (#1, highest priority action to address the threat):

Actions needed to address unsustainable fuel wood collection

1. Implement poverty reduction activities, with a focus on areas of high biodiversity importance: buffer zones of PAs, IBAs, important wetlands and watercourses, and in key watersheds.

2. Provide alternative fuel (gas, electric, etc.) especially in rural areas, and a financial program to help cover costs of obtaining fuel.

3. Implement community forest activities: designate community forest land; develop and implement community forest management plans; ensure transparency in providing community benefits; provide training, as necessary, to community members; and monitor compliance. As part of this, capacity

should be strengthened in the MoA (Hyantar) to oversee community forest management; and capacity will have to be strengthened in communities to implement community forest management activities.

4. Improve protection of PA resources, and as appropriate, introduce a program of sustainable, well-monitored fuel wood collection by communities. This may have the potential to become a community enterprise that could generate income for communities.

5. Encourage use of wood lots for fuel wood.

Actions needed to address unsustainable commercial timber harvesting

1. Implement "industrial forests" category; require a sustainable forest management plan; and monitor for compliance with the FMP.

2. Ensure a transparent process for appropriating industrial forest to commercial enterprises.

3. Consider community benefit component in industrial forests, where communities could form commercial enterprises and manage a forest for commercial purposes. In conjunction with this, capacity strengthening should be provided to communities and community-based organizations so they can implement or oversee commercial timber harvesting, including the negotiation and management of timber contracts.

4. Create an open access GIS including application of environmental/biodiversity monitoring criteria. This should incorporate accurate reforestation/deforestation data.

5. Provide training to target environmental NGOs that have the potential to serve as advocates for community interests and strengthen capacity in advocacy, management, and fundraising.

Actions needed to address inappropriate grazing practices

1. Reduce and prevent land degradation with anti-erosion, anti-landslide measures.

2. Implement restoration measures (re-cultivation) of degraded lands.

3. Define principles for privatized agricultural land consolidation to reduce land fragmentation.

4. Create an open access GIS including application of environmental/biodiversity monitoring criteria.

5. Through land use planning exercises, strengthen and train local government authorities who will make decisions about land use.

Actions needed to address mining and other industrial and commercial developments that impact biodiversity

1. Increase environmental fees/fines to encourage use of clean technology to minimize waste, and water, land, and air pollution.

2. Ensure that a transparent EIA/environmental compliance process is implemented that takes into account all concerns.

3. Strengthen environmental compliance by developing environmental compliance legislation that provides for tiered environmental review and that incorporates transparent, third party environmental audits.

4. Implement an insurance mechanism, funded by the commercial/mining enterprise, which would create a fund that can cover reclamation costs.

5. Strengthen the capacity of the State Environmental Inspectorate.

6. Strengthen pollution prevention legislation on water discharge (point and non-point discharge) and implement pollution prevention measures, including water monitoring programs.

7. Target environmental NGOs that have the potential to serve as advocates for community interests and train them in advocacy, management, and fundraising.

8. Raise awareness of the public of importance of biodiversity and trade-offs between industrial development and other development (tourism, niche agriculture, etc.); and provide environmental education to schoolchildren.

9. Implement land use planning, incorporating Environmental Action Plans to integrate environmental concerns into land use decisions.

Actions needed to address poaching of fish and wildlife

1. Implement a holistic approach to recover the fish stock, including commercial and endemic fish populations. This includes artificial propagation; control of invasives; protection of the fish stocks; regularization (minimize) of water withdrawals from Lake Sevan, especially at time periods critical to the ecosystem (not only fisheries, also migratory and nesting birds, amphibians, etc); and implement a program to provide livelihood options for those living near the lake. It is important to treat the entire ecosystem—including the human dimension.

2. Implement a program of community-based natural resources management (CBNRM) that would allow local populations to benefit from hunting and fishing and other natural resource use. This would also encourage conservation and discourage illegal activities, and should be implemented in conjunction with biodiversity awareness campaigns.

Actions needed to address climate change

1. Develop alternative livelihood options for communities in areas that are particularly vulnerable to climate change and who rely on vulnerable biodiversity resources.

2. Develop clean, alternative sources of clean energy for use by Armenia's population.

3. Enlarge/establish additional PAs and corridors between PAs to mitigate climate change effects and to allow migration of wide-ranging species.

4. Gradually increase the forest cover area (target: 266,500 hectares by the year 2050, First National Communication on Climate Change, 1999).

5. Implement an integrated system of forest protection from pests, diseases, livestock grazing, and fire.

Actions needed to address invasive species

1. Improve State Quarantine inspections at borders; and train customs officers on important and endangered species requiring import and export permits.

2. Implement relevant articles of the Law on Flora (1999); Law on Fauna (2000); and Law on Lake Sevan (2001), which prohibit illegal import and export of "flora and fauna organisms for acclimatization and selection purposes."

3. Develop and implement management plans for the control of alien invasive species.

Actions needed to address PA system

1. Implement the MNP's National Strategy and Action Plan on Developing Specially Protected Areas. If implemented, the strategy will improve the system of SPNAs (**Annex L**) by ensuring the network corresponds to international agreements, standards, and criteria.

2. Implement community PA model(s) to illustrate how communities can benefit from management and use of PA resources.

3. Implement an improved biodiversity monitoring scheme, including regular data collection, systematically compiled, and publicly accessible.

4. Rationalize roles and responsibilities of central, regional, and local governments in supervision, management, and use of biodiversity resources. Given that budgetary, staff, and technical constraints are high, moving towards decentralization and eliminating overlapping functions would help ensure that those best placed to provide certain functions are providing them and on a cost-effective basis.

5. Conduct biodiversity awareness raising campaign for Armenia's SPNA system to help raise awareness and pride in the biodiversity heritage of the country, and its revenue generating potential.

6. Improve environmental education in Armenia, from pre-school through university by training teachers to provide environmental education to students and by providing the material and equipment needed. Teacher training and access to modern, high quality educational material are keys to ensuring environmental education programs are implemented.

7. Consider charging entry fees (to international tourists, and eventually, possibly to local tourists) to increase the revenue from the PA system, and allow this revenue to be used by the SPNA system (implement article in law, "On the RA Budget System" that applies to environmental programs, which is scheduled to be implemented by 2011). Charging entry fees can also be a source for revenue sharing with adjacent communities.

Key Recommendations

The Biodiversity Analysis team identified potential threats to biodiversity from the USAID/Armenia program and recommends the following mitigation measures:

1. While Competitiveness Armenian Private Sector (CAPS) activities in the pharmaceutical sector do not affect biodiversity, USAID interventions in this sector should promote environmentally sound disposal practices.

2. Development Credit Authority (DCA) programs should implement training of loan officers in environmental compliance and incorporate into future DCAs; and should identify lessons learned for similar programs to be implemented in the future.

3. Energy sector technical assistance in the management of non-radioactive nuclear waste should ensure that waste is not disposed of directly in areas of important biodiversity or where it could contaminate important biodiversity. In particular, waste disposal should not affect PAs, wetlands, and other waterways.

4. For all GDAs, an IEE is required prior to implementation, wherein site-specific impacts can be evaluated. For alternative energy GDAs, for example, mitigation measures for small-hydropower can ensure that there will be no biodiversity impacts (See, for example, USAID/Dominican Republic mini-hydropower environmental guidelines; USAID's Environmental Guidelines for Small-Scale Activities). General guidelines are available, but will need to be adapted to the situation in Armenia. As far as biodiversity impacts, siting of wind farms is key to avoiding avian migratory routes. Development of small-scale hydropower ("micro" and "mini-hydropower") is unlikely to significantly affect water flow for fisheries or other animals dependent on aquatic resources. However, a site-specific IEE will ensure that negative biodiversity impacts are identified and mitigated.

5. GDAs, as yet to be designed, may involve support to health clinics. This may offer the opportunity to improve the medical waste management and disposal system at clinics.

6. The cross-cutting education activity could have a positive effect on biodiversity if it helps to address gaps in formal education in biodiversity conservation.

Potential Options for USAID to Enhance Mission Contribution to Biodiversity Needs

The below recommendations are provided to assist USAID in addressing the needs identified for biodiversity conservation in Armenia and to fill the gaps. These recommendations are provided within the framework of currently proposed activities under the CAS.

1. Economic Growth: Under the reduced scope of the competitiveness project, consider working with enterprises in buffer zones of PAs. This could fit within the new scope, which will focus on those enterprises with greatest potential for economic growth and trade, and it fills a need identified, *poverty reduction activities in buffer zones.*

2. Economic Growth: possibly as part of a GDA in the alternative energy sector, encourage the design of small hydro-electric power generation projects. This would minimize the need for fuel wood collection, and would fill an action needed to *develop sources of clean, alternative energy.*

3. Democracy and Governance: The CSO Project should include capacity building (management, fundraising, and advocacy skills) for *environmental* CSOs/NGOs so they can better advocate for *environmental* protection. Also, consider working with CSOs in buffer zones of PAs to help advocate for sustainable use and environmentally sound development. This fills an action needed to *train and help professionalize CSOs and other NGOs.*

4. Democracy and Governance: Rule of Law Program should include responses to environmental complaints to help strengthen the environmental justice system in Armenia. This fills an action needed, *to improve transparency in decision making.*

5. Democracy and Governance: With the change in focus to support for alternative media (rather than the previous focus of mainstream media), USAID should consider providing assistance/training to environmental journalist organizations such as Ecolur.

6. Health: One of the focus areas is "creating demand," which involves raising awareness of rights to health care and preventative medicine. As part of this focus area, consider raising awareness of the importance of environmental health issues, including clean water, health impacts from mining activities (for mine workers but also those in the community), which would create demand for improved health care of those exposed to environmental pollution, but also will create advocates for environmentally sound design, clean technology, etc.

Additional Opportunities for USAID/Armenia

As above, recommendations are provided to assist USAID in addressing the actions needed for biodiversity conservation in Armenia and to fill the gaps. These recommendations fall outside planned activities, and are therefore more wide-ranging than the above. But while the recommendations do not fall within specific projects, they are within the framework of the anticipated program. They are provided in order of priority, from highest priority to lowest based on their potential to contribute to biodiversity conservation and on USAID's comparative advantage.

1. Economic Growth and Democracy and Governance: USAID should consider supporting transboundary PAs (Armenia/Georgia; Armenia/Turkey) as a means of promoting regional integration, cooperation, and security—these are foundations of the USG's Country Assistance Strategy. Another option for USAID to consider is support for a cultural/eco-trail that traverses Armenia and neighbor countries.

2. Economic Growth: USAID should consider supporting the development of alternative livelihood options for communities in areas that are highly vulnerable to climate change and that depend on biodiversity that is also highly vulnerable (for example, communities that depend on steppe ecosystems for grazing, communities that are reliant on fisheries).

3. Economic Growth and Democracy and Governance: USAID should consider strengthening the EIA process. This would fill an "action needed" to strengthen the transparency of Government decision making, and the participatory process in Government decisions.

4. Economic Growth and Democracy and Governance: USAID should consider improving the legislative framework for environmental compliance. EIAs must be conducted for a wide range of projects, and currently there is no tiered system of EIA. This discourages investment and encourages corruption. As part of this process, USAID could develop environmental audit legislation, which would provide for third party audits, and/or support the conduct of transparent, third party audits.

5. Economic Growth and Democracy and Governance: USAID should consider supporting the development of a publicly accessible biodiversity database for natural resources. The lack of reliable monitoring data and limited publicly accessible and reliable biodiversity information is a constraint to adequately protecting biodiversity resources.

6. Economic Growth and Democracy and Governance: USAID should consider strengthening Armenia's pollution prevention/water discharge legislation. This could be linked to the development of community monitoring programs, which would help alleviate the constraint of limited human resources available for monitoring. To further support implementation of pollution prevention/water discharge legislation, USAID could support a GDA(s) that would assist private sector industries to comply with pollution prevention legislation. This could include an

environmental audit and the incorporation of clean technology, using the model of Akhtala (PA Government Services).

7. Economic Growth, Democracy and Governance, and Health: USAID should consider supporting Urban/Village planning. This could promote civil society participation in decision making, encourage investment, and promote "smart growth,"—growth that is environmentally sound and that promotes human health as well.

In addition to the above, USAID could play a role in improving coordination among donors, the RA Government, and NGOs. Through this forum, USAID could leverage donors and others to promote the rationalization of government functions, and thereby strengthen and streamline the institutional framework for biodiversity conservation. USAID is well-placed to leverage donors in the environment sector given its support in the water resources management field.

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LIST OF ACRONYMS

Abbreviations and acronyms have been kept to a minimum in the text of this document. Where abbreviations or acronyms have been used, they are accompanied by their full expression the first time they appear, unless they are commonly used and generally understood abbreviations such as NGO, kg., etc. However, in order to facilitate understanding of the acronyms used, a complete list is included here.

ACP	Armenia Copper Program
ASPB	Armenian Society for the Protection of Birds
ATP	Armenia Tree Project
BSAP	Biodiversity Strategy and Action Plan
CAPS	Competitive Armenian Private Sector
CBD	Convention on Biological Diversity
CBNRM	community-based natural resources management
CI	Conservation International
CSO	civil society organization
CSP	Civil Society Project
CTP	Community Tree Planting
DCA	Development Credit Authority
EA	Environmental Assessment
ECP	Ecoregional Conservation Plan
EU	European Union
ENP	European Neighborhood Policy
FAA	Foreign Assistance Act
GDA	Global Development Authority
GEF	Global Environment Facility
GMO	genetically modified organisms
GMP	Good Manufacturing Practices
GTZ	Gesellschaft für Technische Zusammenarbeit
IBA	Important Bird Areas
IEE	Initial Environmental Examination
IUCN	International Union for the Conservation of Nature
KfW	Kreditanstalt für Wiederaufbau
LMO	living modified organisms
masl	meters above sea level
MB	modern biotechnology
MCA	Millennium Challenge Account
MCC	Millennium Challenge Corporation
MNP	Ministry of Nature Protection
MoA	Ministry of Agriculture
NAS	National Academy of Sciences (Armenia)

NEAP	National Environmental Action Plan
NP	National Park
NRM	Natural Resources Management
OSCE	Organization for Security and Cooperation in Europe
PA	Protected Area
RA	Republic of Armenia
RMD	Rural and Mountainous Development
SNCO	State non-commercial organization
SPNA	Specially Protected Nature Area
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UN FAO	United Nations Food and Agriculture Organization
USAID	United States Agency for International Development
USG	United States Government
WB	World Bank
WWF	World Wildlife Fund

1. INTRODUCTION

1.1 PURPOSE OF THE BIODIVERSITY ANALYSIS

Section 119(d) of the U. S. Foreign Assistance Act (FAA), as amended (see **Annex A**), requires USAID to assess, in all country strategy documents, a country's biodiversity conservation needs and USAID contributions to these needs. Specifically, FAA Section 119(d), Country Analysis Requirements requires 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.*

As stated in the Task Order for the Armenia Biodiversity Analysis Update (see **Annex B**),

> *with respect to USAID programs, Country Assistance Strategies must include the biodiversity analysis as required by FAA 119. The findings of the analysis will provide necessary insight for future programmatic decision making required to develop the USG Country Assistance Strategy. The country specific analysis will also serve as a planning tool to assist USAID to identify stand alone and/or cross-cutting opportunities to promote sustainable, environmentally-sound employment, trade, investment and income interventions while integrating environment concerns into its overall programs.*

Specifically, the purpose of the task order is to conduct an *update* of the country biodiversity analysis for Armenia. A biodiversity analysis was originally conducted in 2000 with a Mission-prepared update in 2003.

This Biodiversity Analysis update responds to requirements of Section 119(d) of the FAA of 1961 (as amended) and ADS 201.3.8.2 regarding biodiversity analysis for country strategic plans. The analysis is intended to assist USAID/Armenia during the strategic planning process by identifying necessary actions in the county to conserve biodiversity, and recommending measures USAID can take that will benefit biodiversity conservation.

In accordance with the Task Order, this Biodiversity Analysis update also includes a review of any threats to biodiversity and forests from activities proposed for USAID support, and suggests mitigating actions; and identifies opportunities for cross-cutting, cross-sectoral linkages with proposed activities, especially those that are low cost and/or would enhance the effectiveness of the proposed activities.

1.2 METHODOLOGY

This Biodiversity Analysis update was conducted by a three-person team, including one international biodiversity specialist (the Team Leader) and two Armenian biodiversity specialists. Biographical sketches of team members are included as **Annex C**.

Prior to arrival in Armenia, the Biodiversity Analysis Team Leader met with USAID staff in Washington, and others involved in biodiversity conservation in Armenia. Meanwhile, the two Armenian biodiversity specialists gathered documents and assembled a list of in-country experts to be interviewed.

The Biodiversity Analysis team spent four weeks in-country conducting the analysis. Upon the Team Leader's arrival in Armenia, the three-person team began to review documents and websites (**Annex D** contains the list of references) and to conduct interviews. The team interviewed environmental professionals, USAID/Armenia staff, and other donors to determine the status of biodiversity conservation in Armenia, including status of protected areas, endangered species conservation, forest management, and institutional and legislative aspects of biodiversity conservation; the main threats to biodiversity; and actions needed in Armenia to conserve biodiversity. The list of people interviewed for the Biodiversity Analysis is in **Annex E**.

The team went on three field trips to help "ground-truth" the information from interviews and document reviews. The team traveled to:

(1) Lake Sevan National Park, including Important Bird Areas (IBA) in the National Park, adjacent to the lake
(2) Khosrov Forest State Reserve and the location for the planned Jermuk National Park
(3) Lori Marz: Akhtala and Alaverdi to see copper mining and processing facilities, and the resulting pollution of the natural environment.

Information gathered from these field trips is incorporated into this Biodiversity Analysis update.

Working with the Acopian Center for the Environment (ACE) at American University-Armenia, the team identified maps needed for the analysis. ACE prepared all maps included in this report (**Annex F**).

Prior to departure of the Team Leader, the team de-briefed the USAID Mission on the analysis and preliminary results. The de-brief focused on the primary threats to biodiversity; actions needed to address the threats; the team's recommendations to USAID regarding opportunities to engage in the biodiversity sector; and mitigation measures to minimize biodiversity threats resulting from proposed USAID actions.

1.3 BACKGROUND ON THE U.S. GOVERNMENT COUNTRY ASSISTANCE STRATEGY

At the time this Biodiversity Analysis update was conducted, the CAS was in draft. Therefore, recommendations from the Biodiversity Analysis update could be incorporated into the overall CAS and into USAID programs for 2009-2014.

Brief background on the CAS

According to the CAS, "U.S. policy seeks to transform Armenia into a stable partner, at peace with its neighbors, that respects principles of democracy and where all members of society share the benefits of sustained economic growth." The CAS intends to assist Armenia to end its isolation from its neighbors, and believes this will significantly contribute to Armenia's economic growth, its democratic development, and its overall political stability. The CAS states that the U.S. Government (USG) seeks to help resolve Armenia's regional conflicts by encouraging business growth, civil society interaction, and other people-to-people ties.

Over the five-year period, from 2009 to 2014, the USG intends to accomplish the CAS by focusing on the following priority goals, summarized from the Draft CAS, below:

Priority Goal 1: *Developing Armenia's ability to be a constructive and peaceful regional neighbor*
Accomplishment of this goal will result in increased popular pressure in Armenia and its neighbors for better ties among the countries, and the establishment of cross-border cooperation mechanisms. These will, in turn, increase understanding between Armenians and their neighbors and will demonstrate that conflict resolution

and open borders would benefit Armenians. This goal will accomplish the cross-cutting benefit of promoting democracy and the rule of law.

Priority Goal 2: ***Bolstering those institutions that effectively promote democracy***
With the accomplishment of this goal, the capacity of civil society groups to provide policy advice and serve as watchdogs will improve, as will the financial viability of NGOs and their legal and regulatory framework. Institutions that effectively promote democracy, including civil society NGOs, local government, alternative media, reform-minded officials and others, exist in Armenia and are a potentially potent force for the successful promotion of democracy and democratic values.

Priority Goal 3: ***Improving Armenia's justice sector institutions and structure***
The anticipated result of this priority goal is that Armenia will have an effective and professional justice sector that respects modern human rights standards and provides equitable treatment for all citizens.

Priority Goal 4: ***Increasing Armenia's private sector competitiveness and economic sustainability***
To accomplish this goal, the USG will work with the Government of Armenia to establish sound rules to facilitate the efficient, environmentally sound, and transparent operation of a fair and fully competitive market economy and to improve the capacity of the private sector. It will also work to enhance access to credit for all businesses and to improve essential public services. The USG will explore ways to strengthen the foundation for Armenia's energy independence and security. **While the CAS has no specific biodiversity goal, Priority Goal 4 includes activities supported by the USG that will promote a clean productive environment—these may include biodiversity conservation activities.** Accomplishment of this goal will result in an improvement in the private sector's ability to be more competitive regionally and internationally. Improvements in the business environment will lead to reduced corruption, increased foreign and domestic investment, and improved economic performance indicators.

Priority Goal 5: ***Enhancing Armenia's health and human services through innovative institution building to assist the Armenian people***
Achievement of this goal will bring improvements in the quality of primary health care services and health system finance and efficiency. Easier access to better health care will encourage an improved health culture that includes preventive and care-seeking behavior, which will lead to increasing demand for high quality health services. Attainment of this goal will also bring about the development of a sustainable public social insurance system. Ultimately, the result will be an Armenia wherein the majority of the population is well cared for, thereby, better able to interact effectively with, and without animosity towards its neighbors.

All above priority goals may include activities that indirectly promote biodiversity conservation.

1.4 ARMENIA COUNTRY BACKGROUND

General

Armenia is located in the southern Caucasus and is the smallest of the former Soviet republics, covering 11,506 sq. miles (29,800 sq. kilometers). It is situated along the route of the Great Silk Road, and is bounded by Georgia in the north, Azerbaijan in the east, Iran in the south, and Turkey in the west (**Annex F-1**). Contemporary Armenia is a fraction of the size of ancient Armenia. Most of the population lives in the western and northwestern parts of the country, where the two major cities, Yerevan and Gyumri, are located. The 11 marzes (provinces) of Armenia and their provincial capitals are shown in **Annex F-2**. As of 2008, Armenia's population is estimated at 2,968,590. Its GDP (2007) was $16.83 billion; and per capita income was US$5,700.

Physical Features

Twenty-five million years ago, a geological upheaval pushed up the earth's crust to form the Armenian Plateau, creating Armenia's complex topography (**Annex F-3**). Armenia is dominated by the Lesser Caucasus range, which extends through northern Armenia, and runs southeast between Lake Sevan and Azerbaijan, then passes roughly along the Armenian-Azerbaijani border to Iran. Significant geological events continue to this day in the form of devastating earthquakes. In December 1988, the second largest city in the republic, Leninakan (now Gyumri), was heavily damaged by a massive quake that killed more than 25,000 people.

About half of Armenia's land area is at elevation of 2,000 meters above sea level (masl) or higher and only three percent of the country lies below 650 meters. The lowest points are in the valleys of the Arax and Debet Rivers in the far north, which have elevations of 380 and 430 masl, respectively. Elevations in the Lesser Caucasus vary between 2,640 and 3,280 masl. To the southwest of the range is the Armenian Plateau, which slopes southwestward toward the Arax River on the Turkish border. Along the plateau are mountain ranges and extinct volcanoes. The largest of these, Mount Aragats, at 4,095 masl, is the highest point in Armenia.

The valleys of the Debet and Akstafa Rivers form the chief routes into Armenia from the north as they pass through the mountains. Lake Sevan, 73.5 kilometers across at its widest point and 376 kilometers long, is by far the largest lake. It is at elevation 1,899 masl on the Armenian Plateau.

Armenia's terrain is most rugged in the extreme southeast, which is drained by the Bargushat River, and most moderate in the Arax River valley to the extreme southwest. Most of Armenia is drained by the Arax or its tributary, the Hrazdan, which flows from Lake Sevan. The Arax forms most of Armenia's border with Turkey and Iran. Armenia's primary water resources are shown in **Annex F-4.**

Temperatures in Armenia generally depend upon elevation (see **Annex F-5**). Mountain formations block the moderating climatic influences of the Mediterranean and Black Seas, creating wide seasonal variations. On the Armenian Plateau, the mean midwinter temperature is 0° C, and the mean midsummer temperature exceeds 25° C. Average precipitation ranges from 250 millimeters per year in the lower Arax River valley to 800 millimeters at the highest altitudes (see **Annex F-6**)**.** Despite the harshness of winter in most parts, the fertility of the plateau's volcanic soil made Armenia one of the world's earliest sites of agricultural activity Soils are shown in **Annex F-7**.

2. CURRENT STATUS OF BIODIVERSITY IN ARMENIA

2.1 OVERVIEW

As stated in the original Biodiversity Analysis (2000), Armenia is located at the junction of the Lesser Caucasus biogeographic zones and the Iranian and Mediterranean zones and has a great range of altitudinal variation and a diversity of climatic zones (**Annex F-5**). Together, this has resulted in a diversity of landscapes (**Annex F-8**) and ecological systems with distinct flora and fauna, including many regionally endemic, relict, and rare species.

While encompassing only six to seven percent of the Caucasus area, nearly all vegetation types (**Annex F-8**) found in the southern Caucasus can be found in Armenia. This reflects the great altitudinal variation and consequent juxtaposition of distinct ecosystems.

The following general ecosystem types are found in Armenia: sandy deserts, semi-deserts, arid open forests, shibliak (a Mediterranean type of vegetation, characterized by dominance of spiny shrubs and small trees; in Armenia, the dominant vegetation of shibliak is *Paliurus spina-shristi*) mountain steppes, forests, meadow-steppes, sub-alpine meadows, and alpine meadows and carpets. At different altitudinal belts, intrazonal ecosystems are also present: wetlands, petrofilous ecosystems (cliffs, rocks, screes), and ecosystems of disturbed habitats. Each ecosystem, discussed briefly below, is characterized by its unique set of plants, animals, fungi, microorganisms, soil types, and corresponding climatic condition.

2.2 MAJOR ECOSYSTEM TYPES

Annex F-8 shows the locations and extent of the main ecosystems in Armenia. Dominant vegetation and representative fauna of these ecosystems are listed in **Annex G**. The discussion below incorporates information from the original Biodiversity Analysis (2000) and Biodiversity Analysis update (2003), as appropriate.

Deserts in Armenia do not occupy a separate altitudinal belt, but can be found in the lower mountain belt at an altitude of 400 to 1,000 masl. They are also found among semi-desert vegetation on sandy and saline soils (solonchak) and on dark alkaline soils (solonetz).

In Armenia these ecosystems are found in the Ararat Valley, in the Araks Valley in Megri district, on the Shirak Plateau and at the mouth of the Debed and Agstev Rivers. The majority of desert plant species are not found in other habitats.

Fauna is characterized by several species of reptiles, such as the steppe racerunner (*Eremias arguta*), several endemic subspecies of the lizards, *Lacerta* and *Agama*, and in particular, the sunwatcher lizard (*Phrynocephalus persicus*). Mammals include the weasel (*Mustela nivalis*), and red fox (*Vulpes vulpes*). The typical bird species is the finch's wheatear (*Oenanthe finschii*). Long-legged buzzard (*Buteo rufinus*), pallid harrier (*Circus macrourus*), and the globally threatened lesser kestrel (*Falco naumanni*) also occur in Armenia's deserts.

Semi-deserts are widespread in Armenia. They are found in all foothills and in the lower mountain belt at 400 to 1,300 masl. They are a complex, mosaic type of ecosystem. Typically, semi-desert vegetation has a double rest period; summer is the period of droughts, and winter is the period of frost. Semi-deserts are found in dry habitats that have stony, fine earth and mildly salinated soil variants. These ecosystems are

found in conjunction with desert ecosystems in the Ararat Valley, in the Araks Valley in Megri district, on the Shirak Plateau, and at the mouth of the Debed and Agstev Rivers; and they are found on all foothills of Armenia.

Semi-desert vegetation does not form a thick cover (typically, 20-30 percent vegetation cover). Annual plants that develop during spring and/or autumn under comparatively high precipitation are most common. Vertebrate fauna is rich and represented by approximately 150 species (mammals - 35, birds - 71, reptiles - 30, amphibians - 3 species). The invertebrate fauna is also very rich: 51 species of mollusks, 66 species of spiders, and more than 800 species of beetles. Many invertebrates have yet to be identified.

Fauna includes the long-eared hedgehog (*Erinaceus auritus*), the local subspecies of European badger (*Meles meles canescens*) and several species of bats. The striped hyena (*Hyena hyena*), the great bustard (*Otis tarda*), and the houbara bustard *(Chlamidotis undulate*) once occurred in Armenia's semi-desert ecosystem, but now appear to be extinct in Armenia.

Semi-deserts are the original habitat of several important wild ancestors of domestic crops, such as *Triticum araraticum*, *T. urartu*, *Secale vavilovii,* and *Aegilops* spp. In recent history, natural semi-deserts are being converted to irrigated agriculture, and are rapidly disappearing.

Arid open forests (**including shibliak)** are complex ecosystems, with significant vegetation and animal variety among different open forest types. Arid open forest vegetation is characterized by a prevalence of low trees and shrubs. Shrubs and low trees in shibliak often form thick, nearly impenetrable stands. Leafy arid open forests (typically dominated by oak and pistachio) are found in the lower and middle mountain belts often in conjunction with shrub communities dominated by Christ's thorn (*Paliurus spina-christi*). Juniper open forests are widespread and found from the lower to upper mountain belts (to 2,200 masl). Along with shibliak, they are found in comparatively dry habitats (especially in the lower mountain belt), mainly in central and southern Armenia. Juniper open forests are also found in the Lake Sevan basin.

Specific types of vertebrates and invertebrates representative of arid open forests are unavailable since, in the literature, this ecosystem type is often grouped together with forests. The number of beetle species is over 500, and many have yet to be identified.

Steppe ecosystems are the most widespread in Armenia, and cover approximately 37 percent of the land area. They are found on all forestless mountain slopes and plateaus at the middle mountain belt (1,000-2,400 masl). Steppe ecosystems develop in comparatively dry habitats, usually with well developed, deep fertile soil. Vegetation cover is usually thick, at 80-90 percent coverage. Tragakanth steppes cover a relatively large area of the steppe ecosystem. In these steppes, prickly cushion shrubs dominate (mainly astragals and *Onobrychis cornuta*).

Biodiversity in steppe ecosystems is exceedingly rich. About half of all representatives of Armenian flora, including many endemic and rare species of plants and animals, can be found in steppe systems. Vertebrate fauna is represented by approximately 140 species (mammals - 28, birds - 84, reptiles - 16, amphibians - 3 species). Ninety species of mollusks, 132 species of spiders, and about 300 species of beetles are found in these ecosystems.

Fauna is characterized by 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 raptors, including the peregrine falcon (*Falcon peregrinus*) and golden eagle (*Aquila chrysaetos*).

Steppes are often used for agriculture. At lower altitudes, frost-tolerant fruit trees are grown, and in highland areas, fodder plants.

Forests: Armenian forests occupy approximately 332,000 hectares (see Section 6 for the various estimates of forest cover), and are distributed irregularly across Armenia, as follows: northeastern Armenia, 207,000 hectares (62.5 percent); central Armenia, 45,000 hectares (13.5 percent); southern Armenia 8,000 hectares (2.4 percent); and southeastern Armenia, 72,000 hectares (21.6 percent). Forests are mainly found on steep, extremely indented mountain slopes, at 550-2,400 masl. Armenian forests are primarily broad-leaved, and the main forest-forming species are beech (*Fagus orientalis*), oak (*Quercus iberica* and *Querucs macranthera*), hornbeam (*Carpinus betulus* and *Carpinus orientalis*) and pine (*Pinus kochiana*). Forest ecosystems are described in greater detail in Section 6 and threats to forest ecosystems are discussed in Section 10.

Vertebrate fauna of Armenian forests is rich: approximately 110 species are found in forests (mammals – 24 species, birds – 84, reptiles – 4, amphibians – 1). Invertebrate fauna is diverse as well, and includes 33 species of mollusks, 87 species of spiders, and more than 850 species of beetles.

Fauna is characterized by 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 include the mole (*Talpa orientalis*), shrews (*Sorex mintus and S. araneus)*, the hedgehog (*Ernaceus europaeus*), and two species of bats (*Vespertilio pipistrellus* and *V. serotinus*). Forest birds are characterized by buzzards (*Buteo buteo*), goshawk (*Accipter gentilis*), sparrowhawk (*Accipter nisus*), lesser spotted eagle (*Aquila pomarina*), eagle owl (*Bubo bubo*), tawny owl (*Strix aluco*), and several species of woodpeckers.

Meadow ecosystems are mesophilous and require a rather high volume of precipitation. These conditions are met on all mountain belts, but meadows are most commonly found on high mountains (mainly above 2,200 masl). At this altitude, meadow vegetation is the dominant type, developing on plateaus and comparatively steep slopes with high moisture and fine soils. Meadow ecosystems (depending on altitude and other natural conditions) are represented by alpine and sub-alpine meadows and sub-alpine high-grass communities.

Sub-alpine meadows are found at 2,300-2,800 masl and support a distinct assemblage of grasses, particularly in northern regions. Almost 500 plant species have been recorded in this habitat.

Alpine meadows are found at the highest altitudes, above sub-alpine meadows, up to 4,000 masl (on Aragats Mountain) and cover about 28 percent of the land area of Armenia. They are the principal pasture lands in the country. Climatic conditions can be severe, with long, cold winters. Snow cover lasts up to nine months, and permanent snows may be found in some areas.

Biodiversity of meadow ecosystems is very rich, but there are far fewer endemic species than in low mountain belts or in other habitat types. Vertebrate fauna is rather poor (approximately 70 species: mammals - 16, birds - 52, reptiles - 8, amphibians - 2 species). Numbers of invertebrates include 51 species of mollusks, 13 species of spiders, and approximately 200 species of beetles (40 of which are endemic). Many invertebrate species have yet to be identified.

Characteristic birds of meadow ecosystems are the lammergeyer (*Gypaetus barbatus*), Caspian snowcock (*Tetragallus caspicus*), alpine chough (*Pyrrhocorax graculus*), wall creeper (*Tichodroma muraria*), and snowfinch (*Montifringilla nivalis*). Wild goats are found in less accessible meadow areas.

Meadow ecosystems are important for summer pastures and for a variety of edible and medicinal plants. The gradual increase in grazing pressure has caused significant changes in vegetation cover and species composition. Section 10 discusses the threat to meadow ecosystems from inappropriate grazing practices.

Wetlands and waterways (see Annex F-4) cover 6.17 percent of the total territory of Armenia (1,774 km²). Of these, 5.51percent (1,584 km²) is open water (lakes, ponds, rivers, reservoirs, canals); 0.52 percent (150 km²) is temporarily flooded area (saline lands); and only 0.14 percent (42 km²) is permanent marshes, fens, and peatlands (the last two categories are considered wetlands, whereas the first category is considered open water).

Lake Sevan is the largest freshwater lake in the Caucasus, and Minor and Middle Asia regions. The second largest lake, Lake Arpi, is located in the northwestern part of Armenia, at an altitude of 2,023 masl. Section 10 describes threats to Lake Sevan and Armenia's wetlands. Wetlands are among the most threatened habitats in the country.

Wetland flora is rich and includes species of algae, moss, and vascular plants. Sixty-seven families of vascular plants have been recorded in Armenia's wetlands. Among the most diverse families are *Cyperaceae* (97 species) and *Potamogetonaceae* (13 species). The total number of recorded species of aquatic invertebrates in Armenia is 491. However, since so many aquatic ecosystems have yet to be explored, the actual numbers are probably more than 1,000. The highest number of aquatic organisms is found in the class *Insecta* (147 species); the second highest, in the class *Crustacea* (97 species).

Waterfowl are a key element of wetland fauna. Wetland bird diversity is very rich and consists of at least 136 species, 22 of which are considered endangered (Red Data Book of Armenia, 1987). Of 39 fish species which occur in the wild in Armenia's waters, 11 are introduced species and two are endangered. The endemic *Ishkhan* (trout) is at risk of extinction in the wild. Eight amphibian species are found and include the European green toad, European marsh frog and brusa frog. The Syrian spadefoot toad, found in Armenia's wetlands, is listed in the Red Data Book of Armenia. Only four species of reptiles are found in Armenia's wetlands. Snakes are abundant in wetlands throughout the country, while tortoises occur only in lowlands. Section 2.8, Important Bird Areas, provides additional information about Armenia's wetlands.

Cliffs, stones and screes, as well as other stony habitats, are common in a mountain country such as Armenia. They are found in all mountain belts, and develop plant and animal ecosystems specific to stony, rocky habitats. Biodiversity of these ecosystems is very rich, and they are high in endemics. In these habitats, there are about 30 endemic plant species and more than 50 rare and endangered plant species.

2.3 BIODIVERSITY HOTSPOTS AND GLOBAL ECOREGION 200

Armenia is located in two "biodiversity hotspots," the Irano-Anatolian and the Caucasus Hotspots. Originally coined by Norman Meyers, a "biodiversity hotspot" is the term the international NGO, Conservation International (CI), uses for a region that has at least 1,500 species of vascular plants (> 0.5 percent of the world's total) as endemics, and has lost at least 70 percent of its original habitat. These are areas that have high biodiversity but that are highly threatened. Recently, CI reviewed their original hotspot analyses and produced, *Hotspots Revisited* in which six previously overlooked areas now qualify for hotspot status. Among these is the Irano-Anatolian region, which is located, in part, in Armenia. The following information is from http://www.biodiversityhotspots.org/Pages/default.aspx (December 2008).

The Caucasus Hotspot

The Caucasus hotspot spans 532,658 km² and is found in Georgia, Armenia, and Azerbaijan, the North Caucasian portion of the Russian Federation (including the Dagestan, Chechnya, Ingushetia, Northern

Ossetia, Kabardino-Balkaria, Karachai-Cherkesia, and Adigea Autonomous Republics), the northeastern part of Turkey, and a part of northwestern Iran. In the southern reaches, this hotspot is adjacent to the Irano-Anatolian Hotspot.

The vegetation of this hotspot is quite diverse. In the northern part of the hotspot, ecosystems transition from grassland steppes in the west to semi-desert to desert in the east. In the central Transcaucasian Depression, swamp forests, steppes, and arid woodlands are replaced by semi-deserts and deserts along the Caspian Sea. Scattered throughout the hotspot are broadleaf forests, montane coniferous forests, and shrublands.

Recent economic and political crises in the region are intensifying forest clearing for fuel wood, and together with illegal hunting and plant collecting, threaten the unique biodiversity of this region. The majority of intact habitat is in the higher mountain regions; and the lower plains are experiencing the greatest destruction.

The Irano-Anatolian Hotspot

Forming a natural barrier between the Mediterranean Basin and the dry plateaus of Western Asia, the mountains and basins that make up the Irano-Anatolian Hotspot contain many centers of local endemism. The hotspot covers 899,773 km², including major parts of central and eastern Turkey, a small part of southern Georgia, the Nahçevan Province of Azerbaijan, much of Armenia, northeastern Iraq, northern and western Iran, and the Northern Kopet Dagh Range in Turkmenistan.

The principal habitat in the hotspot is mountainous forest steppe, supporting oak-dominant (*Quercus* spp.) deciduous forests in the west and south (Anatolia and Zagros mountains) and juniper (*Juniperus* spp.) forests in the east (southern slopes of the Elburz Mountains and the Kopet Dagh). A wide zone of sub-alpine and alpine vegetation covers the mountain peaks above the timberline, and thorn-cushion formations are found in the sub-alpine zone.

World Wildlife Fund's Global Ecoregions

The map of ecoregions developed by the World Wildlife Fund (WWF)-U.S. is now the most widely used system for bioregional classification. WWF defines an ecoregion as a large unit of land or water containing a geographically distinct assemblage of species, natural communities, and environmental conditions. CI has tried to ensure that hotspot boundaries correspond to WWF's ecoregions. The following information is from http://www.panda.org/about_wwf/where_we_work/ecoregions/caucasus_temperate_forests.cfm (December, 2008).

WWF developed the Global 200, a list of ecoregions that are priorities for conservation. WWF assigns a conservation status to each ecoregion in the Global 200: critical or endangered; vulnerable; and relatively stable or intact. Armenia is located in the Caucasus-Anatolian Hyrcanian Temperate Forest Global 200, which is considered a critical/endangered Global 200 ecoregion.

This Global 200 ecoregion is made up of the following terrestrial ecoregions: Kopet Dag woodlands and forest steppe; Caucasus mixed forests; Euxine-Colchic deciduous forests; Northern Anatolian conifer and deciduous forests; Caspian Hyrcanian mixed forests; and Elburz Range forest steppe. The temperate forests of this Global ecoregion represent some of the most diverse and distinctive temperate forests in Eurasia.

The combination of a moderate climate, rugged topography, varied geology, and geographic proximity to both Europe and the Near East, help account for the uniqueness and complexity of plant and animal life. Endemism is high throughout - in the Caucasus alone up to 20 percent of the flora is considered endemic.

The threats to this Global ecoregion include clear cutting and replanting with alien species, coastal development in narrow coastal strips, overgrazing, recreation, and dam construction in large and small catchments.

2.4 ARMENIA'S BIODIVERSITY

According to the Floristic Division of the World (Takhtadzhjan, 1986), Armenia is located on the border between the Caucasian and Armeno-Iranian floristic provinces; or, more broadly, Boreal and Ancient Mediterranean floristic sub-kingdoms. The Caucasian province is more humid, and the Armeno-Iranian, more arid. The border between them does not correspond to the administrative areas as delineated by country borders. Four southern regions of Armenia are in the Armeno-Iranian province, and the rest --eight regions-- are in the Caucasian.

There are about 3,600 species of wild-growing vascular plants in Armenia. More than the half of the flora of the Caucasus (about 7,200 species) occurs in Armenia, which occupies only 6.7 percent of the whole territory of the Caucasus. In particular, plant density in Armenia is rather high - about 100 species per one km^2.

The dominant plant families of Armenia are *Asteraceae* (429 species), *Fabaceae* (309), *Poaceae* (258), *Rosaceae* (192), *Brassicaceae* (176), *Caryophyllaceae* (166), *Scrophulariaceae* (144), *Lamiaceae* (142), *Apiaceae* (124), and *Cyperaceae* (97). Armenia is one of the most important centers of species diversity for the many genera of vascular plants. There are more than 110 species of the Irano-Turanian genus *Astragalus* (the largest genus in the flora of Armenia).

Besides high species diversity, Armenia's flora has other notable features. There are over 125 endemic species found only in Armenia (**Annex I** lists endemic plant and animal species), a rich agro-biodiversity of wild-growing relatives of cultivated plants (see **Annex J**), including the single gene stock of wild-growing cereals--wheat, barley, rye (all wild-growing cereals originate from this stock), and tertiary relicts (juniper, yew, rhododendron). Armenia's flora contains plants important for their medicinal, decorative, historical, edible, and fodder value. Properties of many of Armenia's plants have yet to be evaluated.

As one of the centers of the origin of cultivated plants, Armenia is known for its indigenous diversity of numerous species of cereals, vegetables, in particular cucurbits, oil-bearing plants, and fruit crops. According to paleontological studies, wheat, barley, rye, oat, pea, melon, watermelon, apricot, grapes, pomegranate, and quince have been cultivated in Armenia since ancient times.

The fauna of Armenia is also very rich and diverse. There are over 500 species of vertebrates, including 350 bird species (as a comparison, the continental United States has approximately 550 species). The location of Armenia, and its varied ecosystems and climate, result in relatively high bird diversity. Bird species of Europe, the Mediterranean, and the Middle East are represented in Armenia, and the country is on a major migratory pathway. Mammals represent the second largest vertebrate class in Armenia, after birds, with 83 species recorded. The number of invertebrate species is about 17,000.

A total of 40 species of fish and eight amphibian species have been recorded in Armenia. The country is recognized as having one of the most interesting reptile faunas in the former Soviet Union. Of 156 reptiles recorded from across the former USSR, a total of 53 are present in Armenia, many of which are both endemic and threatened.

2.5 ENDEMIC SPECIES AND THEIR HABITATS

The flora of Armenia is remarkable by the high number of taxa confined to a small area, especially Armenian endemics. Armenian endemism is at the same level as found on large Mediterranean islands, which are ecologically richer than mainland regions of comparable size. The number of Armenian endemics approaches that of Sicily and Sardinia. The 125 plant species endemic to Armenia represent 3.5 percent of the total Armenian flora (as compared to 1.5 percent endemics across the Caucasus). Some of the highest plant endemism is found in the arid zones of the southern and central part of the country. **Annex I** contains a list of endemic species found in Armenia.

Of about 17,500 animal species recorded in the country, at least 330 are endemic to Armenia. Nine species and sub-species of fish are endemic to Armenia. These include the endemic species of Sevan trout *(Salmo isshkhan*), and its four races or sub-species (winter ishkhan-*S. ishkhan*; gegharquni-*S. ishkhan gegarkuni;* bojak-*S. ishkhan danilewskii*; and summer ishkhan-*S. ishkhan aestivalis*), which occur in Lake Sevan and surrounding rivers.

Of 53 reptile species found in Armenia, seven are endemic, including several species of rock lizards, such as *Lacerta unisexualis* (white-bellied lizard, found in the Sevan basin, and surrounding areas), *L. armeniaca* (the Armenian lizard, found in the north of the country), and *L. nairensis* (found around Hrazdan river and Lake Sevan).

No true endemic bird species are found in Armenia, although the Armenian gull (*Larus armeniacus*) is considered to be a sub-endemic, and has been recorded in the Lake Sevan basin, along the Arax, Hrazdan, and Akhurian Rivers, and in recent years in the Ararat Valley. In addition, the Caucasian Grouse (*Tetrao mlekosiewiczi)*, which is endemic to the Caucasus, occurs in Armenian highlands.

Among 83 mammals recorded in Armenia, six endemic (or sub-endemic) species or sub-species have been recorded - Transcaucasian mole vole (*Ellobius lutescens*), Vingradov's jird (*Meriones vinogradovi*), Minor-asian jerboa (*Allactaga williamsi*), the Caucasian birch mouse (*Sicista caucasica*), the Armenian mouflon (*Ovis orientalis gmelinii*), and a sub-species of Natterer's bat (*Myotis nattereri araxen*). Of particular note is the Armenian mouflon which used to range much farther, but is now restricted to areas in southern Armenia.

2.6 ENDANGERED AND THREATENED SPECIES AND THEIR HABITATS

The first edition of the Armenian Red Data Book was published during Soviet times, in 1987 for animals and 1989 for plants (they were in preparation for 15 years). Although they were published, they were not approved by Government as a Law and did not have the power of a Government policy or as a juridical document (that could be used in a court of law to try legal cases). After Independence, the new Government established the Ministry of Nature Protection (MNP), but the Ministry had no funding for a new edition of the Red Book (depending on the country, the Red Book must be republished every five to ten years). Even while scientists and some administrators understood that the existing Red Book was out of date, there was no possibility to conduct updated studies. To resolve this, the list of species from the first edition was approved by Government, without changes, as a juridical document. Then, in 2007 funding was provided (but not sufficient to complete the work), and the MNP ordered a new edition of the Red Book. For this edition, the list of species will be reviewed according to IUCN criteria. This was not done for the original Armenian Red Data Book.

The new edition (of which Biodiversity Analysis team member, Dr. Kamilla Tamanyan is a coordinator of the botanical part) is required to be completed in 2009, and at that time, Armenia will have a complete new list of rare and endangered species. Of course, many of the species from the previous list will be included in the new one. Because the IUCN criteria will be used, approximately 100 plant species, which were in the first list, will be excluded from the second; additionally, about 300 new plant species will be included in the update.

The current Red Data Book includes eight species of *Pteridophyta*, four gymnosperms, and 369 angiosperms, classified into five threat categories, ranging from 0 to 4. Thirty-six species are rated 0 (probably extinct – meaning that they have not been found recently although they may survive in inaccessible places); 130 species have been rated 1 (endangered – in the process of becoming extinct and requiring special protective measures); 154 species qualify as 2 (rare – not immediately endangered but at risk due to their excessive rarity); 59 species qualify as 3 (vulnerable – declining or in regression because of natural or anthropogenic factors); and eight species are classified as 4 (indefinite – of indeterminate status due to lack of information).

According to recent data from the Institute of Botany of Armenia, some species of previously indeterminate status (e.g. *Bupleurum kozo-poljanskyi, B. pauciradiatum, Merendera candidissima*) can now be assigned to a definite category. Also, two species (*Cyclamen vernum* and *Sternbergia colchiciflora*) which, in the Red Data Book, were presumed extinct in Armenia have recently been rediscovered.

Out of approximately 17,500 species of invertebrates and vertebrates recorded in Armenia, approximately 300 are considered to be rare or declining. Studies undertaken during the preparation of the updated Red Data Book for invertebrates indicate that over 100 species will be listed. Forty-eight species of invertebrates occurring in Armenia were listed in the Red Data Book of the Former Soviet Union.

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 internationally threatened, according to the IUCN Red List of Threatened Animals. The new edition of the Armenian Red Data Book will likely include many more species, perhaps doubling the existing list of vertebrates.

The status, distribution, and even scientific names, of many species have changed since the Armenian Red Data Book (plants and animals) was last published. A number of species occurring in isolated populations were not included in the book. Furthermore, the recent economic crisis during the transition period and natural disasters have severely impacted many species, and existing legislation still is not effective enough to protect them and to promote sustainable use—and discourage unsustainable use—of resources.

Annex H contains the IUCN list of threatened animal species (only vulnerable, endangered, and critically endangered have been included). The IUCN list of threatened plant species contains 20 species of plants, among them only *Rhus coriaria* and *Sambucus tigranii* are in the "vulnerable" category (none of the 20 are in a more threatened category). Given that the Armenian Red Book (plants and animals) is out of date, and the new edition is not yet available, the IUCN list is a credible alternative source of information for vulnerable, endangered, and critically endangered plants and animals. However, the IUCN list is also incomplete for Armenia. For example, about 20 plants are included in the IUCN list for the Caucasus region, with no indication that they occur in Armenia. Currently, both lists--Armenia's Red Data Book, and the IUCN list--must be referred to during the conduct of environmental impact assessments (EIA) to ensure no negative impacts to threatened species occur. When the Armenia Red Book is updated, this will be the official and legal version.

2.7 GENETIC DIVERSITY AND AGROBIODIVERSITY

Agrobiodiversity of Armenia includes cereal crops, grain legumes, fodder crops, vegetable-melons, and oil-bearing plants. The *Poaceae L.*, one of the most important taxonomic families for human food security, is represented in the country by 106 genera and 336 species. Armenia's rich agrobiodiversity is described below.

The Cereals group includes:

- 13 species and about 360 varieties of wheat. Wild one-grain, urartu, and wild two-grain species, growing in Armenia, are three of the four world famous wild wheat species which are characterized by a large intra-specific diversity (more than 110 varieties).
- Aegilops genus – represented by nine species and a large intra-specific diversity
- rye (Secale)– represented by cultivated, field-weed, and wild annual and wild bi-annual species
- barley (Hordeum) – represented by eight wild species with high intra-specific diversity and by two-row, intermediate and multi-row cultivated species
- oat (Avena) – seven species are found; it is not widespread or cultivated on-farm
- millet (Panicum) – two species are found in the wild. It is cultivated on small-scale plots (peasant farms).
- sorghum – two species are found, usually cultivated on small plots.

- maize (Zea maize) – local and imported varieties are cultivated.

Grain legumes are represented by lentil, wild species of chick-pea, and pea.

Fodder crops are represented by numerous species, ecotypes, and forms from the *Poaceae* and *Fabaceae* families. About 346 plant species of the *Fabaceae* family are reported in Armenia, among them meadow (*Lathyrus*) – 23 species, alfalfa (*Medicago*) – 14 species, and sainfoin (*Onobrychis*) – 24 species. Mainly indigenous species and forms are cultivated.

Vegetable-melons are represented by numerous species of the *Solanaceae, Brassicaceae, Liliaceae, Chenopodiaceae, Cucurbitaceae, Apiaceae, Asteraceae, Portulacaceae, Lamiaceae,* and *Malvaceae* families.

Oil-bearing plants are represented by cultivated and wild flax, hemp, Oriental poppy, and many other species, ecotypes, and forms.

Fruits and berries are widespread. Cultivated crops primarily belong to the Rosacea family: pear (*Pyrus*) – 32 species, 12 of which are Armenian endemic plants; almond (*Amygdalus*) – two species, apple (*Malus*) – one species, medlar (*Mespilus*) – one species, plums (*Prunus*) – 17 species, hawthorn (*Sorbus*) – 15 species.

Nut bearing trees cultivated in Armenia include walnut (*Juglans regia*), hazel (*Corylus avellana*, *C. colurna*), and chestnut (*Castanea sativa*). Wild species of almond (*Amygdalus nairica, A. fenzliana, A. urartu*) and pistachio (*Pistacia mutica*) are also cultivated.

Wild-grown plants of local/community and traditional significance include medlar, holly, rhubarb, some herbs/condiments, and fodder crops.

Agrobiodiversity in Armenia is notable for the diversity of economically valuable species, which can be divided as follows:

- Edible plants are represented by more than 200 species plus ten species of mushrooms.
- Forage – more than 2000 species
- Medicinal plants make up more than ten percent of the entire flora
- Melliferous plants – about 350 species
- Volatile-oil-bearing plants – 120 species
- Vitamin plants – 30 species
- Resin plants – 60 species

Due to an abundance of wild relatives of cultivated plants (see **Annex J**), Armenia was defined by N.I.Vavilov (1987) as a center of cultivated plant diversity. Armenia is considered the Western Asia center of cultivated plant origin (soft and durum wheat, pea, lentil, grape). The high concentration of wild progenitors of cultivated plants represents a very rich gene pool for the creation of new crop varieties resistant to diseases, drought, and cold—this is of great importance given the global impacts that climate change is expected to have on crop production.

Armenia is also an ancient center for livestock breeding and is the native land of the wild ancestor of sheep—the Armenian mouflon. Armenia also contains habitats of endemic goats and horses that originated on the Armenian Plateau.

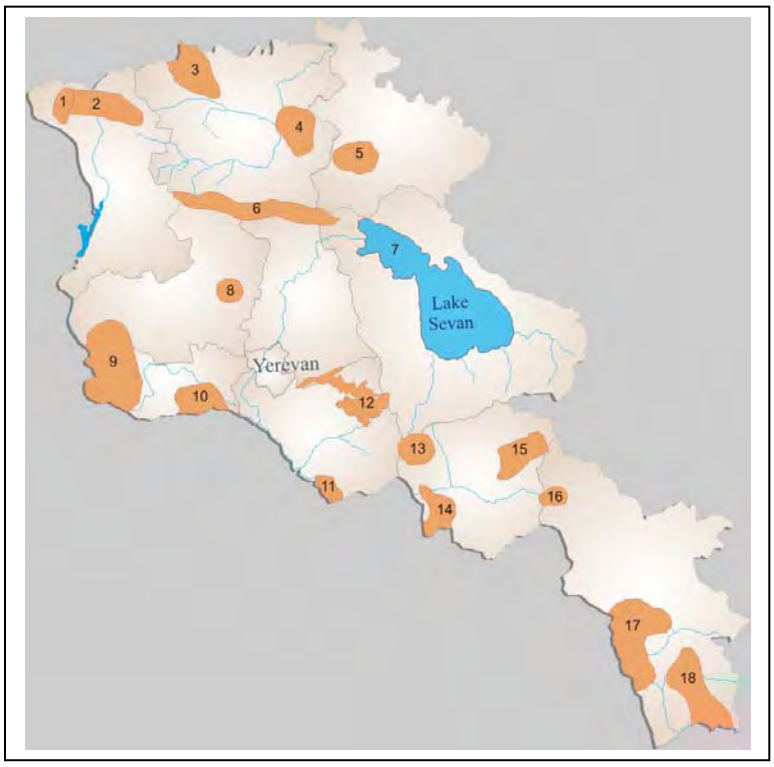
2.8 IMPORTANT BIRD AREAS AND MIGRATORY PATHS

The Important Bird Areas (IBAs) Programme of BirdLife International aims to identify, monitor, and protect a global network of IBAs for the conservation of the world's birds and other biodiversity. The selection of IBAs is a particularly effective way of identifying conservation priorities. IBAs are key sites for conservation – small enough to be conserved in their entirety and often already part of a protected area (PA) network—and if not, the IBA selection process can help a country set priorities for conservation of PAs. The IBA Programme can also be a powerful way to build national institutional capacity, to identify conservation priorities, and to set an effective conservation agenda (*http://www.birdlife.org/action/science/sites/index.html*). IBAs are also an important tool for the consideration of environmental impacts to bird populations during the EIA process.

The BirdLife affiliate in Armenia is Armenian Society for the Protection of Birds (ASPB). After years of field research and data compilation, ASPB identified 18 IBAs in Armenia (see **Exhibit 1**).

Exhibit 1: IBAs in Armenia

1. Lake Arpi IBA
2. Amasia IBA
3. Tashir IBA
4. Dsegh IBA
5. Haghartsin IBA
6. Pambak Mountain Chain IBA
7. Lake Sevan IBA
8. Mount Ara IBA
9. Sardarapat Steppe IBA
10. Metsamor River System IBA
11. Armash IBA
12. Khosrov IBA
13. Gndasar IBA
14. Noravank IBA
15. Jermuk IBA
16. Gorayk IBA
17. Zangezur IBA
18. Meghri IBA



All 18 of the IBAs satisfy one or more of three requirements for selection of IBAs:

1. Hold significant numbers of one or more globally threatened species (**Annex J**);
2. Are one of a set of sites that together hold a suite of restricted-range species or biome-restricted species; or
3. Have exceptionally large numbers of migratory or congregatory species.

Exhibit 2 shows the criteria for designation of each IBA.

Exhibit 2: Name and criteria for IBAs of Armenia (BirdLife International)

#	International name	* Criteria
1.	Lake Arpi	A1, A4i, B1i, B1iv, B2
2.	Amasia	A1, A4i, B1i, B2
3.	Tashir	A1, A2, B2
4.	Dsegh	B1iv, B2
5.	Haghartsin	A1, B2
6.	Pambak Mountain Chain	A1, A2, A3, B2
7.	Lake Sevan	A1, B2, B3
8.	Mount Ara	A1, A3, B2
9.	Sardarapat Steppe	A4i, B1i
10.	Metsamor River System	A1, A4i, B1i
11.	Armash	A1, A2, A3, B2, B3
12.	Khosrov	A1, B1iv, B2
13.	Gndasar	A1, A2, B2, B3
14.	Noravank	A1, B2
15.	Jermuk	A1, B2
16.	Gorayk	A1, B1iv, B2
17.	Zangezur	A1, B1iv, B2
18.	Meghri	A1, A2, A3, B2

*** Criteria of IBA**

A: Global	B**: European**	C: **European Union**
A1. Species of global conservation concern A2. Restricted-range species A3. Biome-restricted species A4. Congregations i. The site is known or thought to hold, on a regular basis, ≥ 1% of a biogeographic population of a congregatory waterbird species. ii. The site is known or thought to hold, on a regular basis, ≥ 1% of the global population of a congregatory seabird or terrestrial species. iii. The site is known or thought to hold, on a regular basis, ≥ 20,000 waterbirds or ≥ 10,000 pairs of seabird of one or more species. iv. The site is known or thought to be a 'bottleneck' site where at least 20,000 storks (Ciconiidae), raptors (Accipitriformes and Falconiformes) or cranes (Gruidae) regularly pass during spring or autumn migration.	B1. Congregations i. The site is known or thought to hold ≥ 1% of a flyway or other distinct population of a waterbird species. ii. The site is known or thought to hold ≥ 1% of a distinct population of a seabird species. iii. The site is known or thought to hold ≥ 1% of a flyway or other distinct population of other congregatory species. iv. The site is a 'bottleneck' site where over 5,000 storks, or over 3,000 raptors or cranes regularly pass on spring or autumn migration. B2. Species with an unfavourable conservation status in Europe B3. Species with a favourable conservation status in Europe	C1. Species of global conservation concern C2. Concentrations of a species threatened at the European Union level C3. Congregations of migratory species not threatened at the EU level C4. Congregatory – large congregations C5. Congregatory – bottleneck sites C6. Species threatened at the European Union level C7. Other ornithological criteria

Some IBAs (Armash Fish Farm, Metsamor River System, Lake Arpi, Lake Sevan, and Gorayk) are mainly open water and wetland ecosystems that provide habitat for large colonies of waterfowl. Alternatively, Khosrov IBA extends over four landscape zones: desert/semi-desert, mountain steppe, woodland, and alpine

and sub-alpine meadows (much valuable high altitude habitat--meadow steppe on plateaus and rocky areas—lies outside the reserve). At least 156 bird species have been recorded there, and 76 species breed there. It is an outstanding site for raptors, with at least 21 species breeding and three possibly breeding (i.e., *Aquila chrysaetos, A. pomarina, Circaetus gallicus, Accipiter brevipes,* and, uniquely in Armenia, a small relict population of *Aegolius funereus*). A colony of *Apus melba* in Azat Gorge numbers some 2,000 birds. Among other breeding birds are *Dendrocopos medius, Oenanthe hispanica, Monticola saxatilis, M. solitarius* and *Bucanetes githagineus* (http://www.birdlife.org). Of special interest are the largest breeding colonies of the "endemic" Armenian gull *(Larus armenicus)* on Lake Arpi and Lake Sevan, and breeding colonies of the globally threatened pygmy cormorant *(Phalacrocorax pygmaeus)* on commercial fishponds in Ararat Valley. (Jenderedjian K. et al., 2004).

The IBA map largely coincides with the map of specially protected nature areas (SPNA) of Armenia, published under the "Protected Areas Programme 2012 - Caucasus Ecoregion." Especially with the newly planned Lake Arpi, Arevik, and Gnishik National Parks and Zangezur Sanctuary, the SPNA network will strongly correspond to the designated IBAs. Establishment of these PAs is important for protection of unique and abundant rare and endangered species of avifauna in the northern and especially in the southern part of Armenia.

There are still gaps between the IBAs and the planned network of PAs. For example, the PA network does not include the very important Armash Fish Farm or Metsamor River System IBAs. This is because of their forms of land ownership, high population, and/or human activities.

2.9 ECOSYSTEM SERVICES AND VALUE

Natural ecosystems provide various services that are beneficial to humans. Watersheds protect sources of potable water, provide irrigation water, regulate water flow and thereby protect against flooding and drought, and provide water for electricity generation. Ecosystems are important for maintaining soil fertility and a soil's physical characteristics, which is key to agricultural production as well as ecosystem maintenance. Other ecosystem services include:

- Economic benefits: from timber, fodder for livestock; commercial fisheries; and fees collected from users of PAs to support the government budget
- Livelihood benefits: fuel wood from forests; non-timber forest products for cultural and medicinal purposes; protein from fisheries
- Aesthetic and recreational benefits: lakes, forest trails, open space
- Carbon sink: forests and other vegetation capture climate changing gases
- Clean water: wetlands and other waters act as filters
- Mitigation of potential disasters: forests and wetlands soak up floodwaters; intact vegetation on slopes can prevent landslides.
- Biodiversity conservation: complex webs maintain ecosystems; the knowledge that the world is rich in species contributes to the overall well-being of many.

The following is a brief description of the services that Armenia's ecosystems provide:

Deserts are sometimes used as alternative, but inferior pastures. The sand is used for building. When irrigated, they may be used as agricultural fields, but agricultural productivity is very limited. The role of deserts in biodiversity conservation is probably their most important service. There are many endemic, rare, and endangered species that are found in Armenia's desert region. Aesthetically, Armenia's deserts contain very decorative, ornamental plant species and are a major interest for nature lovers (high potential for ecotourism).

Semi-deserts are used by local populations as winter and spring pastures. Semi-desert areas in Armenia are often irrigated and used in agriculture. The biodiversity function is also very important. There are many endemic, rare, and endangered species included in the Red Data Book. Due to arid conditions, the speciation processes are more intensive, leading to an abundance of endemic and rare plant and animal species. Also as above, semi-deserts hold great interest for nature lovers.

Arid open forests are used by the local population as a source of timber. On moderate slopes with a low density of woody vegetation, they are used as spring and summer pastures. The flora includes many medicinal and edible (fruit-berry) plants, which is collected for personal and commercial use (selling in local markets). As far as biodiversity value, arid open forests and shibliak are characterized by very rich species composition. There are many endemic and rare plant and animal species in these communities. Aesthetically, these forests are considered beautiful and peaceful, and include many highly ornamental plants.

Mountain steppes: A majority of steppes are plowed and used for irrigated and unirrigated agriculture. Most of the remaining steppe is used as pasture and, infrequently, as hayfields. The flora includes many medicinal and edible plants. As one of the most widespread ecosystem types, it has high biodiversity value—it is widespread enough to securely hold many endemic and rare plant and animal species. Steppes are one of the most common landscapes of Armenia, and are considered exceedingly beautiful in springtime and early summer (particularly feather-grass steppes). Many very ornamental plants are found in steppes.

Forests: From an economic standpoint, forests are the most important natural ecosystem of Armenia. Wood and non-timber products contribute to Armenia's GDP. Their biodiversity value is high as well; there are many endemic and rare plant and animal species in Armenian forests. They hold the most diverse and rare wildlife of Armenia, and provide food and habitat for wildlife and birds. As all forests do, Armenia's forests accumulate CO_2, thereby providing a "carbon sink," which can potentially generate income (as part of carbon markets) if left in its natural state. Aesthetically, forests are considered among the most beautiful landscapes in Armenia, and include the most picturesque places—historical and natural monuments are located in forests, and many paintings of Armenia proudly display Armenia's forests. Forests also stabilize soil, and especially on steep slopes, can mitigate potentially disastrous landslides. They also hold water, and slowly release it, ameliorating floodwaters and providing a cushion against drought, and they are a source of irrigation water, potable water, and provide water for electricity generation.

Sub-alpine and alpine meadows are used by the local population as high quality pasture and hayfields. Many edible plants are found in these meadow ecosystems, and they are collected by local populations for personal use and for sale at local markets. Although endemic species are not very rich, the number of rare species is high. Because of the high humus content in the soil (15-20 percent), they act as good CO_2 sinks. Aesthetically, sub-alpine and alpine meadows are considered exceedingly beautiful and they have many very ornamental plants.

Wetlands and waters are used for a variety of economic purposes including sources of clean water for drinking and washing, sources of power production, nurseries for fish, and sources of turf. Biodiversity-wise, wetlands and waters provide important habitat for many endemic and rare species of flora and fauna, and are especially important as habitat for migratory and nesting birds. Lake Sevan once provided an important commercial fishery, and many in Armenia hope that this will some day be restored. In Armenia, wetlands are many of the designated IBAs and Lake Sevan and Lake Arpi and their adjacent wetlands are Ramsar sites. Wetlands absorb water and slowly release it to the surroundings, ameliorating floods. Aesthetically, a majority of lakes and rivers of Armenia provide beautiful vistas and are destinations for many tourists.

Petrofilous ecosystems: Except for stones as a source for building, these ecosystems are not used by local populations. Their most important function is for biodiversity since many endemic, rare, and disappearing species of plants and animals are found there. Aesthetically, petrofilous ecosystems are usually located in very picturesque spots, and contain ornamental plants with breathtaking cliffs, rocks, and screes.

Around 10 percent of plants in Armenia are thought to have some medicinal value, and have been used for traditional medicine for centuries. Key medicinal plants include species of hawthorn (*Crataegus*), blackthorn (*Rhamnus*), juniper (*Juniperus*), barberries (*Berberis*), roses (*Rosa*), and St. John's wort (*Hypericum*). A further 120 species are known as a source for essential oils (such as *Thymus spp., Helichrysum spp.,* and *Artemisia spp.*), and 130 for their high vitamin content. Around 300 plants are used for their decorative value, as a source of horticultural plants. Plants are also used in a range of other ways: for dyeing (120 species, including *Euphorbia, Rhamnus, Sambucus,* and *Rubia*); for tannin production (60 species); and for resin (around 60 species, including *Astragalus*).

As a whole Armenia's biodiversity has enormous value. An abundance of endemic plant and animal species contribute to Armenia's global biodiversity value. Armenia's ecosystems also contribute revenue to the budget of the republic; it is the foundation for economic growth and for much of the population's livelihoods. However, a root cause of biodiversity loss is that ecosystem services (biodiversity) are valued only for their economic value, not for the other services they provide (see Section 10, threats). And therefore, in government decision making and in the accounts of the Republic, as well as in the minds of Armenia's people, Armenia's biodiversity is significantly under-valued.

3. POLICY AND INSTITUTIONAL CONTEXT FOR BIODIVERSITY CONSERVATION

3.1 POLICY FRAMEWORK

Armenia's National Environmental Action Plan (NEAP-1) was approved in December 1998. NEAP-1 was available when the previous USAID/Armenia Biodiversity Analysis (2000) and update (2003) were prepared. Since then, NEAP-2 has been approved (August 2008), and provides a strategic framework for environmental policy. The box below highlights, by program area, NEAP-2 priority activities directly relevant to biodiversity conservation.

As discussed in USAID/Armenia's Biodiversity Analysis (2000), based on Armenia's first national report to the Convention on Biodiversity (CBD), a national Biodiversity Strategy and Action Plan (BSAP) was prepared. The BSAP outlines 242 priority activities.

NEAP-2 Biodiversity Conservation Activities

Environmental Policy, Legislation and Institutional Capacities

- Draft the "Law on Environment Protection" and sub-legislative acts to ensure enforcement
- Develop package on mechanisms for comprehensive and integrated prevention of harmful environmental impacts

Economic and Financial Mechanisms

- Develop strategy on funding environmental programs (including a package for introduction of state environmental expenses system; establishment of legal framework for promoting participation of private sector in the environment sector; and an increase in environmental programs funded through the Clean Development Mechanism)
- Develop recommendations on improving procedures for development and implementation of environmental programs
- Develop recommendations for introducing economic stimulation mechanisms
- Develop proposals on economic assessment of bio-resources

Management of biodiversity and bioresources, including the forest sector

- Inventory of more valuable areas of Armenia from a biodiversity perspective, determination of biodiversity protection mechanisms for those areas
- Implement state accounting of biodiversity and create state cadastre according to the marzes of Armenia, including preparation of the annotated lists of flora and fauna species and basic ecosystems
- Establish biodiversity monitoring system and database
- Analysis of SPNAs, elaborate proposals on system improvement, create new PAs, including biosphere reserves and corridors
- Inventory and situation assessment for rare and endangered flora and fauna, publish the Red Book of Armenia
- Identify the most used and useful species of plants and hunted animals, develop quotas for collection/hunting
- Analyze international experience in impact assessment of various branches of the economy, pilot impact assessment methodologies, develop guidelines applicable to Armenia
- Develop mechanisms for fair distribution of benefits from use of genetic resources
- Improve industrial fishing mechanisms and restore valuable fish species
- Clarify 2009-2012 implementation timescales for measures in the National Forest Programme
- Develop and implement pilot project on pests and fire prevention in forests most vulnerable to climate change

In 2001, the Second National Report to the CBD was prepared. Based on this, the 2002 Assessment of Priority Capacity Building Needs for Biodiversity was produced. In 2005 the Third National Report to the CBD was prepared. Currently, the Fourth National Report to the CBD is in preparation, and will be completed in March 2009.

Armenia's Key Policies and Laws Related to Biodiversity

Below are brief descriptions of Armenia's key biodiversity policies and laws that have come into effect since the 2000 Biodiversity Analysis.

(1) The Forest Code (2005) regulates the protection and use of forests, including conservation of biodiversity within forest areas. The Code stipulates that all forests are state property and that Government is responsible for their use. However, the Code allows for developing forests on private land; and significantly, it also discusses forests on community land, which can be managed by local communities. However, community forest management is still at a very nascent stage in Armenia. Although at this point, it is impossible to predict how community forests will be managed and how communities will benefit, this is a major change since the original USAID Biodiversity Analysis (which stated that the Forest Statute did not allow for the development of forest-based enterprises by the private sector or local communities.)

(2) Recent developments in the legislative framework (since 2000) for PAs are:

- In 2002, the Strategy on Developing Specially Protected Nature Areas of Armenia and National Action Plan was approved by the Government of Armenia; and
- In 2006, the new Law on Specially Protected Nature Areas was adopted.

The 2006 law provides for sustainable use of certain SPNAs (although the mechanism for this to occur is still uncertain. Management Plans are required to be participatory, with the involvement of stakeholders. However, as stated in Gevorgyan and Aghasyan (2008), "there is not much experience in such collaboration as the management planning process on the territory of RA is still in its first stages of development." Most of the impetus and experience for using the participatory approach is coming from the NGO sector: WWF and UNDP are providing the lead and expertise in conducting participatory management planning processes. Gevorgyan and Aghasyan (2008) also state that SPNA management envisages a balance between protection of biodiversity and socioeconomic development of the local population and integrating this into SPNAs. This is a significant change since the previous Biodiversity Analysis; but again, it is difficult to predict how local populations will obtain socioeconomic benefits from SPNAs.

(3) The Law on Plant Conservation and Plant Quarantine establishes the legal and economic issues for plant quarantine.

(4) The Law on Lake Sevan (2001) regulates activities on Lake Sevan and includes the establishment of a high-level management structure to address issues of conservation and sustainable use of the basin and its ecosystem. The Law on Adoption of Comprehensive Annual Measures of Rehabilitation, Conservation, and Replication and Use of Sevan Lake Ecosystem defines annual and comprehensive projects on the Sevan Lake ecosystem, and provides for collecting information on Lake Sevan basin's water resources, flora, and fauna. The law establishes norms for the use of water and bioresources.

(5) The Water Code adopted in 2002 is based on the concept of integrated basin management and is designed to promote water allocation decisions based on a balancing of basin supplies with demand. The Code puts in place a system of water use permitting that includes quality protection standards and enables the use of economic instruments for water resources management and cost recovery. In addition to creating a set of institutions for water management and protection, water use systems, and the regulation of use systems, the

Code reinforces requirements for public notice and comment on major actions and provides right of access to information.

(6) The Law on Hunt and Hunting Economies (2007) regulates hunting in the territory of the country, including hunting of endangered species (Red Listed), as well as establishment and management of hunting economies.

(7) The National Biosafety Framework (2003) objectives are to: implement the framework of the Cartagena Protocol to prevent and regulate uncontrolled living modified organism (LMO) distribution in Armenia; prevent any LMO-related activity that is prohibited in Armenia; develop technical and procedural norms for conservation of biodiversity, and protection of the environment and human health, taking into consideration the risks related to LMOs' use; develop administrative, institutional, and scientific capacities to control and manage the import, export, obtaining, and use of LMOs; provide opportunities for land owners and biotechnological industries to decide between application of modern biotechnologies and traditional production techniques (including organic farming); provide consumers with a choice between the products obtained by application of modern biotechnologies and those of traditional production techniques; create equal opportunities for the public to participate in LMO-related decision-making processes; and establish appropriate administrative and legislative frameworks to ensure proper implementation of the Cartagena Protocol.

Currently, Armenia lacks a comprehensive biosafety legislative framework that regulates LMO use, their deliberate release to the environment, placement on the market, and export and import of LMOs and GMO-containing products. Developing a law on biological safety and mechanisms and tools for its enforcement are priorities of the MNP. According to the National Biosafety Framework, GMO/LMO monitoring system gaps are: a system for modern biotechnology (MB)/GMOs monitoring has not been established yet; the legislative framework is absent; and there is no structural body responsible for implementation of MB/GMOs monitoring.

Other key laws and regulations relating to biodiversity conservation and natural resource use in Armenia (in effect since 2001) are:

- The Land Code (2001)
- The law of the RoA "On approving the annual plans for rehabilitation, conservation, reproduction and use of the ecosystem of the Lake Sevan" (2001)
- The law of the RoA "On population's environmental education and upbringing" (2001)
- The law of the RoA "On tariffs for compensation of damages caused to fauna and flora as a result of environmental violations" 03 May.2005
- The law of the RoA "On wastes" 24 Nov.2004
- The law of the RoA "On environmental supervision" 11 April 2005
- State strategy for the development of the specially protected area of Armenia's nature and national action plan (2002)
- National Forest Policy and Strategy (2004)
- Sustainable Agriculture Development Strategy (2004)
- Armenian Food Safety Policy (2004)
- National Forest Program (2005)
- Action Plan of Measures to Address the Problem of Illegal Logging (2005)
- Program of Implementation of State Forest Monitoring (2006)

International treaties

After independence, Armenia became a signatory to a number of international conventions that pertain to biodiversity conservation, including:

- Convention on Biological Diversity (CBD, Rio de Janeiro, 1992), ratified by Armenia in 1993.Cartagena Protocol, ratified in 2004.
- Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention, 1971). Armenia ratified the Ramsar Convention in 1993.
- Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention, Paris, 1972). Armenia ratified this convention in 1993.
- Convention on Long-Range Transboundary Air Pollution ratified on 1996.
- Convention to Combat Desertification (UNCCD, Paris, 1994). The UNCCD was ratified by Armenia in 1997. A National Action Programme to Combat Desertification in Armenia has been developed to meet obligations under this convention (the NAP was prepared since the last USAID Biodiversity Analysis).
- Framework Convention on Climate Change (UNFCCC, Rio de Janeiro, 1992) was ratified by Armenia in 1993 and a Country Study on Climate Change and First National Communication were produced (produced after the last Biodiversity Analysis). Preparation of the Second National Communication is underway.
- Espoo Convention on Environmental Impact Assessment in Transboundary Context was ratified by Armenia in 1996.
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was ratified in 1999.
- Aaarhus Convention on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters was ratified in 2001 and in response, the Public Information Center was created in the MNP. This occurred after the 2000 Biodiversity Analysis was prepared, and is a major step for Armenia. It could have significant ramifications in the way that environmental information is disclosed, and in the way civil society's views are considered in government decisions.
- Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) was ratified in 2008.
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), ratified on 21 October 2008; will be in force on 21 January 2009.

3.2 INSTITUTIONAL FRAMEWORK

National

Soon after independence, the Ministry of Nature Protection (MNP) was created on the basis of the former State Committee on Nature Protection. The MNP's current responsibilities are assigned by the Code approved by Government Decree No. 908 of 26 August 2002, and include conservation of all natural resources in Armenia, as well as management, use, and regeneration of biological and water resources. However, in practice, this is shared with the Ministry of Agriculture (MoA). The MoA is responsible for agricultural development on state lands and coordinates assistance and extension services to farmers on recently privatized lands. It is also the authorized management body for forest maintenance, protection, reproduction, and use. The Ministry of Energy and Natural Resources is charged with management and use of natural resources other than biological and water resources.

Since the First National Communication of Armenia (1998) until 2004 the forest sector was regulated by the MNP—governing and regulatory functions covering forests were combined under one entity. In 2004, the Government of Armenia removed the "Hayantar" State Non-Commercial Organization (SNCO) that held the forestry regulatory function and placed it under the MoA. Now, the authorized management body for forest maintenance, protection, reproduction, and use is the MoA. This is a significant change since the original Biodiversity Analysis was prepared, and many in the environmental community hope that it signifies a change that would allow the MNP to provide oversight and to regulate, without creating a conflict of interest (MNP is no longer in charge of timber production and activities that support timber production).

As the original USAID Biodiversity Analysis describes, through its relevant departments and in collaboration with external experts, the MNP is responsible for:

- Organizing and implementing ecological surveys and natural resource inventories;
- *In-situ* conservation of habitats and species; and
- Providing guidelines for the sustainable management of habitats and species, including *ex-situ* conservation.

The MNP is also the administrative authority responsible for the supervision of all PAs in Armenia. Nonetheless, direct management of PAs is:

- Carried out by the MNP directly, as in the case for National Parks and State Reserves, as well as of eight State Conservation Areas;
- Assigned to the Hayantar, the Forestry Department of the MoA, which is directly responsible for the management of 14 state conservation areas; or
- Assigned to the Institute of Physics, as is the case for one PA, Aragats Alpine State Sanctuary which includes Kari Lake and alpine glacier.

Additional information on the MNP, its functions and agencies is provided in Section 5, Status and Management of Armenia's Protected Area System.

3.3 ENFORCEMENT OF LEGISLATION

The MNP, through its Agencies (i.e., Agency for Bioresources Management, Agency for Water Resources Management), is responsible for management of natural resources; and through the State Environmental Inspectorate, for enforcement of environmental legislation. The MNP is one of four Armenian Government bodies entrusted with legal enforcement powers; the other three being the Ministry of Finance, Ministry of Justice, and the Republic of Armenia Police (www.gov.am).

The MNP undertakes its enforcement responsibilities using its own staff and financial resources, although in many cases inspections and patrols are carried out in close collaboration with the police. The MNP is also responsible for overseeing and advising on the activities of other relevant ministries to ensure coordination and compliance with environmental legislation. However, consideration of the environment in other sectors is limited. Several of those interviewed stated that there is little "cross-fertilization" between other technical ministries and the MNP.

Under current legislation, all new industrial enterprises are required to conduct an environmental impact assessment (EIA) and obtain clearance from the MNP. An EIA is required if: i) the project is in the mandatory list stated in the law; ii) the amount of production exceeds threshold values specified in regulations; and iii) the project is located in a protected area. The MNP thus has a legally mandated role in monitoring, advising, and potentially vetoing proposed investments, based on the EIA. EIAs in Armenia are

required to be participatory, and to consider the views of the potentially affected public. Limitations to this are described in Section 10.

The MNP also issues licenses for the use of natural resources; a user fee is required to obtain a permit. These fees are defined by the MNP. User fees are collected by the Government for hunting permits and fishing permits.

3.4 ACADEMIC INSTITUTES

Academic institutes of the National Academy of Sciences (NAS), notably the Institutes of Zoology, of Botany, of Hydro-ecology and Ichthyology, the Center of Noosphere Investigations (Noosphere is the sphere impacted by human activity), and Yerevan State University are involved in environmental research. The focus of their activities is largely academic, although the Institutes of Zoology, of Botany, and the Biological Faculty of Yerevan State University are currently updating the Red Data Book of Armenia. Individuals from these institutes may work on other conservation projects (i.e., biological monitoring, and national reports such as for the CBD and UNCCD).

American University of Armenia's Acopian Center for the Environment (ACE) is involved in biodiversity conservation. ACE is specifically notable for its research and conservation of birds in Armenia. The Agricultural Academy is the only academic institution in Armenia teaching forestry science and management; and it is also active in the field of agro-biodiversity teaching and research. Yerevan State Institute of Economy teaches the subject of Environmental Economics. At Yerevan State University of Architecture and Construction, research is carried out on economic valuation of biodiversity resources and EIA.

The following (from the *National Capacity Self Assessment for Global Environmental Management 2004*) describes some of the activities of the main academic institutes in Armenia and their work in the field of biodiversity conservation:

Institute of Zoology (RA National Academy of Science): Studies on the state and taxonomic composition of vertebrates; composition of insects, and rare, endemic, and endangered species in some SPNAs; database on vertebrates of reserves and national parks; and taxonomic data for the updated Red Book.

Institute of Botany (RA National Academy of Science): Developed and published *Flora of Armenia* (10 volumes; the 11th is currently being developed); developing electronic version of the Red Book of Armenia; investigates natural resources and norms for use in different regions of Armenia; and investigates crops of wild relatives.

Institute of Hydro-ecology and Ichthyology (RA National Academy of Science): Studies on the state of the whitefish population in Sevan Lake, fodder base and industrial school size; and structural changes in the phytoplankton of the lake.

Scientific Center on Agriculture and Plant Protection (RA Ministry of Agriculture): Developing ecological methods for integrated pest management aimed at improvement of forest ecosystems.

Forest Research and Experimental Center: Investigates current state of forests, role and significance of species in regard to rehabilitation, taxonomic composition of wild flora, and main habitats of species.

Yerevan State University: Investigates biological characteristics of parthenogenesis lizards' population in regard to climate adaptation; investigates Sevan National Park macro-micelles, mapping of Red Book fungi; and investigates medicinal mushrooms and potential in biotechnology.
Armenian Agricultural Academy: Investigates valuable wild species of the Armenian gene pool, and developing a database.

3.5 NON-GOVERNMENTAL ORGANIZATIONS (NGOS)

Historically, environmental NGOs in Armenia have been created and run by scientists and academic experts with an interest and training in environmental issues. Recently, more environmental NGOs are being started and registered by those interested in advocating for environmental causes, including journalists, teachers, and others interested in conserving nature. These NGOs have shifted the environmental "scene" towards a greater involvement of civil society in environmental issues and increased environmental awareness among the public.

The RA Law on Non-Governmental Organizations (2001) regulates the activities of NGOs in Armenia and relevant freedoms reserved for them. Following the ratification of the Aarhus Convention by Armenia in 2001, cooperation with NGOs has expanded.

At the time the original Biodiversity Analysis and update were prepared, most local NGOs were small, had very few resources, and relied on the initiative and economic support of a few individuals. This is still the case today. However, international environmental NGOs have given a boost to the local NGO community. WWF was established in Armenia in 2001. Many WWF activities are undertaken in collaboration with local organizations, and this provides a means of support to these smaller, local NGOs. The World Conservation Union (IUCN) is now working closely with MNP and local NGOs—this also has been a fairly recent development (since preparation of the original Biodiversity Analysis).

In 2003, more than 50 NGOs were involved in environmental activities, principally awareness raising and information dissemination. Today there are approximately 106 environmental NGOs, the majority, located in Yerevan (A Directory of Environmental NGOs of Azerbaijan, Armenia, Azerbaijan, and Georgia, 2004, REC Caucasus). According to the NGOs' self-assessment, conducted by the Association for Sustainable Human Development (July, 2003), all environmental NGOs consider the improvement of the ecological situation as the main priority in their respective missions and evaluate themselves as highly professional organizations with great potential and highly effective operations.

The Armenian diaspora strongly supports the environmental NGO community. The Armenian Tree Project (ATP), American University's Acopian Center for the Environment (ACE), and the Armenian Environment Network are three examples of local NGOs with considerable diaspora support. NGO projects are discussed in Section 9.

Marzes

Only one territory government in Gegharquniq Marz has an Environmental Department. All other administrative regions have Environmental Divisions or groups, mainly in the Agricultural Department. They are obliged to monitor biodiversity status as a whole and in particular, monitor the status of populations of rare and endangered species. However, these programs are highly constrained by the lack of specialists at the Marz Environmental Department level and insufficient funding. The role of these departments in biodiversity conservation, therefore, is largely on paper only.

The "Forest Code" has expanded the functions of Territory Governments and Local Administrations regarding forest management. These government entities are now charged with organization and management of community and private forests. However, as above, technical capacity and funding are significant constraints. And currently, "community forests" exist on paper only.

Local

According to the law "On local administration," community majors organize conservation and protection of community lands, forest, and water territories, as well as the environment as a whole.

3.6 POLICY AND INSTITUTIONAL WEAKNESSES AND GAPS

Policy Weaknesses and Gaps

The following are some key weaknesses and gaps in Armenia's policy framework that governs biodiversity conservation.

There are gaps, inconsistencies, and in some cases contradictions between some of the RA laws and other legislative documents. For example, between the "Law on Fauna" and the "Law on hunt and hunting economies," there is an inconsistency regarding the hunting of red-listed species. The law on hunting and hunting economies allows hunting of red-listed species; whereas the Law on Fauna protects these species from hunting.

Also, there are contradictions between legislative documents and actual practice. For example, in some cases the MoA is responsible for PA management, while the MNP is the responsible administrative authority.

As compared to worldwide best practice, there are gaps in the procedures for EIA, as regulated by the "Law on Environmental Impact Expertise." Typically, a screening process would be incorporated to identify projects that have little or no potential environmental impacts, and these would be categorically excluded from further environmental review. During the screening process, for those projects with potential impacts, different levels of environmental review would be assigned. The RA law does not allow for this tiered environmental review.

Even though several legally binding documents may require action, there may be little or no actual implementation of officially approved Laws, National Strategies, and Action Plans. For example, even though restoration of Lake Gilli was to be completed in 2002, as mentioned in the "Law on approving the annual plans for rehabilitation, conservation, reproduction and use of the ecosystem of Lake Sevan" and the "State strategy for the development of the specially protected area of Armenia's nature and national action plan," Lake Gilli was not actually restored.

In addition, a community benefit component is now included in the PA and forestry legislation, but it has yet to be put into practice. Given that the concept of community benefit is a recent development, this gap in implementation is now beginning to be addressed. However, the mechanisms for communities to actually benefit from PA and forest resources are still unclear. This is a key gap in the legislation that may be filled in part by from the "ground-up." World Wildlife Fund (WWF), Armenia Tree Project (ATP), and the Global Environmental Facility (GEF)/United Nations Development Programme (UNDP) are working with communities to develop models for community benefit. The results of this "ground-up approach" will hopefully feed into future legislation.

As stated above, a legislative framework for biosafety does not exist. This is a significant gap in the framework for biodiversity conservation, and remains unchanged since the 2003 Biodiversity Analysis update.

There have also been weaknesses in implementation of the Aarhus Convention. This often can be attributed to the formalities that have been taken towards the main provisions of the treaty rather than focusing on "on-the-ground" implementation.

Environmental considerations are not well integrated into other sectors, including sectoral policies, and sectoral development plans. As stated in Ayvazyan (2008, in *Some Urgent Environmental Issues of Armenia in the Context of Undertaken International Obligations*), there is no systematic approach for incorporating environmental considerations, there are only discrete initiatives in a few fields, such as energy and national security. Thus, limited –if any—coordination takes place between the environment sector and other sectors.

Institutional Weaknesses and Gaps

Institutional weaknesses and gaps can primarily be attributed to limited technical capacity, low staff numbers, and financial constraints. In addition, there is limited coordination among agencies, especially coordination between other sectors with the MNP. Some of the key weaknesses and gaps in Armenia's institutional framework for biodiversity are discussed below.

The territorial administration lacks capacity to implement their duties related to biodiversity monitoring. They have a dearth of specialists and finances. In addition, local administrations are technically unprepared to take on their roles in organizing conservation and protection of community lands, forests, and water territories.

There is no institution that is currently undertaking regular, strategic monitoring of Armenia's biodiversity resources. As Gevorgyan and Aghasyan (2008) found, "complex monitoring" activities are not implemented in Armenia's SPNAs. Monitoring that does occur is not "purpose-oriented" and it occurs irregularly. Gevorgyan and Aghasyan found that this was due to "insufficient financing, lack of qualified staff as well as [an] insufficient legislative and scientific-methodological basis. The absence of biodiversity monitoring has [a] negative impact on the effectiveness of fauna and flora protection and management." The report also noted that the lack of accurate, updated information and the lack of a coordinated inventory and monitoring constrain good decision making on biodiversity resources.

On 18 December 2008 the Government decree was adopted, "About concessions for the right to rent, and building on plots in Sevan National Park and adjoining territories and implementation of urban development activities" (came into effect 24 Jan 2009). Before the adoption of this decree, development permits were given by local self government bodies, municipalities of towns in Gegharkunik marz, and Sevan National Park's administration. This overlap resulted in over-development within the territory of the National Park and its buffer zones. However, now the new decree defines roles and responsibilities and eliminates overlap.

As stated in Section 5.2, as of 15 January 2004, a Government decree delegated responsibility for forest management to the MoA. The only forest sector responsibility that remains with the MNP is environmental supervision (inspections). The MNP remains responsible for PA policy, strategy, development of management plans, and management of PAs of international and national importance; yet 14 state sanctuaries now come under the jurisdiction of the MoA. Whether this delineation of responsibilities will be a benefit for biodiversity conservation or if it will make protection, management, and use more difficult remains to be determined.

There is limited staff at MNP-Bioresources Management Agency and State Environmental Inspectorate to perform their responsibilities. As discussed in this report (see Section 5), the MNP, and specifically these agencies, have wide ranging responsibilities for the SPNA network and biodiversity conservation. Limited staff, equipment, and funds constrain successful implementation of their roles. As stated in the 2003 Biodiversity Analysis, given budgetary constraints, the command-and-control approach to enforcement is not practical, and an incentives-based system would be more appropriate, yet the top-down approach to enforcement is still typical.

The situation found in 2003 (Biodiversity Analysis) remains unchanged, and government remains highly centralized, while there are regional and local staff on the ground who could begin to undertake biodiversity conservation activities (in accordance with legislation). Regional and local staff, however, as found in 2003, still have limited technical capacity and financial resources to undertake their responsibilities. When the Biodiversity Analysis update team interviewed biodiversity professionals about this situation, there was no indication that technical capacities of regional and local staff have improved since 2003. And attitudes at central levels of government about local capacity to take on additional responsibilities were negative.

Although government institutions that oversee, manage, and protect biodiversity are supported by NGOs, donors, and (to a lesser extent) the private sector, coordination among these groups is limited. As the 2003 Biodiversity Analysis update stated, there is confusion regarding the most appropriate and effective roles for government at both national and local levels, for academic institutions, and for NGOs. The comparative advantage of each of these groups should be considered and used to benefit biodiversity conservation. The situation appears to have improved little since the Biodiversity Analysis update (2003).

4. SOCIO-ECONOMIC CONTEXT FOR BIODIVERSITY CONSERVATION AND SUSTAINABLE NATURAL RESOURCES MANAGEMENT

According to Minasyan and Mkrtchyan (2005), poverty monitoring from 1996-2003 through household surveys did not show poverty reduction in rural areas. At the same time, poverty reduction in urban areas especially in the capital was significant. The report found that rural poverty in Armenia has been stagnant. They further found that incomes from non-farm employment of rural households failed to increase; while the growing state benefits and remittances were insufficient to serve as a safeguard against poverty.

Almost two decades after the break-up of the Soviet Union, poverty in Armenia is still widespread, deep-rooted and severe, according to surveys conducted by the Government and the World Bank (Rural Poverty Portal, 2007). And despite recent economic growth, the income gap is widening. According to the Rural Poverty Portal (2007), a relatively small proportion of people prosper, while most struggle to stay above the poverty line: about half of Armenians live in poverty and two out of ten of them are extremely poor; rural people are particularly vulnerable.

Under these conditions, biodiversity often suffers. Governments are prone to choose development over conservation, and to disregard the need for mitigation measures (especially if they are costly) that could protect the environment while pursuing development.

In addition, previous conservation regimes in Armenia have been top-down and have had limited, if any, participation of and benefit to local populations. There are signs that this is changing. Management Plans, prepared between 2002-2004 under the World Bank's Poverty Reduction and Natural Resources Management Project for Dilijan and Lake Sevan National Parks used a participatory approach. However, there is still little information in these management plans about how communities can actually work with national park authorities to ensure community input is integrated into national park activities; and how communities will be able to benefit from the national park. Community forest management is still in early stages, and to date, no community forest management plans (FMP) have been prepared and approved.

Under the current high rural poverty in Armenia, pressure on natural resources is severe. Immediate benefit from "mining" natural resources is more attractive than sustainable use. Unless communities can realize benefits from sustainable use, they are unlikely to support PAs, and the MNP will continue to be faced with an expensive regime that involves regular patrols; and one that is open to corruption.

5. STATUS AND MANAGEMENT OF ARMENIA'S PROTECTED AREA SYSTEM

The history of SPNAs in Armenia goes back to the second and third century BC, where large territories were protected as hunting areas for nobles. The modern history of SPNAs in Armenia dates back to 1958.

The strategic goal of Armenia's Specially Protected Nature Areas' (SPNA) policy is biodiversity conservation. The policy provides for the protection and conservation of 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 PAs were created to preserve the habitats of unique, rare, and endemic species listed in the Armenian Red Data Books (plants and animals).

An important step forward in Armenia's PA development was the production of the "Strategy on Developing Specially Protected Areas and National Action Plan 2003-2010," which was approved in 2002 by Government Decree No. 54. During implementation of the National Action Plan substantial progress was made in the improvement of environmental legislation, PA management effectiveness, and capacity building. However, the situation is far from ideal, primarily due to weak socioeconomic conditions and the unstable political situation in the region.

The new Law on "Specially Protected Nature Areas" (2006) defines SPNAs as, "designated by Law, areas of terrestrial land (including surface and underground waters and ore) and the appropriate air space, and separate natural objects that have environmental, scientific, educational, healthcare, cultural, historical, recreational, tourist, and aesthetic value, and a special regime of protection is established for them."

PAs in Armenia are categorized by:

- **Importance**: international, national, and local
- **Categories**: state reserves, national parks, natural monuments, and state sanctuaries. These are defined as follows:

State reserve – an area of international and/or national importance of scientific, educational, historico-cultural values with unique environmental and aesthetic features, where nature develops without human intervention into environmental processes (corresponds to IUCN category Ia).

National park - an area of international and (or) national importance of environmental, scientific, historico-cultural, aesthetic, recreational values, which, due to its landscape and cultural values, could be used for scientific, educational, recreational, cultural, and economic purposes, and which has a special protective regime (corresponds to IUCN category II).

Natural monument – a natural object with unique scientific, historico-cultural, and aesthetic values (partly corresponds to IUCN category III).

State sanctuary – an area of scientific, educational, natural-historical, and/or economic values, where the conservation of ecosystems and their components and natural reproduction are secured (corresponds to IUCN category IV).

Armenian PAs currently consist of three state reserves, two national parks, 230 natural monuments, and 26 state sanctuaries. The list of Armenian natural monuments was recently approved (14 August 2008) by Government Decree No. 967 – N. Currently, it consists of 109 geological, 48 hydrogeological, 38 hydrological, 16 natural-historical, and 19 biological objects. Much work remains to be done (inventories, documentation, borders established, etc.) to adequately ensure protection of these monuments.

Around 60 percent of Armenian species are represented within the PA network. However, there is a bias toward forest habitats. The system needs to be expanded to adequately represent all ecosystems (see Section 10). **Annex F-9** provides a map of PAs, including planned PAs. The full list of state reserves, national parks, state sanctuaries, proposed PAs, and their key attributes is provided in **Annex K**.

The total area of SPNAs is approximately 308,000 hectares (including the surface area of Lake Sevan). This is equivalent to approximately ten percent of the total territory of Armenia and six percent if the surface of Lake Sevan is excluded ("Current state of the specially protected nature areas of the Republic of Armenia", 2008). However, the exact surface area covered by PAs is imprecise since the boundaries are not well defined. Since 2005, with funds from the State budget, Government has implemented activities to revise and accurately define boundaries and to map PAs. Along with the delineation of newly established natural monuments, this will be completed by 2012.

When the previous Biodiversity Analysis (2000) was prepared, there were a total of 28 PAs, but the estimate was also about ten percent of the country in protected status. Also, in 2000, Dilijan had been a state reserve, and since then, it has been made a National Park (this was the case at the time of the Biodiversity Update (2003), as well.)

According to the Law on "Specially Protected Nature Areas," PAs of international and national importance are exclusively State property, while PAs of local importance could be situated on and could be the property of local communities. According to this Law, PAs of international and national importance should be exclusively managed by the responsible authority, MNP. However, in reality this is not so: the MNP is responsible for all three state reserves, two national parks and only eight sanctuaries. A number of PAs are under the responsibility of other organizations: 14 state sanctuaries are managed by the "Hayantar" (the SNCO--of the MoA), and one state sanctuary is managed by the Institute of Physics of the Ministry of Economy and Natural Resources; for two state sanctuaries management authorities have not yet been defined. Management authority for all 230 natural monuments has not yet been established; but this is expected to be resolved during 2009-2012, when the boundaries will be delineated.

Status of National Protected Area System (including all IUCN categories of protected areas)

Exhibit 3 shows the PAs currently registered in Armenia and their IUCN category. However, IUCN's categories are equivalent in name only (reserve, national park). The situation on the ground in Armenian reserves and national parks does not actually correlate with IUCN categories Ia and II. Conservation and active management of Armenia's PA network is limited. The 2000 Biodiversity Analysis stated that "only a small proportion of the state reservations have been actually established." While the situation has improved there are still large gaps in conservation and management.

Exhibit 3: List of protected natural territories of Armenia

Name of SPNA	IUCN category	Area (hectares)	Year of creation
	National Parks		
Sevan	II	147,343 (125,200 – water surface)	1978
Dilijan	II	33,765	1958 (reserve created)
	State reserves		
Khosrov Forest	I a	24,196	1958
Erebuni	I a	89	1981
Shikahogh	I a	12,137.075	1958
	Conservation areas		
Akhnabat Yew Growe	IV	25	1959
Hazel-nut	IV	40	1958
Rhododendron	IV	1,000	1959
Vordan Karmir (Kochenil)	IV	219.85	1987
Goravan Sands	IV	95.99	1959
Aragats Alpine	IV	300	1959
Arzakan-Meghradzor	IV	13,532	1971
Banks' Pine	IV	4	1959
Boghakar	IV	2,728	1989
Gangzakar	IV	6,813	1971
Getik	IV	5,728	1971
Juniper open forests of Sevan	IV	3,312	1958
Goris	IV	1,850	1972
Ijevan	IV	5,908	1971
Hankavan (hydrological)	IV	9,350	1981
Her-her open forests	IV	6,139	1958
Margahovit	IV	3,368	1971
Jermuk	IV	3,865	1958
Jermuk (hydrological	IV	18,000	1981
Sev Lich	IV	240	1987
Pine of Gjulagarak	IV	2,576	1958
Plane grow	IV	64.2	1958
Yeghegnadzor	IV	4,200	1971
Khor Virap	IV	50.28	2007
Gilan	IV	118	2007

5.1 THE MINISTRY OF NATURE PROTECTION

According to the law on "Specially Protected Nature Areas," the MNP is responsible for PAs including:

- developing protected area policy and strategy;
- developing protected area state programs and management plans;
- managing protected areas of international and national importance;
- approving management plans for protected areas of local importance;
- establishing and maintaining the protected area cadastre;
- monitoring protected areas of international and national importance;
- state control over law enforcement in protected areas;
- developing the list of natural monuments;
- developing the charter of protected areas;
- issuing permits for protected area use;
- reviewing and approving reports of protected area managers;
- establishing new protected areas;
- developing legal orders for financing protected area protection, research, etc; and
- developing educational, public awareness and scientific programs.

Within the MNP, there are three subdivisions with responsibility for SPNAs:

- The **Division of Biodiversity and Water Conservation**, in particular, plays a substantial role in choosing the PA regime (national park, state forest reserve, etc.) and for the development of appropriate requirements for the PA based on the regime.
- The **State Environmental Inspectorate's** responsibilities are assigned by the Law on "Environmental Supervision" (approved by Government Decree No. 1149 of 25 July 2002). The Inspectorate is responsible for the inspection and verification regime, which is implemented based on the annual management plan. The annual management plan is prepared by the Inspectorate and approved by the Minister; the agreement is signed between the Inspectorate and PA administrations. In some cases (severe violations, complaints), inspections can be done at times other than stipulated by the annual plan.
- The **Agency of Bioresources Management,** in accordance with Government Decree No. 1236 of 8 August 2002, is responsible for the following PA management functions:

    1. review of SNCO annual reports;
    2. establishment and management of SNCO cadasters;
    3. methodological assistance to SNCO scientific activities;
    4. analysis of SNCO monitoring data;
    5. assistance to SNCOs in various aspects of PA management and financing, including program and project design;
    6. design and preparation for approval of SNCO codes;
    7. design and preparation for approval of SNCO financial needs through the state budget (medium-term projects), and donor organizations; and
    8. design and preparation for approval of other documents related to SNCOs (laws, government decree, ministerial decree).

The Staff of the Agency consists of 26 people. In spite of a cadre of highly experienced staff, the Agency needs additional human and technical resources for effective functioning.

PA management currently is implemented through appropriate SNCOs, legal entities created by Government in 2002. Financial assets of SNCOs come from the State budget, as income from land rental and provision of services, and from donations, grants, and other sources that do not conflict with national legislation. Each SNCO has its own budget and bank accounts in local and hard currencies.

Conservation of PAs, on the ground, is implemented by the Protection Service, which consists of the Conservation Division and district conservation officers.

Regretfully, in spite of SNCOs' budgets doubling since 2006, monthly salaries of inspectors remain around 30,000-40,000 Armenian dram (approximately US$100-133). Low salaries, together with unsatisfactory equipment, and lack of transport and weapons are constraints to providing adequate protection of SPNAs.

The five existing SNCOs are:

1. Khosrov Forest State Reserve SNCO manages Khosrov Forest State Reserve, Khor Virap, and Gilan and Gorovan Sands State Sanctuaries.
2. Shikahogh State Reserve SNCO manages Shikahogh State Reserve and Platan Park State Sanctuary.
3. Sevan National Park SNCO manages Sevan National Park and Sparse Growth of Juniper State Sanctuary.
4. Dilijan National Park SNCO manages Dilijan National Park and State Sanctuary and Akhnabad Yew Park State Sanctuary.
5. Reserve-park Complex SNCO manages Erebuni State Reserve, Sev Lich and Vordan Karmir State Reserves, as well as six dendroparks (arboreta) aimed at *ex-situ* conservation of arboreal plant species.

5.2 THE MINISTRY OF AGRICULTURE

Government Decree No. 7-N of 15 January 2004 delegated responsibility for forest management (conservation, protection, reproduction, and use) from the MNP to the MoA (ten years earlier another government decree delegated responsibility for forest management from the MoA to the MNP). The only forest sector responsibility that remains with the MNP is environmental supervision (inspections).

Fourteen state sanctuaries that are managed by the SNCO Hayantar have no clear delineation of boundaries. They are managed as forests under the Government forest management plan (this is not an individual FMP for each forest, but an overall plan for managing Armenia's forests). This plan differs considerably from Government's protected area management plan. None of these state sanctuaries have their approved statutes, and therefore, it is much more difficult to legally protect them than it is to protect state sanctuaries that have approved statutes.

5.3 REGIONAL STATE MANAGEMENT AUTHORITIES (MARZPETARAN)

According to the "Law on Specially Protected Nature Areas," responsibilities that are delegated to the regional state management authorities in the field of PA conservation and use are:

- participation in the protected area state program and management plan development, and
- assistance to protected area conservation.

Furthermore, the Presidential Decree NP-728 of 06 May.1997, "About State Management in the Provinces," declares that the *marzpets* (heads of regional state management authorities) are authorized to assist with measures and actions against poaching, illegal fishing, and logging within the territories of state reserves, state sanctuaries, and other SPNAs. In reality, assistance is restricted to advice on the PA state program and on

management plan development since there are no mechanisms that allow for regional state management authorities to take measures against illegal activities.

5.4 LOCAL SELF-ADMINISTRATION BODIES

Responsibilities that are delegated to regional state management authorities in the field of PA conservation and use are described in the "Law on Local Self-governance" and in the "Law on Specially Protected Nature Areas." Local Self-administration Bodies have more expansive responsibilities than *marzpetaran*, including:

- participation in the PA state program and in management plan development;
- assistance in protected area conservation;
- submission of proposals to the administrative authority on protected area establishment on their territories;
- submission of proposals for management plan development;
- organization of conservation, use, monitoring, and scientific research;
- provision of important protected area information to the administrative authority; and
- assistance in developing and implementing projects for environmental public awareness and education.

Notably, to date, no local PA has been established, although currently a proposal from Syuniq Marz is under consideration by the Agency of Bioresources Management. Reasons for the lack of local PA designation are the absence of appropriate local administrative structures and specialists, and lack of awareness that this process exists.

5.5 CHALLENGES AND THREATS TO ARMENIA'S SPNAs

According to CBD reports, and other documents reviewed by the Biodiversity Analysis update team, threats to Armenia's SPNAs include land use changes and land usurpation (privatization and land rental), illegal logging, fuel wood and non-timber forest product collection, overgrazing, poaching, over-fishing, infrastructure development and poorly planned tourism and recreational development, and pollution of rivers and wetlands. Effects of these threats (habitat degradation, decline of species populations, and disruption of ecological processes) are made more severe by climate change (see Section 10 for the key threats the Biodiversity Analysis team identified).

According to the First National Communication on Climate Change (1998), by the end of the present century, temperature will rise throughout the entire territory of Armenia (1.7^0C by 2070 and 2-4^0C by 2100). Forests, including those in SPNAs, located in the lower altitudinal belt of the southeastern forest area (Syunik marz), are particularly vulnerable to anticipated climate change (Harutyunyan D., Ter-Zakaryan A., 2008).

Water management problems (quality and quantity) will become more acute given the vulnerability of water resources to climate change. For the period of 1930-2000, precipitation decreased; and this has particularly been the case since 1978 (Tonoyan V., 2008). Climate change is expected to impact the water balance of Lake Sevan, reducing the inflow and increasing the outflow. To mitigate these effects, it will be necessary to develop and implement appropriate adaptation measures.

When establishing SPNAs and developing protection regimes, climate change vulnerability is not considered. Given the expected impacts of climate change to Armenia's biodiversity, this should be included in selection criteria for the SPNA system, and should be considered when identifying management actions.

Other threats to Armenia's SPNAs, as stated in reports that the Biodiversity Analysis team reviewed, are:

- As yet, there is no complete survey of flora and fauna in PAs. Flora and fauna species composition of national parks and state reserves are determined during the development of management plans—however, most PAs do not yet have management plans. Biodiversity in Armenia is investigated rather well, but unequally—some taxons are very well studied, while others have not been investigated at all. The main survey work was conducted in the Soviet period.
- Of all the PAs, only Sevan and Dilijan National Parks have management plans. Management plans for Khosrov Forest and Shikahogh State Reserves are currently being reviewed and have not yet been approved, and a management plan for Erebuni State Reserve is currently being developed. No sanctuary has a management plan, and only six of them (Sev Lich, Vordan Karmir, Plane Grove, Gorovan Sands, Khor Virap, and Gilan) have approved statutes.
- There is a lack of local proponents for PAs. Environmental knowledge and awareness of community members about PAs and why they should be protected is low; there are limited opportunities for locals to benefit; and there are limited local governance options.
- Low salaries of SNCO staff and low staff morale, limited number of specialists, and limited opportunities for training and continuing education are challenges. Frequent changes in administration result in little historical knowledge and inconsistent working relationships and arrangements.

Besides these general threats, specific threats to each SNCO, identified from survey work during summer 2008 are discussed below. These threats are from the draft report, "Capacity Development Needs of Armenia's Specially Protected Natural Areas," to be published in 2009 under the framework of the Programme of Work on Protected Areas of the Convention on Biological Diversity.

- ***Khosrov Forest State Reserve SNCO***
  Main threats to Khosrov Forest State Reserve, as well as Khor Virap, Gilan, and Gorovan Sands state sanctuaries are (in decreasing order): land use change, land usurpation, grazing and tourism and recreation. Land use change and land usurpation have increased during the last five years. The recent delineation of the borders has changed the category of some lands from protected to community and as a consequence, several summer houses were constructed near the main entrance to Khosrov Forest State Reserve. Land usurpation in an area of Urtsasar occurred when land was handed over, rent-free, to the organization, Animals' World.
- ***Shikahogh State Reserve SNCO***
  Main threats to Shikahogh State Reserve, as well as Platan Park State Sanctuary are (in decreasing order): grazing and non-timber plant collection.
- ***Dilijan National Park SNCO***
  Main threats to Dilijan National Park, as well as Akhnabad Yew Park State Sanctuary are (in decreasing order): grazing, hay making, logging, fuel wood collection, non-timber plant collection, poaching, illegal fishing, land usurpation, waste dumping, and water pollution. Threats have not increased over the last five years, and a number of threats decreased sharply (poaching, logging, land usurpation) or slightly (construction, illegal fishing, grazing) during the last five years.
- ***Sevan National Park SNCO***
  Main threats to Sevan National Park, as well as Sparse Growth of Juniper State Sanctuary are (in decreasing order): legal and illegal fishery, water pollution, construction , grazing, waste dumping, land usurpation, hay making, tourism and recreation, land use change, hunting, poaching, logging, non-timber plant collection, and invasive species.
- ***Erebuni Reserve-park Complex SNCO***
  Main threats to Erebuni State Reserve, Sev Lich, and Vordan Karmir State Reservations are (in decreasing order): waste dumping, land usurpation, grazing, water pollution, non-timber plant collection, land use change, tourism and recreation (medium), and logging (low).

These threats (general and specific) were taken into account when the Biodiversity Analysis update team established the key biodiversity threats in Section 10.

5.6 SUMMARY OF ECONOMIC POTENTIAL OF THESE AREAS

Current economic activities in PAs are limited to national parks and the reserve-park complex SNCOs. Activities that can provide economic benefits include recreation and other types of tourism and sale of fuel wood (after sanitary felling). However, SNCOs lack specialized divisions and staff to oversee these activities. Therefore, income generating activities are currently limited to land rent to third parties (PA land is rented to private parties in accordance with a contract).

The diversity of natural and historical heritage of SPNAs in Armenia provides opportunities for tourism development. Ecotourism and agrotourism can be effective ways to ensure additional and sustainable income for PAs and for local populations. However, to date, there are few ecotourism and agrotourism development activities.

Fees are not collected at entrances to national parks or at entrances to other PAs. This is a missed opportunity to raise revenue from Armenia's SPNA system. Those interviewed stated that Armenians are not used to paying to enter and use the national parks. However, fees could be charged to non-Armenian visitors, on a sliding scale, whereby visitors from the region would be charged less than those from the EU and US and other areas. Eventually, this may acclimate Armenians to the idea of paying for PA services.

In addition, community use of PA natural resources is limited to fuel wood collection after sanitary felling. To date, there are no opportunities for communities to earn income from the use of natural resources. For example, in many countries, community members can earn income by establishing community-based enterprises that are based on sustainable use of PA resources (i.e., medicinal plants, coffee and herb teas, ornamental plants, wild fruits). In some cases, traditional users are given precedence to harvest natural resources for subsistence use and in some cases for commercial markets. These types of community-based natural resources management approaches have yet to be tested and accepted in Armenia.

The National Forest Program (2005) focuses (in part) on the development of ecotourism, recreation, and hunting farms. It also targets an increase in the production of forest products as a revenue generating activity. In spite of some achievements in forest certification (certification preparation of Zikatar model forest under the "Natural resources management and poverty reduction" project), the problem of unsustainable use of forest resources is still significant in Armenia (see Section 10).

Armenia has not evaluated the economic potential of PAs, and there is no doubt that the potential of the SPNA system to generate revenue has yet to be realized. Meanwhile, due to the threats some SPNAs are facing, revenue generation opportunities may be lost before they were ever identified (i.e., bird watching tours, sport fishing, provision of drinking water, etc.).

5.7 FUTURE DIRECTIONS FOR ARMENIA'S PA SYSTEM

Progress since 2000 in SPNA management and future challenges are described in **Annex K.**
Recommendations for future directions of the SPNA system are (Capacity Development Needs of Armenia's Specially Protected Natural Areas, in draft, 2009):

I. Improve protected areas management

- Enlarge the scope of PA management (protection, conservation, and sustainable use) authorities by involvement of Regional State Management Authorities, Local Self-administration Bodies, and the private sector.

- Develop and approve codes and management plans for all PAs.
- Establish SNCOs in charge of management of all state sanctuaries.

II. Improve scientific research

- Increase the number of organizations responsible for research in PAs by creating and implementing mechanisms to attract appropriate scientific institutions.
- Provide capacity development of organizations that are responsible for protected area monitoring data collection, analysis, and cadastre maintenance.

III. Improve protection, conservation, and sustainable use

- Finalize the list of natural monuments and develop and approve their passports.[1]
- Improve socio-economic conditions and technical capacity of PA personnel in charge of environmental control (inspectors).
- Complete survey and account of flora and fauna in PAs.
- Establish possible limitations for different kinds of legal use of natural resources in PAs.
- Provide financial support and technical assistance for tourism, recreational, and other economic development activities in PAs.

IV. Improve capacity of personnel

- Assess training and retraining needs of staff SNCOs (including directors, their deputies, and heads of divisions) and ensure participation of staff personnel in appropriate training and retraining courses, including abroad.
- Organize study tours abroad.

V. Improve financial mechanisms

- Develop and implement mechanisms of financial incentives for PA inspectors.

For a PA system that is so constrained by a limited budget, it is surprising that more emphasis is not placed on public-private partnerships and CBNRM. CBNRM and other types of community conservation activities (i.e., co-management with community organizations or NGO; community-based enterprises) could alleviate some of the management burden on the MNP, provide benefits for local communities, and could create proponents, within local communities, for PAs. Community benefit concepts and activities are still in early stages in Armenia. Some biodiversity professionals interviewed by the Biodiversity Analysis team thought that Armenia should develop its own models; others felt that capacity is too low in communities and in community-based organizations (CBOs) to manage community benefit/revenue generation activities. To be successful in conserving biodiversity, management of PAs must address inequitable access to economic opportunities. A top-down, command-and-control approach is, however, still common in Armenia's PA community.

[1] According to the "Law on Protected Areas," each natural monument should have its own passport, which should include the following information: name and category; location and geographical coordinates; description, size and condition; borders and buffer zone description; information about owner and land user; any peculiarities about protection and conservation regime; and information about protection implementing organization.

6. STATUS AND MANAGEMENT OF ARMENIA'S FORESTS

6.1 FOREST COVER

The fundamental principle of Armenia's National Forest Policy is that forests are a national inheritance and they should serve future generations as well as the present. According to the Armenian Forest Code, forest lands are the State's exclusive domain (i.e., ownership is with the State). To expand the area considered managed forest, community and private ownership are now included in the Code. The Code preserves State ownership over forest lands, but encourages establishment of new forests on community and private lands, and sets out a process to obtain rights of ownership.

Since 1993, stock-taking and planning in the forest management sector have been almost suspended. Therefore, forest management has relied on outdated information from the last forest stock-taking of 1993. Obviously, these data do not reflect the significant qualitative and quantitative change of forest stock in the last 15 years.

According to the results of the 1993 stock-taking, Armenia's forest lands covered 459,900 hectares, including:

a) 392,300 hectares of forest lands, which included 334,100 hectares of forest cover areas; and
b) 67,600 hectares of non-forest lands.

Annex F-9 shows the forested areas of Armenia and Forest Reserves.

According to Government figures, until the intensive forest-felling of 1992-1996, the forest wood-stock in Armenia made up 41.74 million m^3.

The FAO's 2005 Global Forest Resources Assessment found that the forest cover of Armenia, as of 1 January 2005, was approximately 282,000 hectares, with the total stock amounting to 36.3 million. m^3. A study by the "Economic Research on Armenia's Forestry and Wood Processing Sector" gave the forest cover area in Armenia in 2006 at 232,000 hectares, with the timber-stock estimated at 28 million. m^3.

According to the FAO Global Forest Resources Assessment (2005) and the State of the World's Forests (2005, 2003, 2001), between 1990 and 2000, Armenia lost an average of 4,100 hectares of forest annually. This amounts to an average annual deforestation rate of 1.18 percent. Between 2000 and 2005, the rate of forest change increased to 1.44 percent per annum. In total, between 1990 and 2005, Armenia lost 18.2 percent of its forest cover, or around 63,000 hectares. Armenia lost 3,000 hectares of its primary forest cover during that time. Deforestation rates of primary forest have decreased 17.7 percent since the close of the 1990s. Measuring the total rate of habitat conversion (defined as change in forest area plus change in woodland area minus net plantation expansion) for the 1990-2005 interval, Armenia lost 15.7 percent of its forest and woodland habitat. **Exhibit 4** illustrates the change in forest cover in Armenia.

Exhibit 4: Change in Forest Cover, 1990-2005

TOTAL FOREST COVER		
Forest 1990 (ha)	346,000	
Forest 2000 (ha)	305,000	
Forest 2005 (ha)	283,000	
Annual Change 1990-2000 (ha | %)	(4,100)	-1.18%
Annual Change 2000-2005 (ha | %)	(4,400)	-1.44%
Total Change 1990-2005 (ha | %)	(63,000)	-18.21%
Change in rate (%)	21.74%	

Source: FAO Global Forest Resources Assessment (2005)

6.2 FOREST TYPES

Forests generally cover the mid-zone of mountains, occurring at altitudes between 500 masl and 2,200 masl in the north and up to 2,400 masl in the south of the country. Forest zones are mainly located in areas with temperate climate, in rugged territory, and with adequate water resource availability.

Armenia's geographic location and mountainous relief contributed to the formation of rich forest biodiversity and a high degree of endemism in forest ecosystems. Armenia has over 200 types of forest communities. These forests harbor 274 species of trees and bushes; some of the main trees found in natural forests are: Oriental beech (*Fagus orientalis)*, Georgian oak (*Quercus iberica)*, broad-leaved oak (*Quercus macranthera)*, hornbeam (*Carpinus betulus)*, *Carpinus orientalis*, and *Pinus kochiana*. These species cover 89.1 percent of Armenia's total forest area and provide 97.2 percent of total wood-stock. Other tree species – birch, elm, maple, ash, pear tree, apple-tree, yew, hazel, plain, walnut, and others cover 8.4 percent of the forest cover area.

Oak forests are the most common forests in Armenia, covering about one-third of the forest area, and are characterized by a complex and varied typological composition. They occupy southern slopes and are found at 600-2,200 masl.

Beech forests, dominated by Oriental beech, are found at altitude 800-2,000 masl and mainly occupy north facing mountain slopes. In mixed beech forests, the accompanying tree species are oak, ash, elm, lime, hornbeam, and maple.

Pine forests are also common. In these forests, secondary species are represented by hornbeam, oak, and, occasionally, beeches. Pine plantations are also found, mainly consisting of *Pinus silvestris*.

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

At altitude 1,900-2,300 masl, mostly mixed, low-density sub-alpine sparse forests are found. Here the forest-forming species are: *Betula litvinovii, Acer trautvetteri,* and *Sorbus aucuparia*.

Dry scrub forests are found in the north and south of Armenia, at altitudes of 900-1,000 masl in the north, and at 1,800-2,000 in the south. These forests support approximately 80 species of xeric trees and shrubs. Juniper species (*Juniperus* spp.) and broad-leaved forests occur here, the latter characterized by species such as pistachio (*Pistachia mutica*), Georgian maple, and almond (*Amygdalus fenzlianum*).

Socio-economic importance

From an economic standpoint, forests are the most important natural ecosystem in Armenia. Wood and non-timber products provide an important contribution to Armenia's budget. According to Deputy Director of Hayantar Robert Petrosyan (pers. comm., December 2008), forests managed by Hayantar contribute approximately US$1 million to the GDP annually. However, Petrosyan stated that currently there is no industrial logging. A new category, "industrial forests," has recently been created and is expected to be approved by Government in early 2009. These forests would allow commercial logging based on a Government approved Forest Management Plan (FMP).

The *actual* contribution of forestry to Armenia's budget is unclear. The Biodiversity Analysis team was unable to obtain documentation on revenue generated by the forestry sector. Armenia places forestry in the same category with agriculture and fishing. GDP figures, according to http://www.unctad.org/sections/ldc_dir/docs//lldc-arm.pdf are:

GDP (million US dollars), 2004:	$3,615 M
GDP per capita (US dollars), 2004:	$1,195 per capita
GDP growth rate (annual %), 1995-2004:	8.1%
Structure of GDP (%), 2003:	
Agriculture, forestry & fishing	21.4%
Industry	35.4%
Services	35.1%

6.3 PRESENT MANAGEMENT AND PROTECTION

According to the Forest Code, forests in Armenia fall into the following categories, based on their main purpose: protective, special-protective, and production/industrial. The new Forest Code provides for increased forest management functions of regional and local governing bodies and also provided for the establishment of community and private forests.

The Hayantar SNCO, together with its 22 regional forest enterprise branches, manages approximately 75 percent of forest areas. Additional forested area is located in State Reserves (Khosrov State Forest Reserve) and in State Sanctuaries. Most of these are managed by the MNP and no commercial timber harvesting is permitted; and community use of these resources is not allowed.

The new category of "industrial forests" will soon be used to cover forests where timber can be harvested on a commercial basis. Although no forests have yet been delineated as industrial forests, Government expects this new category to have a positive effect on illegal timber harvesting. Commercial timber harvesting will be easier to patrol since specific areas will be designated for these activities, and will not be allowed in other forests. In addition, commercial timber interests are expected to "buy-into" this new scheme, and therefore, are expected to no longer "poach" timber (pers. comm., 2008)

Community forests are expected to contribute to improved management and protection by providing a means for communities to benefit from forests. As discussed in Section 10.2, no community forests are functioning as yet, but as of January 2009, the first community forest management plan is expected to be approved by Government.

6.4 REASONS FOR FOREST DEGRADATION

Armenia's forest stock is being degraded by unsustainable and illegal felling, as well as other factors including pests, diseases, and fire. Non-regulated forest-felling affects climate conditions in forests, and this increases fire threat, and also creates conditions for increased spread of pest insects and diseases. This is most readily observed in the dry-tolerant open forests of the central and southern parts of Armenia, as well as in natural pine forests. In particular, drought conditions exist in some forest locations in Aragatsotn, Hrazdan, Kotayq, Vayq, Jermuk, and Megri regions. These areas require regular forest protection measures against insects and diseases and anti-fire measures. Forecasted climate change scenarios predict that forests in southern locations of Armenia and forests of the lowest forest belt will be most vulnerable to pests, diseases, and fire threats. However, forest-pathological studies and monitoring data on pests and diseases are lacking.

Due to a variety of factors, including unfavorable conditions for seed self-reproduction of the main forest-forming species in the country (oak and beech), these forests are being replaced through natural processes by the ecologically more viable hornbeam.

Although it is assumed that the greatest loss of Armenia's forests occurred during the energy crisis in 1991-94, the cutting and devastation continue at alarming rates. According to World Bank estimates, Armenia's forests will be eradicated in 20 years if cutting continues at the same pace.

A study on deforestation in Armenia (June, 2007), prepared by the Economy and Values Research Centre was the first attempt to assess the volume of illegal logging and how it is intertwined with the wood processing industry. The report found that in Armenia, deforestation is largely due to the illegal logging of forests to obtain wood for construction and fuel. The study revealed that nine percent of households in Armenia use wood as fuel for cooking and heating, and more than 300 small, medium, and large wood processing companies operating in Armenia use ten times more wood than the volumes set by the state for annual cutting.

The study recommends addressing the problem of deforestation on the economic level by expanding natural gas supply to remote villages via micro-credits, exempting taxes on imported wood, promoting recycling and renewable energy production, and tightening the enforcement of policies and regulations.

Illegal timber harvesting and collection of fuel wood are considered key threats to Armenia's biodiversity, and are discussed in greater detail in Section 10.

6.5 ACTIVITIES THAT ADDRESS DEGRADATION

Hyantar SNCO's forest enterprises conduct forest rehabilitation (afforestation and reforestation) on State forest lands. Forest rehabilitation works performed on forest lands of Armenia from 2004 to 2006 totaled approximately 16,000 hectares. In 2006, Hyantar SNCO's forest enterprises performed forest recovery works on an area of 9,460 hectares (Petroysan, pers. comm., 2008).

The Armenia Tree Project (ATP) has also reforested and afforested a significant amount of land. For example, in 2007, ATP's Community Tree Planting (CTP) Program planted 71,327 trees and shrubs in 170 communities. Since 1994, CTP has supervised the planting and rejuvenation of 871,702 trees at 729 sites throughout Armenia (and Karabagh). In 2007, ATP's Rural and Mountainous Development (RMD) Program planted 476,625 trees on 212 hectares of deforested and degraded lands in Gegharqunik and Lori regions.

Since 2004, the RMD Program planted a total of 1,146,375 tree seedlings on 555 hectares of deforested land at ten sites in Gegharqunik and Lori (ATP Annual Report, 2007).

Intensive timber exploitation has resulted in a decrease of high-value forest areas and their transformation to low-value stands, losses in natural growth productivity, sparse forests with open clearings, and general economic devaluation of forests. To address this problem, forest management and recovery measures are needed: reforestation and afforestation combined with preparation, implementation, and enforcement of a sustainable FMP for each forest. A variety of forest management options must be available – not only on paper, but in practice – including community forests, private forests, woodlots (for fuel wood and construction material), and industrial forests. Section 10 discusses the threats to forests from unsustainable commercial timber harvesting and fuel wood collection; and Section 11 describes actions needed to address these threats.

Deforestation is a priority issue for local environmental groups and international organizations. Four organizations--WWF Armenia, American University of Armenia's Acopian Environment Center, Armenia Tree Project Charitable Foundation, and Armenian Forests NGO—formed the EcoArmenia alliance in 2006 to help shift Armenia from a mode of deforestation to reforestation. While reforestation and afforestation are a focus of these groups, illegal timber harvesting and unsustainable fuel wood collection continues to degrade Armenia's forests.

7. CONSERVATION OUTSIDE PROTECTED AREAS

The MNP is the administrative authority for biodiversity conservation outside PAs, and is responsible for regulating biological and water resources, and ensuring sustainable use in accordance with following legislative acts:

- Water Code (10 Oct 2002)
- Land Code (02 May 2001)
- Forest Code (26 Nov 2005)
- Law on Legislative Bases for Nature Protection in the Republic of Armenia (09 July 1991)
- Law on Environmental Impact Expertise (20 Nov 1995)
- Law on Charges for Environmental Protection and Natural Resource Use (28 Dec 1998)
- Law on Flora (23 Nov 1999), the Law on Fauna (03 April 2000)
- Law on Lake Sevan (15 May 2001)
- Law on Rehabilitation of Lake Sevan Ecosystem, its Maintenance, Reproduction and Utilization (14 Dec 2001)
- Law on Environmental Supervision (11 April 2005)
- Law on Hunt and Hunting Economies (09 April 2007)

The MNP issues permits for hunting and fishing, for import and export of wild animal and plant species, and for any new business activity (on the basis of an EIA).

7.1 WATERSHEDS

The rivers of Armenia are the headwaters of the largest rivers of the South Caucasus - Araks and Kura. These rivers split the territory of the Republic into two unequal parts – Araks Basin with 22,556 km2 (76 percent of the territory) and Kura Basin with 7,185 km2 (24 percent of the territory).

The RA Law on "Water National Programme of the Republic of Armenia" (2006) was promulgated to determine water requirements of the population and economy; to ensure ecological sustainability of the environment; to ensure strategic water resource use; and to protect national water resources through efficient management of water resources. Short-term (to 2010), mid-term (2010-2015), and long-term (2015-2021) projects are purposed as part of the Programme.

7.2 WETLANDS

In Armenia, wetlands remained undisturbed for most of history. However, during the Soviet period, wetlands were considered wastelands. During 1930-1960, wetland loss was 40,000 hectares (Jenderedjian, K., et. al, 2002). The main reasons for destruction of the wetlands were conversion to agricultural land, creation of reservoirs, and draining to combat diseases. Unsustainable land use practices, such as poaching, illegal fishing, grazing, and logging have affected the remaining natural balance of many of Armenia's wetlands.

Less than two years after independence, as a result of recognizing the true values of wetlands, Armenia was the first former Soviet republic to become a signatory to the Ramsar Convention on Wetlands (6 July 1993)

and to designate Ramsar sites—Lake Sevan and Lake Arpi—with a total surface area of 492,239 hectares. Khor Virap Marsh (52.8 hectares) was declared a Ramsar site and state sanctuary in 2007. Two more wetlands (Pond Ardenis and Relict Mires of Lori Upland) are on the Ramsar 'shadow' list (wetlands that have been evaluated and proposed for submission to the Ramsar list, but not yet submitted). *Establishment of Transboundary Biosphere Reserve in the Javakheti Plateau*, approved in July 2003 for funding by the 'Kreditanstalt für Wiederaufbau' (KfW, Germany), will give special conservation status to Lake Arpi (National Park), Ardenis Pond, and to the upper stream of the Akhuryan River.

Despite Lake Sevan being a Ramsar site and a main part of a National Park, Sevan is one of the most endangered ecosystems of the country (AM-NR-3, 2006). Because of the decrease in the lake's water level, the natural balance of the ecosystem has been destroyed; as a result of drying of spawning areas, the endemic fish species, Sevan trout (*Salmo ishkhan*), and sub-species, Sevan Barbel (*Barbus goktchaikus*) and 'Koghak' (*Varicorhinus capoeta capoeta*) are on the verge of extinction. Over-fishing and poaching reduced the quantity of white fish (*Coregonus lavaretus*) drastically. Its status as a national park and a Ramsar site has not offered the needed protection to Lake Sevan.

Wetland conservation is included in a number of legislative acts (Water Code, Law on Lake Sevan) and National Reports (CBD, UNFCCC, CCD).

7.3 LAND USE PLANNING

A three-tier land management system was introduced by the Constitution of the RA: Central government (national); regional administrations; and local self-governing bodies (communities). Land resources management is becoming more and more decentralized. As of 2002, Government transferred ownership of State-owned lands within administrative borders of communities to the communities. Cadastre mapping of lands within administrative borders of communities is already completed.

Also since 2002, several land use activities have been implemented which promote optimal use of land, sustainable land use, and transparent land use planning decisions. They include: master plan for settling of RA; project on area planning of Lake Sevan watershed; documents on zoning of the Lake Sevan coastal areas (top-priority construction projects); program on anti-landslides measures (a high priority in the RA); research and registration of resources of abandoned mines of RA Kotayk and Tavush Marzes; and pilot project on land consolidation in Nor Yerznka community of Kotayk Marz implemented with the support of the United Nations Food and Agriculture Organization.

Since 2003, master plans and zoning drafts have been developed for a number of rural and urban community areas. However, current land use planning practices do not adequately consider biodiversity conservation and sustainable use of natural resources. In addition, land use planning continues to be somewhat haphazard, not fully transparent, and not based on publicly vetted plans.

7.4 GAME ANIMALS AND HUNTING

There are more than 20,000 hunters in Armenia. The most common game species are quail, chuckar, pigeons and doves, ducks, coot, snipes (common and greater), hare, and fox. Of large game species, roe dear, boar, bezoar goat, mouflon, and bear are traditional game species (the last three species are listed in the Red Data Book of Armenia). Hunting and fishing can only be conducted with a license and (in the case of commercial fishing) with a special contract from the organization responsible for water body management and/or protection.

Armenia has made some progress in regulating hunting in the last ten years. Before each hunting season, a range of expert bodies is consulted for guidance on populations, hunting methods, and likely impacts. Based

on this information, the MNP approves annual quotas and issues the appropriate number of permits for hunting or fishing. In practice, often the quotas are not sufficiently based on actual surveys.

Illegal hunting and fishing remain a problem. One possible solution is to establish special hunting farms. Game farms, where local communities can manage and control hunting could contribute to local community revenue and could promote sustainable use.

8. STATUS AND MANAGEMENT OF ENDANGERED SPECIES

8.1 ARMENIA'S ENDANGERED SPECIES

As discussed above, as a result of its biogeographical position and altitudinal variations, Armenia supports an enormous diversity of plants and a wide range of animal species. The new Red List of Armenian Flora will include approximately 600-650 species. For the revised Red List, IUCN categories of endangerment are being assigned, but it is not yet clear the number of plants and animals that will be considered endangered and critically endangered. The IUCN list of endangered species found in Armenia and the Armenia Red Book of plants and animals are included in **Annex H**.

8.2 IMPORTANT HABITAT CONSERVATION ISSUES

As was reported in the First National Communication on Climate Change (1998), climate change is expected to have a significant impact on conditions for the majority of natural ecosystems of Armenia—climate conditions will shift ecosystems up the mountain for 150-200 meters. Since the First National Communication, no additional data have been generated. Instead, new scenarios (temperature will increase by 2^{o}C, and precipitation will decrease by 4-5 percent by 2030) for climate change have been developed, and on the basis of these scenarios, new conclusions will be made concerning the vulnerability of natural ecosystems in various regions of the country—and this will include vulnerability of endangered species. Conclusions are not yet available, but the Biodiversity Analysis team understands that it is unlikely they will be significantly different than previous estimates.

According to the NEAP-1 (1998) the main problems resulting in endangerment are: point sources of pollution from mining plants, metal, chemical, and service industries; non-point sources of pollution from fertilizers and organic and inorganic chemicals on agricultural and forestlands; lack of enforcement of regulations; lack of adequate and updated information databases; lack of planning and operational capacity (MNP); lack of financial resources; inadequate organizational structure (MNP); and lack of clear management guidelines for protected areas.

As described in this Biodiversity Analysis update, some of these problems are currently being addressed, and the situation has improved since 1998 (information databases, enforcement of regulations, clear management guidelines, financial resources). However, for others (pollution, operational capacity) the situation has remained stagnant or has worsened. Also since 1998, development, including roads and buildings, is an additional threat to endangered species in Armenia. While EIA should help address this threat, the EIA process remains problematic (see Section 10).

8.3 ENDANGERED SPECIES OF PARTICULAR SOCIAL, ECONOMIC, OR ENVIRONMENTAL IMPORTANCE

A new protection category is being developed in Armenia—areas and ecosystems which are not included in SPNAs, but have globally or nationally important biodiversity (including endangered plants) will become "Important Plant Areas" and areas important to biodiversity as a whole will be included in the "Emerald" network.

These areas will include the most important and vulnerable ecosystems such as:

- Salted swamps in the Ararat Valley (the rarest plant species included in the Red Book of Armenia: *Linum barsegianii, Thesium compressum, Iris musulmanica, Reseda globulosa, Microcnemum coralloides*, etc.), which are threatened with extinction as a result of drying-out and salinization. These are now included in the list of Natural Monuments.
- Sub-alpine meadows and meanders on the upper-river Argichi of the Sevan basin containing a number of rare species and threatened by aridization;
- Some areas of steppes, sub-alpine meadows, and tall grasses on mid-high mountain ridges of Armenia, particularly the Shirak mountain ridge (where shift of conditions from steppes to semi-deserts is possible), as well as Bazum, Pambak, Bargushat, Meghri, and Javakhet mountain ridges; and
- Several small relic lakes (i.e., Chmoi-lich, Chili-lich)

The list may also include Arteni Mountain, with a very rich and unique flora and fauna, whose ecosystem is endangered by intensive spread of semi-desert conditions.

Included in the IUCN list for Armenia and in the Armenia Red Book, leopard and Armenian mouflon are two wildlife species considered endangered (see box). The Caucasian leopard has high biodiversity value as the last of the large cats in this region. The mouflon has high social, environmental, and potentially economic value if species increase enough to be hunted. Several endangered waterfowl could also have high economic value and attract hunters as well as birders.

(From the Ecoregional Plan for the Caucasus, 2003):

The leopard (*Panthera pardus saxicolor*) is the rarest species in the Ecoregion, celebrated in many local poems, fairytales, and songs. Widespread throughout the Caucasus a century ago, the big cat – last sighted in Dagestan and the Greater Caucasus in the 1980s – is now near extinction. Despite growing concern that the leopard has disappeared from the region altogether, recent investigations coordinated by WWF showed that about 35-40 animals still inhabit the Zangezur Range in Armenia and Azerbaijan (Nakhchyvan), the Talish Mountains, and northern Iran. A small population survives in the eastern part of the Greater Caucasus Range and Iori-Mingechaur Priority Conservation Area. The leopard is listed in the Red Data Books of Rare and Endangered Species (Red Book) in all countries in the Ecoregion. The subspecies is listed in the IUCN Red List as endangered. The main threats to the leopard are poaching and over-hunting of ungulates (tur, bezoar goat, mouflon, wild boar, chamois, and roe deer) – the animal's primary food base. Scientists believe that over the long-term, a population of 100 leopards should be sustained in the Caucasus to ensure long-term survival of the species in the Ecoregion. Currently, there are no inter-regional strategies for leopard conservation. Cooperation among the six countries is required to restore the leopard to its native range and to conserve remaining leopard habitat. As an umbrella species, the leopard facilitates conservation of other species that also depend on forest habitats in the leopard's extended range.

8.4 CURRENT EFFORTS TO MITIGATE PRESSURES

The First National Report on Climate Change in Armenia (1998) provides a list of measures aimed at reducing ecosystem vulnerability to climate change; these are expected to reduce pressure on endangered species as well. Some additional measures are envisaged in the National Action Plan for the CCD (2002). NBSAP does not include climate change issues in the form of individual actions; however, certain activities are consistent with the target, especially:

- protect and rehabilitate the biodiversity of the main water-marsh ecosystems (including Lakes Sevan, Gilli, and Arpi);
- rehabilitate rare and commercially rich forests – ensuring their natural reproduction; and
- determine the optimal proportion of pastures and grasslands in various landscapes for use by livestock and wildlife.

Armenia is working to mitigate climate change impacts to natural systems (and endangered species) by establishing new PAs with buffer zones that allow for ecosystem adaptation to climate change and is monitoring existing PAs for signs of climate change. There is a possibility that, based on results from monitoring, existing PAs will be enlarged to account for climate change effects.

In the "National Biodiversity Strategy and Action Plan" (NBSAP) the following actions have been accepted as the national target objectives of the country:

- Preserve and restore the most endangered landscapes, ecosystems and flora and fauna species;
- Expand the SPNA network;
- Expand forest areas by protecting, restoring, and promoting sustainable use of forest resources;
- Improve the biodiversity conservation management system (including the management of SPNAs) to increase efficiency of operations.

In addition, the Law on Hunt and Hunting Economies foresees establishment of hunting economies with different types of ownership. In theory, this should promote sustainable use of wildlife, and discourage poaching.

8.5 EX-SITU CONSERVATION

Overall about 6,000 plant species are grown and conserved under *ex-situ* conditions in Botanical Gardens and dendroparks (arboreta). Approximately 5,000 plant species are held in the Yerevan Botanical Garden where, besides 1,200 tree-bush and 2,000 flower species growing in the open, about 1,000 species of tropical and subtropical plants are conserved in greenhouses. The Yerevan Botanical Garden of NAS was established on eco-geographical criteria, with species from the Caucasus, the Crimea, Europe, Siberia, Eastern Asia, the Far East, and North America. Exceptional importance is also given to aboriginal flora, which includes 800 species. Dendroparks are distributed within different administrative and floristic regions of the Republic.

Yerevan Zoological Garden has a significant *ex-situ* conservation program for endangered species of animals. The privatized fisheries of Ararat marz and Jermuk town assist in the *ex-situ* conservation of the Gegharkuni and summer ishkhan sub-species of Lake Sevan trout. MNP uses privately-owned genetic resources for collection and incubation, and to obtain larvae for the summer ishkhan sub-species that are released to Lake Sevan (AM-NP-03).

9. PROGRAMS THAT CONTRIBUTE TO BIODIVERSITY CONSERVATION

9.1 ARMENIAN GOVERNMENT

Key Government of Armenia projects and activities that address biodiversity conservation (since the 2000 Biodiversity Analysis) are included in **Annex N**. Budget amounts for Government programs were unavailable. Many of the Government actions presented in the Annex are related to development of strategies and action plans. The "Strategy on Developing Specially Protected Areas and National Action Plan 2003-2010" also includes implementation of several key actions, and is considered particularly effective in improving the SPNA system.

9.2 NGOs

The NGO movement has gained momentum over the past decade. Most active among Armenian NGOs are environmentally oriented organizations, which often join forces to protest threats to the environment. In 2005, under pressure from a coalition called SOS-Shikahogh, (more than 40 local and international NGOs and scientific organizations, including support from the Armenian Diaspora), Government re-routed a planned new highway to Iran. This road would have passed through one of Armenia's last remaining virgin forests - Shikahogh Forest Reserve in the southeastern Syunik region bordering Iran.

After the success of SOS-Shikahogh, environmental coalitions went on to protest other activities that threaten the environment, including protection of the Teghout forest from mining activities (SOS-Teghout); and protection of Lake Sevan from the threat of pollution that would result from the development of gold refining activities in the basin of Lake Sevan (SOS-Sevan). Currently, these problems have not yet been resolved and the threats remain. These coalitions have been particularly effective in raising the standards of environmental advocacy, in promoting participation in environmental decision making, and in raising visibility of the importance of environmental conservation.

The main international NGO in Armenia, WWF Armenia (a local office in Armenia established in 2001), implements not only its own projects but also Caucasus Environmental Protection Fund (CEPF) projects, which are implemented under the coordination of WWF Armenia. The overall goal of the CEPF is to help ensure effective protection of biodiversity and sustainable management of natural resources in southern Armenia, providing an operational model that can contribute to development in the Caucasus region. WWF Armenia's program has been transformational in Armenia. It has helped provide a strategic focus and broader support for region-wide conservation; and it has professionalized environmental conservation and advocacy.

NGO activities are discussed in **Annex N**. The team was told that especially during this economic downturn, NGOs did not want to release budgets.

9.3 DONORS

In recent years, international organizations, such as the Global Environment Facility (GEF), World Bank, United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), the

Organization for Security and Cooperation in Europe (OSCE), and governments of several countries have funded projects that aim to protect and conserve Armenia's unique biodiversity (see **Annex N**). Donors have been particularly effective in raising the importance of biodiversity conservation with Government—and helping to ensure that more than "lip-service" is paid to biodiversity conservation. Most effective funding has been towards improving the SPNA system within the framework of the MNP's strategy and action plan for strengthening the SPNA network. In addition, activities that promote transparency in decision making have been highly effective (Transparency International and the Regional Environmental Center-Caucasus model). The Caucasus Protected Areas Fund (CPAF) could provide a source of funding for an often overlooked need—operating costs of PAs, however CPAF fundraising has been constrained especially during the economic downturn. Support in the forestry sector has been less effective. This can probably be attributed to the history of corruption in the sector, the potential for profit in the timber industry, and to date, the limited progress in community forest management and community benefit in the forest sector.

USAID Program Description (2009-2014)

The new CAS (2009-2014) does not include a specific biodiversity priority goal; and the proposed USAID program does not include a biodiversity conservation activity. However, under Priority Goal 4, environment/biodiversity activities are included that promote a clean productive environment. The anticipated USAID Program for 2009-2014 is described in **Annex O**. Certain USAID activities may directly or indirectly affect biodiversity. These effects may be positive or negative and are discussed in Section 12.

10. THREATS TO BIODIVERSITY

10.1 GENERAL THREATS TO BIODIVERSITY AND FORESTS

As described in this report, Armenia's biodiversity is notable when considered on its own, but it is also a key part of the Caucasus and Irano-Anatolian Hotspots, and it is one of the Global 200 ecoregions (the Caucasus global ecoregion). As stated in the Ecoregional Conservation Plan (ECP) for the Caucasus (Williams, 2006), biodiversity in this ecoregion is being lost at an "alarming rate."

The ECP found that on average, nearly half of the land in the ecoregion had been transformed by human activities. Most significantly affected are the plains, foothills, and sub-alpine belts. Only two to three percent of original riparian forests remain in the South Caucasus (Williams, 2006). Most natural old growth forests are considered fragmented. For the Caucasus as a whole, about a quarter of the region remains in reasonable condition, while less than 12 percent of the original vegetation, including forests, can be considered pristine (Williams, 2006).

Participants in the ECP's January 2003 stakeholder workshop determined the following are the major threats to the Caucasus ecoregion's biodiversity:

- illegal logging, fuel wood harvesting, and the timber trade;
- overgrazing;
- poaching and the illegal wildlife trade;
- over-fishing;
- infrastructure development; and
- pollution of rivers and wetlands.

These threats lead to habitat degradation, decline of species populations, and disruption of ecological processes – all contributing to the overall loss of biodiversity. Key threats to the ecoregion's biodiversity are similar to the key threats that the Biodiversity Analysis update team identified for Armenia. The team identified the direct and indirect (root causes) threats to Armenia's biodiversity based on a review of documents, interviews, and the team's knowledge of the biodiversity conservation status in Armenia. Principle threats are discussed below.

10.2 DIRECT THREATS TO ARMENIA'S BIODIVERSITY

1) Unsustainable use of resources: unsustainable fuel wood collection and commercial timber harvesting; inappropriate grazing practices; mining, and other industrial and commercial construction/development; and poaching fish and wildlife.

a) Forest resources are threatened by unsustainable collection of fuel wood for heating and cooking; and unsustainable and illegal commercial timber harvesting.

Between 1990 and 2005, Armenia lost 18.2 percent of its forest cover, 3,000 hectares of which were primary forest, the most biodiverse forest. The two primary threats to forest resources are unsustainable collection of fuel wood for heating and cooking; and illegal industrial timber harvesting. The first is related to poverty and lack of access to alternative fuels; the second is related to a poorly managed commercial timber resource,

weak law enforcement, and corruption. The original Biodiversity Analysis (2000) also found that threats to forests were significant.

Fuel wood collection

The Ministerial Report, 2003-2005 (MNP, 2006), states that as a result of the energy and economic crises, about 40,000 hectares of forest have been cut in recent years (2003-2005), of which about 7,000 hectares were clearcut. The Biodiversity Analysis (2000) reported that from 1992-1995, about 27,000 hectares of forest was cut to provide fuel wood (Third National Report on Biodiversity, 2006). It appears that deforestation due to fuel wood collection remains a threat in Armenia.

Under the Soviet Union, government provided most households with free or heavily subsidized electricity and natural gas. Therefore, few households used fuel wood. In 1992, however, sources of electricity and natural gas were cut off and the cost of these fuels became prohibitive for a majority of Armenian households (Kernan, 2002). Consequently, massive fuel wood cutting began.

In 1999, 53 percent of Armenian households used fuel wood for heating (Kernan, 2002). Since then, energy supplies have become more reliable, so those who can afford gas and electricity probably now use these fuels. However, in rural areas a majority of families continue to use firewood, since it is cheaper, and in some cases, more readily available than the alternatives. The recent worldwide economic crisis has resulted in job losses in Armenia, especially associated with the mining industry, a key source of jobs in rural areas. The Ministerial Report states that the majority of illegal harvesting takes place by residents of the 230 communities at a five kilometer distance from forests, and the primary use of this wood is for heating.

The Third CBD (2006) report states that in recent years there has been a reduction in illegal use of forest resources and mainly this can be attributed to the improved electricity supply and development of gas supply infrastructure. Given that recovery from the 2008 economic crisis is expected to be slow, the reduction in illegal use of forest resources is unlikely to continue, and illegal harvesting for fuel wood may be on the rise once again.

Commercial Timber Harvesting

As stated in the Ministerial Report (MNP, 2006), in 2003, according to assessments by national and international experts, the total timber production (commercial) amounted to 847,000 cubic meters, yet only 63,000 were officially recorded. According to Kernan (2002), reliable data on where and how much timber is cut, is not available, largely because most of it is done illegally. Also, according to Kernan (2002), Ter Ghazaryyan and Ghulijanyan of the National Forest Research and Experimental Center estimated that in 2001 the total area of natural forest logged was about 20,000 hectares and that about half of this was cut without official permits. They also estimate that the legal cut in natural forest for all purposes, including firewood, was about 65,000 m^3 and the illegal cut was about 500,000 m^3. **Annex F-10** includes a series of 5 maps that indicate declining forest cover in Armenia from 4,000 BC until 1990 CE.

According to the NEAP-2 (2008), to regulate the forestry sector, Armenia adopted policies and legislation such as the RA National Forest Policy and Strategy Paper, National Forest Programme of Armenia, and the Action Plan Supporting Issues Related to Illegal Logging. These contain measures to address the restoration of forested areas and to develop sustainable forest use. The National Forest Programme of Armenia includes a number of actions that address conservation of forest ecosystems and promote reforestation/forest restoration activities; and it promotes a vulnerability assessment of forests under climate change regimes.

As mentioned above, the RA Forest Code (2005) identified categories of forest, in particular, a new category was defined – forests of industrial designation. Also, this code established the concept of community forests. Once implemented, this categorization is expected to help reduce illegal timber operations.

Also, to prevent illegal use of forest resources, a Government Resolution "On introducing the state monitoring system of forests" (28 June 2005) created a new entity, the state forest monitoring board, which is responsible for monitoring and combating illegal logging in Armenia. While there has been progress on the policy front, most of those interviewed for this report stated that policies were in place, but they are not being implemented and illegal cutting for fuel wood and unsustainable commercial timber harvesting still occur.

According to the Proceedings of the Urgent Environmental Issues of Armenia conference (2008), in spite of the new Forestry Code, establishment of a forest monitoring center, and reforestation initiatives, many hectares of forest are still being lost to illegal logging, to create agricultural land, and for construction and mining. The Proceedings state that no "radical measures have been taken to prevent and punish illegal logging."

Since 2005, when the community forest management component became law, it has been tested in five to six villages by the World Bank's Poverty Reduction and NRM project. However, as yet, there is no approved community FMP (the first may be ready in January, 2009 according to those interviewed). In addition, community forest legislation is still being developed, and there is not yet a clear idea about how forest use by communities will actually be implemented, for example: who can/will benefit, how benefits will be distributed; and how/if concessions will be let. Lack of a legal route for communities to benefit from forest resources encourages resource "mining" and this threat will likely remain significant until this is resolved.

b) Mining, construction, and other industrial development conducted without appropriate environmental safeguards.

This threat was not discussed in the original Biodiversity Analysis (2000). Armenia is rich in mineral resources. As of January 1, 2007, there were 579 mines with confirmed hard mineral supplies (including 26 metal mines, of which 13 are operating; 553 non-metal mines, of which 238 are operating). Of 43 fresh subsurface water mines and 23 mineral water mines, 20 mines are registered, of which eight are operating (NEAP-2, 2008). While the current international economic crisis has caused several mines in Armenia to stop operating, this situation is unlikely to last.

According to the Proceedings of the Conference on Urgent Environmental Issues (2007), about 470 hectares of forest lands were allocated by the Government of Armenia for mining at the Teghut copper site. Although environmental NGOs are fighting this decision, the potential copper mine remains a threat to these forests.

According to NEAP-2 (2008), among the many environmental issues related to mining, those associated with biodiversity impacts are: mining practiced without appropriate safeguards such as EIA and the mitigation measures that would be required by a professionally conducted EIA; failure to collect fees that could be used as "insurance" for clean-up and reclamation; and lack of re-use and recycling in the mining industry.

Mining also affects biodiversity in the following ways: valuable mineral and metallic resources in Armenia are found in areas that are high in biodiversity (see **Annexes F-11 and F-12**). Many of these areas are forested; others are near important waters and wetlands. Also, processing facilities are often located near water bodies to minimize costs of obtaining water—and discharge often results in pollution of those water bodies. Mining directly disturbs terrestrial resources by disturbing the land surface to gain access to minerals and metals -- even with appropriate safeguards, mining will have negative environmental impacts. Reclamation can reclaim some habitats, however it is costly, and certain species, especially those that have very specialized habitat requirements and/or are already under stress (for example, from climate change or hunting pressure) may be destroyed regardless of attempts to reclaim habitat.

Lack of incentives to implement clean technology (environmental fees/fines are low, see "Root Causes") and lack of an insurance scheme mean that mining companies are more likely to pollute than to prevent pollution.

The Biodiversity Analysis update team observed effects of mining during their field trip to Akhtala and Alaverdi, two beautiful mountain villages that potentially could develop ecotourism based on mountain climbing, hiking, fishing, and birding. However, mining operations, without appropriate safeguards, have changed the character of these towns to an industrial one. Prospects for nature tourism, which could provide sustained revenue for local people—and safeguard biodiversity—are now unlikely. Mining often results in a permanent trade-off.

A report for Akhtala Copper Mining Company, Status Report on Implementation of Cleaner Production Audit Recommendations, prepared by PA Government Services, Inc., revealed that Akhtala can process 200,000 tons of ore/year without changing current levels of expenditures and resources. However, the plant was processing on average of 90,000 tons of ore per year. While an environmental audit is often avoided by industry because of the perception that it will result in additional cost, as this case illustrates, an environmental audit can result in increased efficiency and a cost savings (and introduction of clean technology).

Besides mining, other industrial and commercial development is happening at a quick pace in Armenia (however, as discussed below, poverty remains high, and much of the development is benefiting relatively few). EIA regulations should help protect biodiversity and the environment in general, however, as several interviewed by the Biodiversity Analysis team stated, decisions about development projects are often made, not based on what is best for the environment, but on economics—development wins out over conservation. Too many restrictions (i.e., mitigation measures) are thought to discourage development, rather than encourage wise, sustainable, and environmentally sound development.

c) Inappropriate livestock grazing practices result in the degradation of alpine and sub-alpine meadow ecosystems.

Due to their slope, climatic conditions, and vegetation, these ecosystems are highly sensitive to impacts such as inappropriate livestock grazing, and are very slow to regenerate. In addition, as described above, they contain important biodiversity resources.

According to NEAP-2 (2008), inappropriate grazing in meadow ecosystems results in the reduction of vegetation on steep slopes and causes gradual land degradation. The NEAP continues, "The lands that degrade due to a variety of reasons easily lose their restorative capacity thereby, resulting in decreased biological productivity and increased economic loss." The NEAP supports preventing degradation rather than "combating its consequences, which is more difficult and less efficient." According to the Third CBD Report (2006), natural pastures have been degraded [by over-grazing] and there has been a significant change in species composition and even extinction of some species.

There are a number of Government policies, strategies, and projects that aim to improve meadow ecosystems and promote sustainable use: NBSAP, National Action Plan to Combat Desertification, National Strategy for Sustainable Development of Agriculture, and Community-based Management of Watersheds component of the Poverty Reduction and NRM project (Third CBD Report, 2006).

d) Armenia's fisheries have decreased due to poaching of fish; and illegal hunting is impacting wildlife populations.

The original Biodiversity Analysis (2000) found that threats to wetlands, especially changes in Lake Sevan's water level, was a key biodiversity threat. Several actions have been taken to reduce this threat, but it remains significant today, and is discussed below.

The Third CBD Report (2006) notes that main reasons for illegal fishing are poverty and unemployment in the Lake Sevan region—these are among the root causes of this threat; and, a legal framework that is not well enforced also underlies this threat.

Lake Sevan is one of the most endangered ecosystems in the Republic of Armenia. According to the Third CBD Report (2006), it contains more than 80 percent of the country's water resources. The lake is characterized by endemic fish species (described above) and it was the location of a once healthy commercial fishery. The wetlands adjacent to the lake provide important habitat for migratory and nesting bird species. The decrease of fish stocks has influenced the entire ecosystem of the lake.

White fish, crucian carp, and crayfish are the most important industrial fish species of the lake. White fish was introduced in Lake Sevan and by the end of the 20th century it made up 80 percent of the total fishery. Crucian carp appeared in the lake in the 1980s; and crayfish appeared by the end of the 1970s.

In the 1970s, there were so many white fish in the lake that Armenia gave Russia white fish; now Armenia would like to get white fish back from Russia (pers. comm., Dec, 2008). Currently, the state of fish fauna in the lake remains extremely serious, and the industrial reserves of the white fish are about exhausted (Third CBD Report, 2006). There is still commercial fishing for crayfish and carp.

The industrial fishery of Lake Sevan is based on the registration and evaluation of commercial fish reserves. This involves regular registration of the industrial fish reserves in the lake, a procedure that had been conducted up to 1999; after which, due to financial difficulties, it had not been performed for five years. During this time, the quantity of white fish drastically declined; trout are on the verge of extinction in the lake. Lake Sevan's industrial fishery that had been based on white fish has now collapsed (Institute of Zoology, pers comms, November 2008). Since 2004, evaluation of fishery reserves has resumed under the projects, "Registration of the Lake Sevan fish and crayfish reserves" and "Registration of industrial fish species in the Lake Sevan." These projects have confirmed the reduction in white fish reserves.

To allow the endemic trout and white fish populations to regenerate, every year, from November through December, during spawning season, the MNP bans fishing for these species. Lake Sevan National Park inspectors patrol the area for illegal activities. In 2003, inspectors found 98 violations and in 2004, 83 cases, of which 41 violated rules governing industrial fishing (versus subsistence).

One of the difficulties of enforcing the law is that after sexual maturity, trout travel upriver, through areas with human settlements. This makes it extremely difficult to control illegal fishing. According to the Third CBD Report (2006), the number of inspectors for Lake Sevan National Park is insufficient to patrol the entire length of the river. Other obstacles for monitoring fisheries populations are: limited information available about rare species and insufficient financial resources to monitor and organize annual study expeditions to gather data on the status of the fisheries resource.

The Biodiversity Analysis update team visited Lake Sevan National Park, and interviewed a fisheries staff member. He confirmed that inspectors are patrolling daily for incursions of the fishing ban, and claimed that as far as he was aware, white fish are not being fished during the "black-out" season.

Poaching of fish is not the only threat to the Lake Sevan ecosystem. The decrease in the lake's level has destroyed key ecosystem functions. As a result of the decrease in water level, 36.8 hectares of the lake's bottom has dried. This has resulted in drying of spawning areas of endemic fish species.

The Law on Rehabilitation of Lake Sevan Ecosystem, its Maintenance, Reproduction and Utilization has a special provision to increase of the lake's water level, which is the main precondition for the rehabilitation of the system. The same Law limits maximal outflows to 170 million m^3 per annum. Due to this Law, in the last

six years, water withdrawals from Lake Sevan have reduced, and the lake's level has increased. However, in 2008 water withdrawals exceeded 300 million m^3 due to a controversial amendment to the law.

Also as a result of the decrease in Lake Sevan's water regime, Lake Gilli has dried up, and this has resulted in a decrease in the number of water birds at Lake Sevan. Out of 159 bird species, 33 rare and disappearing species have been registered in the Armenian Red Book.

When the water level in Lake Sevan is increased relatively quickly, this also creates problems. Increasing the water level affects habitats along the shore, and results in increased suspended solids near to shore. This can destroy near-shore habitat used as nurseries by fish and amphibians. Water level fluctuation can result in eutrophication, which also can affect species composition of the lake and near shore.

The Third CBD Report (2006) states that disturbed ecosystems and the biodiversity are being rehabilitated. However, the lake is still considered to be in a degraded condition and its future as an important commercial and subsistence fishing industry, as well as critical habitat for nesting and migrating bird species remains in doubt.

2) Climate change regimes indicate that Armenia's ecosystems are at great risk of desertification.

In Armenia, climate change is expected to result in an increase in average air temperature of 1.7°C, and a decrease in precipitation of about ten percent by 2100 (although there are various alternative scenarios, as discussed above, they all indicate that Armenia's biodiversity is threatened by climate change). This threat was not included in the 2000 Biodiversity Analysis or the 2003 update. The following is from the Climate Change Information Center of Armenia http://www.nature-ic.am/ccarmenia/en/?nid=69) and Fayvush (1998).

The following consequences of climate change are predicted:

- Over the next 100 years, a shift of landscape-zone borders is expected up slope by about 100-150 meters. The desert-semi-desert zone is expected to expand by 33 percent. The steppe belt is expected to expand by four percent and shift upwards by 150-200 meters. The lower border of the forest belt will move upward by 100-200 meters. The sub-alpine belt will be reduced by 21 percent, and the alpine belt will be reduced by 22 percent on average.
- The climate will become more arid and desertification processes will intensify.
- Annual river flow will be reduced by 15 percent, and evaporation from the surface of Lake Sevan will be increased by 13-14 percent.
- The efficiency of plant cultivation in Armenia will be reduced by 8-14 percent. The productivity of cereals will be reduced on average by 9-13 percent, vegetable cultures by 7-14 percent, potato by 8-10 percent, fruits by 5-8 percent. The productivity of more heat-resistant grapes will grow by 8-10 percent.
- Pasture area is expected to reduce and productivity of stocks will decrease by 4-10 percent. Productivity of mountain hayfields will decrease by 7-10 percent.
- Human health effects are expected as well: an increase in cardiovascular diseases, and a possibility of plague and malaria occurring in this region.

The ATP predicts that at current levels of deforestation, the entirety of Armenia will become a desert in 50 years. Mountain ecosystems, especially alpine meadows, are highly vulnerable to climate change—these ecosystems are indicators of climate change. ATP reported that 82 percent of Armenia is at risk of desertification due to the loss of green areas. Climate change scenarios indicate that pests, diseases, and forest fires will become even greater threats to biodiversity than they currently are.

3) Invasive species are affecting species composition, ecosystem functions, and thereby, degrading biodiversity.

According to the Botanical Institute (pers. comm., Nov, 2008), there are over 100 species of invasives that can cause damage to Armenia's natural ecosystems. In Armenia, invasive species of plants and animals and their destructive impacts on lakes and wetland areas have been well documented. This threat to biodiversity was not discussed in the 2000 Biodiversity Analysis or the 2003 update.

A range of species has been introduced to Armenia. Some species have expanded their ranges to the detriment of native species, and have resulted in population declines and disruptions of ecological relationships, affecting both biodiversity and agricultural systems. Among the most aggressive invasive plant species are *Xanthium, Cirsium*, and *Galinsoga parviflora*, while wormwood ambrosia (*Ambrosia artemisiefolia*) has expanded its distribution by over 200 km^2 within the last decade. The increasing levels of trade regionally and internationally, may result in increased introductions to Armenia, as a result on inadequate customs checks and quarantine regulations.

Alien invasive species enter Armenia through many routes, and may be brought in purposefully or unknowingly. Fish farms, which use natural water systems, such as rivers and reservoirs, to capture a population of commercial fish have introduced invasive species. Others have been brought in purposefully—for example, white fish, a valuable commercial fish species, was brought to the lake in 1920s to create a commercial fishery. It is not a competitor with native species, and appears to have caused no damage to the ecosystem.

In addition to white fish, *Cyprinus carpio*, *Carassius auratus,* and crayfish are also alien species in Lake Sevan. *Carassius auratus* is a fish of lower value, and a serious competitor with other fish in the lake. It consumes several times more than other fish, it is a generalist, and has become well established in the lake. Introduction of crucian carp in the fishponds of the Ararat Valley (1960s) and later, in Lake Sevan (1978) negatively affected the quantity of Koghak since their young are food competitors.

Muskrat is one of the aggressive invasive species of fauna, and it is rapidly spreading. It has destroyed the vegetation in the area of Ardenis Lake, which the gray-eyed diver relies on for egg laying. The muskrat has seriously reduced the population of gray-eyed diver.

To meet CBD obligations, Armenia adopted the Law on Flora (1999), Law on Fauna (2000), and Law on Lake Sevan (2001). Articles of these laws prohibit illegal (without an MNP permit) import and export of flora and fauna. The State quarantine service inspects the main transportation routes; however, according to the Third CBD Report (2006), attention is focused exclusively on known weeds and agriculture and forest pests. The quarantine list registers five species of agriculture plant pests; two species of weeds, and three diseases. Import of alien invasive species that may present a potential threat to natural ecosystems is not specifically controlled.

4) The protected area system does not adequately protect ecosystems with significant and threatened biodiversity.

According to the ECP (2003), most strict nature reserves and national parks in the Caucusus ecoregion are too small for long-term biodiversity conservation. This is the case for Armenia, as well.

According to the ECP, due to the high human population density in the region, historically few reserves were created over large territories. Instead, many small territories were set aside, often located in agricultural areas or near villages, particularly in the South Caucasus (**Annex F-9**, map of PAs, which illustrates the fragmented nature of Armenia's PAs). In many cases, the borders curve in and out of agricultural and pasture lands or

have farms located directly on their territories. The ECP recommends the creation of additional PAs and corridors connecting the PAs (**Annex M** contains the proposed list).

In addition (according to the ECP), local people are often poorly informed about PAs, and, as a result of the economic crisis in the Caucasus, poaching, illegal forest cutting, and grazing in PAs are on the rise. Buffer zones are virtually non-existent, so resource use and human pressures outside reserves spill over the borders and impact protected ecosystems.

Budgetary constraints mean that the PA system is not adequately financed. To effectively protect biodiversity in existing PAs, management plans need to be produced and implemented, PAs require sufficient staff, supplies, and equipment, and there is a need for construction and rehabilitation of infrastructure, and regular maintenance. Funding is also needed to create additional PAs and corridors. A limited information base on biodiversity resources means that important biodiversity outside PAs may remain unprotected.

Protected Area Management Plans (PAMP) have been prepared for Dilijan and Lake Sevan National Parks, and adopted by Government in January 2007. These were developed with support from the World Bank's Poverty Reduction and NRM project, which collaborated with communities on the border of the national parks to develop the PAMPs. A participatory approach was used to produce the PAMPs, but the communities do not yet benefit from the national parks. First, an agreement between a community and national park authority must be signed before communities can actually benefit. Currently, it is unclear how many communities will sign agreements, and therefore, it is unclear how many communities stand to benefit, and it is still unclear how communities will be able to benefit (pers. comms., December, 2008).

A UNDP GEF project will support community conservation and the creation of community PAs. It is scheduled to be developed and submitted for approval in May 2009. This project will help identify a methodology for the creation of a community PA, which could involve granting part of an existing PA to a community or identifying new areas as community PAs. The intention of creating community PAs is to allow adjacent communities to benefit from PA resources and thereby, create strong community proponents for sustainable use and conservation of PA resources. When communities adjacent to PAs are not benefiting from the existence of the PA, they are less likely to be proponents of the PA, more likely to view it as an obstacle, and undertake activities that degrade resources (over-fishing, poaching of wildlife, cutting fuel wood, unsustainably collecting plants).

10.3 ROOT CAUSES OF THE THREATS

1) Poverty leads to unsustainable use of natural resources.

According to USAID/Armenia website (www.armenia.usaid.gov, October 2008), "the distribution of wealth in Armenia is highly inequitable, wealth and power are highly concentrated, and there are significant disparities in economic and social development between Yerevan and the rural areas. In short, economic growth has not yet resulted in widespread prosperity." According to the ECP (Williams, 2006), today most of the rural population depends on subsistence farming; in mountain regions, the primary source of income is livestock farming. Fishing in freshwater rivers and lakes plays an important role in local economies and supplements low incomes in many rural areas.

Poverty, especially in rural areas, leads to the unsustainable use of natural resources. Poor people have few if any options but to exploit natural resources, often unsustainably. In Armenia—as found worldwide—this is exhibited by the following direct threats to biodiversity, described above: unsustainable collection of timber for fuel wood; poaching fish and wildlife; and inappropriate grazing practices.

Poverty also explains why communities will be advocates for development projects even if they are shown to harm health and the environment. According to http://news.mongabay.com/2008/0129-hance_armenia.html, despite environmental concerns of the Teghut mine, the towns near the planned mine have generally shown support for Armenian Copper Program (ACP). Both the villages of Teghut and Shnough have high rates of emigration and unemployment, and the mine would bring needed jobs—although most of these jobs would be short-term. However, this illustrates how poverty combined with a low level of environmental awareness can affect decision making.

2) Government decisions over the use and protection of natural resources are often poorly informed: they are hampered by a lack of good quality data, including data from regular monitoring of biodiversity resources, and because they may fail to take into account civil society concerns and recommendations. In addition, there is limited transparency in government decision making on biodiversity issues.

While poverty can lead to communities advocating for unhealthy choices for humans and the environment, CSOs and other NGOs can be unbiased proponents for communities. However, often community members, CSOs, and other NGOs, do not have all the information they may need to make informed decisions.

Access to environmental information in Armenia is guaranteed by the RA Constitution, Article 33.2, which states that officials are responsible for providing environmental information. In 2001, Armenia ratified the Aarhus Convention, in which the country agreed to the principles of information accessibility, public participation, and public access to justice. Essentially, the Convention provides for the participation of local people and transparency in decision making. For example, communities are informed about EIAs carried out on their territory, public hearings are organized, and NGOs from relevant communities are involved in the process.

However, while the legal framework exists, the mechanisms through which that information is conveyed to the public are not sufficient (NEAP-2, 2008). Conversely, as the NEAP states, demand for environmental information has not been strong. Reasons for this are lack of environmental awareness and education. The RA law on "Ecological Education of the Population" (2001) provides for continuous ecological education, and discusses the legal, organizational, and financial foundations of this; again, implementation is limited.

Since the Aarhus Convention was signed, seven public environmental information centers (Aarhus Centers) have been established in the capital and Marzes with assistance from the OSCE Armenia. These centers include official and non-official information, training materials, scientific publications, and videos.

In the past few years, most government institutions have developed websites that notify the public about their activities. According to many of those interviewed, public hearings are common, during which NGOs and individuals are able to voice their opinions about proposed actions and the use of natural resources. Some civil society actions have produced desired results (as described above for Shikahogh Forest).

However, several NGO representatives that the Biodiversity team met with stated that while they may be invited to public hearings, and they are allowed to speak during hearings, their concerns are often not reflected in the approved project design. Government representatives countered that the NGO community is often unprepared to make presentations and poorly informed, and because their concerns may not be clearly articulated and relevant, their concerns are not addressed.

Some NGO representatives also stated that they are unaware of the steps that lead to a decision—or there is a lack of transparency at some of the steps. For example, the Biodiversity team was told of a situation where an ecotourism trail was planned at Dilijan National Park. After approvals were granted for trail construction, and with the agreement that the purpose was ecotourism, the team found out that another project had been approved nearby—for the construction of a large restaurant with accompanying rentals of motorized trail

vehicles. This did not fit into the ecotourism vision that had been agreed to, and the ecotourism project team was unaware how the decision for the "mass tourism" project was reached.

Another issue is that Government may not give enough time to comment. By the time an NGO or other interested party finds out about a development project, it is often too late to gather adequate information to present a case.

Government representatives stated that NGO and private sector entities are free to send letters requesting information, check the website of the relevant ministry, or make a phone call and request information. While this may be the case, it is undeniable that environmental NGOs and civil society feel that their concerns are often not addressed when it comes to government decision making that affects natural resources. However, there is also a need to "professionalize" NGOs so they become more effective.

Transparency International (pers. comm., December, 2008) stated that during the last few years, transparency in government decision making has increased. However, there is still a long way to go. Public participation —and taking the public's concerns into account in decision making is still uncommon. TI stated that they often hear about decisions when it is too late for the public to influence them. The frequency of public participation has increased, i.e., there are more public hearings now, where concerns are voiced--but they often go unaddressed.

In addition to limited participation and transparency in decision making, natural resources decisions are made based on limited data. According to the IUCN website (Countdown 2010, 2007), in southern Caucasus countries, data are collected sporadically, are not compiled systematically, and are not made publicly accessible. The responsible institutions often have insufficient capacity to implement modern monitoring approaches (http://www.iucn.org/about/union/secretariat/offices/europe/work/index.cfm?uNewsID=150). Limited biodiversity data is also noted above (Section 3) as an institutional weakness. Government decisions on biodiversity conservation are based on inadequate and unreliable data, and systematic data collection is hampered by technical capacity and limited finances.

3) Biodiversity legislation has been revised and updated over the last several years, but there are still legislative and institutional gaps and weaknesses. This reflects a lack of political will to protect and conserve natural resources.

Almost all environmental professionals interviewed stated that legislation exists, but it is not being implemented. However, many of those interviewed felt that this was a transition period, and that implementation is now a key focus. Limited implementation is due to budget constraints, staffing constraints (Environmental Inspectorate), and corruption.

Limited implementation/enforcement of regulations is one of the root causes of the unsustainable use of resources noted above. Limited political will is a root cause of an under-funded PA system; politicians are more likely to fund development projects and social service projects than biodiversity conservation projects.

Environmental impact assessment legislation is a particular case where Armenia's legislation does not follow best practice, and needs to be strengthened. Rather than providing tiered environmental review, Armenia's law on Environmental Impact Assessment requires an EIA for a wide range of activities that exceed the "ultimate level," which is determined by the Government of the RA. All proposed projects that exceed the "ultimate level" are required to conduct a full EIA. This is costly—the project developer is required to cover the costs (which is common practice); and time consuming (besides the time needed to conduct a full EIA, the legislation requires public hearings, and additional time is needed to review a backlog of EIAs awaiting decisions); and the process discourages even "clean" investment in Armenia. Of most concern from an environmental/biodiversity standpoint, is that because the legislation can seem untenable to a developer, as

well as to politicians, the most reasonable route may be non-compliance. More practical, and considered best practice worldwide, is to provide levels of environmental review. Projects that are not expected to result in significant harm to the environment or to human health are typically required to conduct simple environmental reviews, and more environmentally hazardous projects require a full EIA. This type of tiered EIA process could improve compliance and could also help focus attention at the more potentially damaging projects. It could also help encourage investment, and reduce poverty in Armenia.

Institutions that are charged with oversight, conservation, management, and use of biodiversity resources (MNP, MoA, and the Ministry of Energy and Natural Resources) have budgetary constraints, limited staff to undertake their responsibilities, and limited technical capacity. While local and regional authorities may be well placed to undertake biodiversity conservation tasks, they face even greater budgetary, technical, and staffing constraints than central authorities. In addition, the institutional framework governing Armenia remains highly centralized. Training and other capacity strengthening opportunities should be provided to local and regional authorities, and central authorities should move into an oversight role. This decentralization process should improve enforcement of legislation. Decentralization, along with an incentive-based approach (see #5 below) to compliance, would alleviate some of the constraints to implementation of legislation.

In addition, improved coordination among agencies and integration of environmental concerns into other sectors could help the MNP move into an oversight role rather than playing an enforcement role. As noted above, the energy and security sectors have begun to incorporate environmental considerations into their strategies, plans, and proposals. When sectors begin incorporating environmental concerns into their activities, the MNP can provide technical expertise rather than playing the more budget and staff intensive enforcement role.

4) There is a low level of public awareness of biodiversity and environmental education remains limited.

Since the original Biodiversity Analysis (2000), mainly because of national and international NGO programs, public awareness of biodiversity has increased. In regions where new PAs are planned, NGOs are implementing public awareness campaigns. However, some public awareness campaigns have low effectiveness because they are poorly organized. And the desire to take action to improve the environmental situation is very low among the general public. Rather, most people are preoccupied with meeting basic needs such as food, drinking water, or employment.

Local communities are now responsible for land management issues, but they do not have the necessary technical capacity to implement sustainable management. The rural population, in general is less well informed than the urban population. However, given the authority that is now vested in local communities, it is critical to continue to raise awareness of the importance of biodiversity, and to train rural people in sustainable use of natural resources. The low level of public awareness of biodiversity is a root cause of the over-exploitation of natural recourses.

Legislation was passed in 2001 regarding teaching environmental education in Armenia's schools (*Environmental Education and Upbringing of the Population*), and some bylaws are now being developed. The 2001 law covers environmental education for six levels, from pre-school to post-graduate and for the public. However, implementation of this law is limited. Teachers are not trained in environmental education, and environment-related teaching tools are limited. In addition, university students are opting for majors in areas such as business, marketing, and engineering over environment-related subjects since jobs in environmental fields are limited and seen as lower paid and lower status. According to Khanjyan (2006 in *Biodiversity of Armenia: From Materials of the Third National Report*), only 50 copies of a teacher manual for pre-school age students was printed; this does not even meet the needs of Yerevan kindergartens. Khanjyan also states that Armenia lacks modern curricula for environmental education, methodological manuals, and appropriate

infrastructure for implementation of environmental education. Khanjyan also finds that environmental NGOs are active in environmental education, yet the activities are not coordinated or continuous.

5) Biodiversity is under-valued in the country's accounts; and environmental fees/fines do not provide an incentive for conservation.

NEAP-2 (2008) states that according to international experts, in countries like Armenia, economic growth causes environmental damage commensurate with 8-10 percent of the country's annual GDP. At present, in Armenia, budget revenues from nature use and environmental fees and fines total only 0.25-0.27 percent of GDP. Therefore, the NEAP states that the actual damage caused is more than 20 times the revenue generated.

The NEAP found that environmental charges, fees, and compensations for environmental damage were used by the State in a highly centralized manner. Charges collected for the purposes of funding environmental protection measures and programs were only partially used for that purpose. The law, "On the RA Budget System," which will enter into force in 2011, stipulates the total budget earmarked for environmental programs shall be no less than the sum total of environmental and nature use charges actually collected in the preceding budget year—one remedy to this threat may be near.

In addition, in 2005, payments under mining concession contracts into the Environmental Protection Fund began. The accumulated funds will be used exclusively for re-cultivating, leveling, greening, tree planting, and developing areas affected by sub-surface resource use.

However, economic disincentives for biodiversity conservation remain. ACP runs Armenia's Alaverdi smelter, which was built during the Soviet era, but closed in 1989 due to the Soviet collapse. It started up again in 1996. In 2006-2007, the smelter released twenty times the sulfuric anhydride permitted by the government, and in 2006 it emitted 12 tons of arsenic, nearly 105 tons of dust, 41 tons of zinc, nearly three tons of lead, and three tons of copper (http://news.mongabay.com/2008/0129-hance_armenia.html). The smelter currently operates without filters; ACP has stated that it is too expensive in relation to the smelter's output to purchase filters. However, if lapses in environmental compliance were fined based on actual damage, ACP would find it more cost-effective to avoid the damage than to clean it up.

There are no environmental fees collected for entry into Armenia's national parks. Those interviewed stated that Armenians are not used to paying for entry to national parks, and would probably refuse to pay. However, that does not preclude charging a fee for international tourists, and allowing Armenians free entry. This would allow revenue to be collected for use by the national parks—and for other PAs—and Armenians may come to value the parks more, and eventually be willing to pay an entry fee.

NEAP-2 states that it is important to develop more favorable conditions for raising financial capital to improve the environmental situation and to fund environmental services, including the development of an environmental insurance system. Presently (as NEAP-2 states), financial sector involvement in the environmental process is limited due to the absence of an appropriate legal framework, in particular, one relating to the environmental insurance system. The measures recommended by the "National Capacities Self-Assessment for Global Environmental Management" (2004) also included, as a priority, the establishment of environmental insurance funds to restore natural resources.

The EIA process fails to account for the full value of biodiversity. For example, the market value of the commercial timber in the forest is considered, but not the intrinsic value of the forest (flood control, fresh air, habitat provision, carbon sink, etc.). Therefore, an EIA that recommends against a development project (or recommends significant mitigation) may appear to be recommending against economic development of the country, when in reality, from an economic standpoint, conservation may be the best choice in the long-term.

The lack of economic valuation of natural resources that takes into account intrinsic value of the resource, and low environmental fees are disincentives for biodiversity conservation.

11. ACTIONS NEEDED TO CONSERVE BIODIVERSITY

Below, we discuss the actions needed to conserve biodiversity—these are correlated to the direct threats discussed above. The "actions needed," which have been gathered from documents (NEAP, CBD Reports, etc.) and through interviews, are designed to address the direct threats, as well as their root causes. They are listed in order of priority (#1, highest priority action to address the threat). A matrix contrasting threats from the 2000 Biodiversity Analysis to actions taken by government, NGOs, and donors is included as **Annex N**. A matrix showing current threats (2008); actions needed to conserve biodiversity; what is currently being done by government, NGO, and donors; extent to which USAID addresses the threats; and gaps (actions not addressed) is included as **Annex P**.

Actions needed to address unsustainable fuel wood collection

1. Implement poverty reduction activities, with a focus on areas of high biodiversity importance: buffer zones of PAs, IBAs, important wetlands and watercourses, and in key watersheds.

2. Provide alternative fuel (gas, electric, etc.) especially in rural areas, and a financial program to help cover costs of obtaining fuel.

3. Implement community forest activities: designate community forest land; develop and implement community forest management plans; ensure transparency in providing community benefits; provide training, as necessary, to community members; and monitor compliance. As part of this, capacity should be strengthened in the MoA (Hyantar) to oversee community forest management; and capacity will have to be strengthened in communities to implement community forest management activities.

4. Improve protection of PA resources, and as appropriate, introduce a program of sustainable, well-monitored fuel wood collection by communities. This may have the potential to become a community enterprise that could generate income for communities.

5. Encourage use of wood lots for fuel wood.

Actions needed to address unsustainable commercial timber harvesting

1. Implement "industrial forests" category; require a sustainable forest management plan; and monitor for compliance with the FMP.

2. Ensure a transparent process for appropriating industrial forest to commercial enterprises.

3. Consider community benefit component in industrial forests, where communities could form commercial enterprises and manage a forest for commercial purposes. In conjunction with this, capacity strengthening should be provided to communities and community-based organizations so they can implement or oversee commercial timber harvesting, including the negotiation and management of timber contracts.

4. Create an open access GIS including application of environmental/biodiversity monitoring criteria. This should incorporate accurate reforestation/deforestation data.

5. Provide training to target environmental NGOs that have the potential to serve as advocates for community interests and strengthen capacity in advocacy, management, and fundraising.

Actions needed to address inappropriate grazing practices

1. Reduce and prevent land degradation with anti-erosion, anti-landslide measures.

2. Implement restoration measures (re-cultivation) of degraded lands.

3. Define principles for privatized agricultural land consolidation to reduce land fragmentation.

4. Create an open access GIS including application of environmental/biodiversity monitoring criteria.

5. Through land use planning exercises, strengthen and train local government authorities who will make decisions about land use.

Actions needed to address mining and other industrial and commercial developments that impact biodiversity

1. Increase environmental fees/fines to encourage use of clean technology to minimize waste, and water, land, and air pollution.

2. Ensure that a transparent EIA/environmental compliance process is implemented that takes into account all concerns.

3. Strengthen environmental compliance by developing environmental compliance legislation that provides for tiered environmental review and that incorporates transparent, third party environmental audits.

4. Implement an insurance mechanism, funded by the commercial/mining enterprise, which would create a fund that can cover reclamation costs.

5. Strengthen the capacity of the State Environmental Inspectorate.

6. Strengthen pollution prevention legislation on water discharge (point and non-point discharge) and implement pollution prevention measures, including water monitoring programs.

7. Target environmental NGOs that have the potential to serve as advocates for community interests and train them in advocacy, management, and fundraising.

8. Raise awareness of the public of importance of biodiversity and trade-offs between industrial development and other development (tourism, niche agriculture, etc.); and provide environmental education to schoolchildren.

9. Implement land use planning, incorporating Environmental Action Plans to integrate environmental concerns into land use decisions.

Actions needed to address poaching of fish and wildlife

1. Implement a holistic approach to recover the fish stock, including commercial and endemic fish populations. This includes artificial propagation; control of invasives; protection of the fish stocks; regularization (minimize) of water withdrawals from Lake Sevan, especially at time periods critical to the ecosystem (not only fisheries, also migratory and nesting birds, amphibians, etc); and implement a program to provide livelihood options for those living near the lake. It is important to treat the entire ecosystem—including the human dimension.

2. Implement a program of community-based natural resources management (CBNRM) that would allow local populations to benefit from hunting and fishing and other natural resource use. This would also encourage conservation and discourage illegal activities, and should be implemented in conjunction with biodiversity awareness campaigns.

Actions needed to address climate change

1. Develop alternative livelihood options for communities in areas that are particularly vulnerable to climate change and who rely on vulnerable biodiversity resources.

2. Develop clean, alternative sources of clean energy for use by Armenia's population.

3. Enlarge/establish additional PAs and corridors between PAs to mitigate climate change effects and to allow migration of wide-ranging species.

4. Gradually increase the forest cover area (target: 266,500 hectares by the year 2050, First National Communication on Climate Change, 1999).

5. Implement an integrated system of forest protection from pests, diseases, livestock grazing, and fire.

Actions needed to address invasive species

1. Improve State Quarantine inspections at borders; and train customs officers on important and endangered species requiring import and export permits.

2. Implement relevant articles of the Law on Flora (1999); Law on Fauna (2000); and Law on Lake Sevan (2001), which prohibit illegal import and export of "flora and fauna organisms for acclimatization and selection purposes."

3. Develop and implement management plans for the control of alien invasive species.

Actions needed to address PA system

1. Implement the MNP's National Strategy and Action Plan on Developing Specially Protected Areas. If implemented, the strategy will improve the system of SPNAs (**Annex L**) by ensuring the network corresponds to international agreements, standards, and criteria.

2. Implement community PA model(s) to illustrate how communities can benefit from management and use of PA resources.

3. Implement an improved biodiversity monitoring scheme, including regular data collection, systematically compiled, and publicly accessible.

4. Rationalize roles and responsibilities of central, regional, and local governments in supervision, management, and use of biodiversity resources. Given that budgetary, staff, and technical constraints are high, moving towards decentralization and eliminating overlapping functions would help ensure that those best placed to provide certain functions are providing them and on a cost-effective basis.

5. Conduct biodiversity awareness raising campaign for Armenia's SPNA system to help raise awareness and pride in the biodiversity heritage of the country, and its revenue generating potential.

6. Improve environmental education in Armenia, from pre-school through university by training teachers to provide environmental education to students and by providing the material and equipment needed. Teacher training and access to modern, high quality educational material are keys to ensuring environmental education programs are implemented.

7. Consider charging entry fees (to international tourists, and eventually, possibly to local tourists) to increase the revenue from the PA system, and allow this revenue to be used by the SPNA system (implement article in law, "On the RA Budget System" that applies to environmental programs, which is scheduled to be implemented by 2011). Charging entry fees can also be a source for revenue sharing with adjacent communities.

12. EXTENT TO WHICH, FINDINGS AND RECOMMENDATIONS

The following recommendations are based on the review and analysis presented in this report, and on a review of the USG Country Assistance Strategy (2009-2014). Within the existing USAID program (see **Annex O**), recommendations are provided for:

1. Mitigation measures for potential biodiversity threats from the anticipated USAID program, 2009-2014 (Section 12.1).

2. Enhancement measures to increase the positive effect on biodiversity of the USAID program. These are based on the actions needed to conserve biodiversity and the gaps (**Annex P**). Measures recommended are within the framework of the planned USAID program (Section 12.2).

Additional recommendations and linkages are also provided:

3. These recommendations (Section 12.3) are provided as additional opportunities for USAID to contribute to biodiversity conservation in Armenia. They are based on the gaps identified (**Annex P**), on the CAS goals, and on USAID's comparative advantages.

As stated above, the new CAS (2009-2014) does not include a specific biodiversity priority goal; and the proposed USAID program does not include a biodiversity conservation activity. However, under Priority Goal 4, environment/biodiversity activities are included that promote a clean productive environment. In addition, certain USAID activities may directly or indirectly affect biodiversity. These effects may be positive or negative (discussed below).

In accordance with the FAA Section 119(d)(2), the following recommendations are provided based on "the extent to which the actions proposed for support by the Agency meet the needs thus identified." Implementation of the recommendations in Sections 12.1-12.3 will mitigate negative effects on biodiversity, amplify positive effects, and will help fill gaps in biodiversity conservation needs in Armenia (as identified in Section).

12.1 FINDINGS AND RECOMMENDATIONS: POTENTIAL IMPACT OF USAID/ARMENIA'S PROGRAM (2009-2014) ON BIODIVERSITY AND RECOMMENDED MITIGATION MEASURES

The following is a discussion of potential biodiversity impacts from the USAID Program (**Annex O**) and recommended mitigation measures.

Social Protection

No effects on biodiversity are expected from these activities. Minor construction under a BRIDGE-similar GDA could have environmental effects. It is expected these will be identified during USAID's Initial Environmental Examination process (IEE) and, given the minor nature of the anticipated construction, impacts are likely to be minor as well, and easily mitigated.

Economic Growth

1. CAPS will continue to work in the tourism sector to build capacity of companies in marketing and management. The intention of these activities is to increase revenue generated by the tourism sector. USAID's assistance is provided in line with Armenia's National Tourism Strategy, for which a Strategic EA was conducted. USAID's support for technical assistance will not have direct effects on biodiversity. Indirectly there could be impacts: tourist numbers may increase, and this may affect biodiversity. Conversely, if the biodiversity resources of Armenia are providing income and are generating revenue for the country, USAID's activities could also have an indirect positive effect—civil society and Government will see value in biodiversity that is protected and not degraded. Given that Armenia's SPNA system suffers from budgetary constraints, and that tourism visits to SPNAs (other than Lake Sevan) have not reached carrying capacity, this activity is more likely to have indirect positive effects.

2. CAPS support in the pharmaceutical sector focuses on Good Management Practices (GMP) from production to storage to distribution. While disposal of expired products is not included in the GMPs, disposal of pharmaceuticals is a significant threat to biodiversity. Worldwide, pharmaceuticals have been found, disposed of in waters and on land, and they have been implicated in reproductive health issues in animals and humans. While CAPS activities in the pharmaceutical sector do not affect biodiversity, USAID interventions in this sector should promote environmentally sound disposal practices.

3. Development Credit Authority Program: The Mission's IEE recommends that environmental compliance training for loan officers is conducted to ensure that loans guaranteed through USAID do no impact biodiversity or the environment. The training should be implemented, and lessons learned regarding training of loan officers in environmental compliance should be incorporated into future DCAs.

4. Water sector:
   The GDA with Coca Cola and Dilijan municipality is likely to have a positive effect on biodiversity. This will be the first wastewater treatment facility in Armenia that uses a constructed wetland. Municipal waste disposal directly into waterways affects aquatic biodiversity of Armenia. A well-designed wetland treatment system will have a positive effect on biodiversity, and could be a model for other municipalities. In addition, given that waste is currently disposed of in surface water bodies, it contaminates the watershed of Dilijan National Park—improving this situation will benefit the important biodiversity of the national park.

5. Energy Sector:
   Technical assistance for non-radioactive waste management for the nuclear power plant will likely have a positive effect on biodiversity. Unsafe storage and disposal of non-radioactive waste from the nuclear power plant could have significant effects on biodiversity. Technical assistance should ensure that waste is not disposed of directly in areas of important biodiversity or where it could contaminate important biodiversity. In particular, waste disposal should not affect PAs, wetlands, and other waterways. Impacts on threatened and endangered species and on critical habitats must also be avoided.

   Although their design is currently unknown, Energy Sector GDAs could impact biodiversity. In particular, small-hydro activities could affect the water balance in rivers and streams, and wind energy (wind farms) could affect birds, especially if windmills are placed on migratory bird routes. For all GDAs, an IEE is required prior to implementation, wherein site-specific impacts can be evaluated.

Mitigation measures for small-hydropower can ensure there will be no biodiversity impacts (See, for example, USAID/Dominican Republic mini-hydropower environmental guidelines; USAID's Environmental Guidelines for Small-Scale Activities). General guidelines are available, but will need to be adapted to the situation in Armenia. Siting of wind farms should avoid migratory routes. An IEE will ensure that negative biodiversity impacts are identified and mitigated.

6. Health:
   Only "light" renovation is expected to take place, and this is not expected to have biodiversity impacts. Mitigation can easily alleviate concerns.

7. GDAs, as yet to be designed, may involve support to health clinics. This may offer the opportunity to improve the medical waste management and disposal system at clinics.

8. Cross-Cutting:
   Interviewees stated to the Biodiversity Analysis team that university students are attracted to business and technology and less to environment-related subjects; and this could create a dearth of experts in biodiversity conservation in the future. The cross-cutting education activity could have a positive effect on biodiversity if it helps to address gaps in formal education in biodiversity conservation.

12.2 RECOMMENDATIONS: OPPORTUNITIES FOR USAID TO ENHANCE MISSION CONTRIBUTION TO BIODIVERSITY NEEDS

The below recommendations are provided to assist USAID in addressing the needs identified for biodiversity conservation in Armenia and to fill the gaps (see **Annex P**). These are provided within the framework of the existing activities.

1. Economic Growth: Under the proposed revised scope of the competitiveness project, consider working with enterprises in buffer zones of PAs. This could fit within the new scope, which will focus on enterprises with greatest potential for economic growth and trade; and it fills a need identified, *poverty reduction activities in buffer zones*.

2. Economic Growth: as part of a GDA in the alternative energy sector, encourage the design of small hydro-electric power generation projects. This would minimize the need for fuel wood collection, and would fill an action needed to *develop sources of clean, alternative energy* to address the threat of climate change.

3. Democracy and Governance: The Civil Society Project (CSP) should include capacity building (management, fundraising, and advocacy skills) for *environmental* CSOs/NGOs so they can better advocate for *environmental* protection. Also, consider working with CSOs in buffer zones of PAs to help advocate for sustainable use and environmentally sound development. This fills an action needed: *to train and help professionalize CSOs and other NGOs*.

4. Democracy and Governance: Rule of Law Program should include addressing environmental complaints to help strengthen the environmental justice system in Armenia. This fills an action needed, *to improve transparency in decision making*.

5. Democracy and Governance: With the change in focus to support alternative media (rather than the previous focus of mainstream media), USAID should consider providing assistance/training to environmental journalist organizations such as Ecolur.

6. Health: One of the focus areas is "creating demand," which involves raising awareness of the right to health care and preventative medicine. As part of this focus area, consider raising awareness of the

importance of environmental health issues, including clean water and health impacts from mining activities (for mine workers and also those in the community), which would create demand for improved health care of those exposed to environmental pollution, but also will create advocates for environmentally sound design, clean technology, etc.

12.3 RECOMMENDATIONS: LINKAGES AND OTHER CONTRIBUTIONS TO BIODIVERSITY CONSERVATION

As above, recommendations are provided to assist USAID in addressing the needs identified for biodiversity conservation in Armenia and to fill the identified gaps. These recommendations fall outside planned activities, and are therefore more wide-ranging than the above. But while the recommendations do not fall within specific projects, they are within the framework of the anticipated program. They are provided in order of priority, from highest priority to lowest based on their potential to contribute to biodiversity conservation and on USAID's comparative advantage.

1. Economic Growth and Democracy and Governance: USAID should consider supporting transboundary PAs (Armenia/Georgia; Armenia/Turkey) as a means of promoting regional integration, cooperation, and security—these are foundations of the USG's Country Assistance Strategy. A transboundary PA could also help generate income for local economies, and could encourage civil society input into protected area management and sustainable use. Transboundary "Peace Parks" have been created in Southern Sudan and Uganda; Peru and Ecuador, and these can be used as models. Another option for USAID to consider is support for a cultural/eco-trail that traverses Armenia and neighboring countries. As with transboundary PAs, this could also increase incomes and promote improved local governance/local input into natural resources decision making. This option is attractive because it can be undertaken with communities and community organizations rather than within the framework of PAs, which would involve working with governments of Armenia and its neighbors. In addition, the cultural/eco-trail could be implemented in Armenia first, with the intention of expanding to an adjacent country. Both options promote security and cooperation in the region. This falls under the CAS Priority Goal 1, *Developing Armenia's ability to be a constructive and peaceful regional neighbor.*

2. Economic Growth: USAID should consider supporting the development of alternative livelihood options for communities in areas that are highly vulnerable to climate change and that depend on biodiversity that is also highly vulnerable (communities that depend on steppe ecosystems for grazing, communities that are reliant on fisheries). This would contribute to economic growth and reduce vulnerability of the human population to climate change, while conserving vulnerable biodiversity. This contributes to CAS Priority Goal 1, *Developing Armenia's ability to be a constructive and peaceful regional neighbor* (climate change and its effects on livelihoods could destabilize Armenia's economy if mitigation is not in place) and to CAS Priority Goal 4, *Increasing Armenia's private sector competitiveness and economic sustainability.*

3. Economic Growth and Democracy and Governance: USAID should consider strengthening the EIA process. This would fill an "action needed" to strengthen the transparency of Government decision making, and the participatory process in Government decisions. USAID's support could be provided within the framework of an economic growth project (for example, a private sector eco-tourism development project in a buffer zone of a PA) that requires an EIA (according to Government of Armenia legislation). USAID's support could target the EIA process. While the overall project (funded by the private sector) would contribute to economic growth, USAID's contribution would be towards strengthening the participatory nature of EIA, and transparency in Government decision making. This could be a model EIA procedure that could encourage future good practice in EIA, and could encourage more investment in Armenia's development. This activity falls under CAS Priority Goal 2, *Bolstering those institutions that effectively promote democracy* and Priority Goal 4, *Increasing Armenia's private sector competitiveness and economic sustainability.*

4. Economic Growth and Democracy and Governance: USAID should consider improving the legislative framework for environmental compliance. As described above, EIAs must be conducted for a wide range of projects, and currently, there is no tiered system of EIA. This discourages investment and encourages corruption. USAID could help strengthen Armenia's environmental compliance policy framework by developing environmental compliance legislation based on worldwide best practice, which involves various levels of EIA: (1) an initial screening process to identify the extent of expected impact; (2) as needed, follow-on environmental review, based on the level of impact; and (3) third-party environmental monitoring/environmental audits. As part of this process, USAID could develop third party environmental audit legislation and/or support the conduct of transparent, third party audits. This activity falls under CAS Priority Goal 2, *Bolstering those institutions that effectively promote democracy,* and CAS Priority Goal 4, *Increasing Armenia's private sector competitiveness and economic sustainability.*

5. Economic Growth and Democracy and Governance: USAID should consider supporting the development of a publicly accessible biodiversity database for natural resources. The lack of publicly accessible and reliable information is a constraint to adequately protecting biodiversity resources. A publicly accessible database would improve governance of natural resources, and would assist NGOs to advocate for biodiversity conservation. It could improve transparency in Government decision making; it would help improve the quality of data available to decision makers; and it could contribute to a country-wide biodiversity monitoring scheme. It would also contribute to economic growth by helping to ensure that investment projects are evaluated based on information that is available to all parties. The Acopian Center for the Environment (American University-Armenia) is well-placed to house such a database. This fits under the CAS Priority Goal 2, *Bolstering those institutions that effectively promote democracy*, and CAS Priority Goal 4, *Increasing Armenia's private sector competitiveness and economic sustainability*.

6. Economic Growth and Democracy and Governance: USAID should consider strengthening Armenia's pollution prevention/water discharge legislation. This could be linked to the development of community monitoring programs, which would help alleviate the constraint of limited human resources available for monitoring and limited biodiversity data. To further support implementation of pollution prevention/water discharge legislation, USAID could support a GDA(s) that would assist private sector industries to comply with pollution prevention legislation. This could include an environmental audit and the incorporation of clean technology, using the model of the Akhtala Copper Mining Company (PA Government Services). This would contribute to CAS Priority Goal 4, *Increasing Armenia's private sector competitiveness and economic sustainability*.

7. Economic Growth, Democracy and Governance, and Health: USAID should consider supporting urban/village planning. This could promote civil society participation in decision making, encourage investment, and promote "smart growth,"—growth that is environmentally sound and that promotes human health as well. The process would promote sustainable development, where decisions are made on the basis of long-term growth (i.e., a mining operation would not be chosen over a safer, more secure and healthier development project) rather than on immediate benefit. The process would include training of community members to help them understand trade-offs between environmentally unsound versus environmentally sound development. This falls under the CAS Priority Goal 2, *Bolstering those institutions that effectively promote democracy,* and Priority Goal 4, *Increasing Armenia's private sector competitiveness and economic sustainability*. It could indirectly support Priority Goal 5, *Enhancing Armenia's health and human services through innovative institution building to assist the Armenian people.*

In addition to the above, USAID could play a role in improving coordination among donors, the RA Government, and NGOs. Through this forum, USAID could leverage donors and others to promote the rationalization of government functions, and thereby strengthen and streamline the institutional framework for biodiversity conservation. This would include encouraging decentralization of natural resources management responsibilities within the existing policy/legislative framework, and the necessary capacity

strengthening required for local/regional governments to take on their roles. USAID is well-placed to leverage resources in the environment sector given its support in the water resources management field.

Annex A: Section 119 of the Foreign Assistance Act

Sec. 119 Endangered Species

(a) The Congress finds the survival of many animal and plant species is endangered by overhunting, by the presence of toxic chemicals in water, air and soil, and by the destruction of habitats. The Congress further finds that the extinction of animal and plant species is an irreparable loss with potentially serious environmental and economic consequences for developing and developed countries alike. Accordingly, 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.

(b) \75\ In order to preserve biological diversity, the President is authorized to furnish assistance under this part, notwithstanding section 660,\76\ to assist countries in protecting and maintaining wildlife habitats and in developing sound wildlife management and plant conservation programs. Special efforts should be made to establish and maintain wildlife sanctuaries, reserves, and parks; to enact and enforce anti-poaching measures; and to identify, study, and catalog animal and plant species, especially in tropical environments.

(c) \77\ Funding Level.--For fiscal year 1987, not less than $2,500,000 of the funds available to carry out this part (excluding funds made available to carry out section 104(c)(2), relating to the Child Survival Fund) shall be allocated for assistance pursuant to subsection (b) for activities which were not funded prior to fiscal year 1987. In addition, the Agency for International Development shall, to the fullest extent possible, continue and increase assistance pursuant to subsection (b) for activities for which assistance was provided in fiscal years prior to fiscal year 1987.

\77\ Pars. (c) through (h) were added by sec. 302 of Public Law 99- 529 (100 Stat. 3017).

(d) \77\ Country Analysis Requirements.--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.

(e) \77\ Local Involvement.--To the fullest extent possible, projects supported under this section shall include close consultation with and involvement of local people at all stages of design and implementation.

(f) \77\ PVOs and Other Nongovernmental Organizations.-- Whenever feasible, the objectives of this section shall be accomplished through projects managed by appropriate private and voluntary organizations, or international, regional, or national nongovernmental organizations, which are active in the region or country where the project is located.

(g) \77\ Actions by AID.--The Administrator of the Agency for International Development shall-(1) cooperate with appropriate international organizations, both governmental and nongovernmental;

(2) look to the World Conservation Strategy as an overall guide for actions to conserve biological diversity;

(3) engage in dialogues and exchanges of information with recipient countries which stress the importance of conserving biological diversity for the long-term economic benefit of those countries and which identify and focus on policies of those countries which directly or indirectly contribute to loss of biological diversity;

(4) support training and education efforts which improve the capacity of recipient countries to prevent loss of biological diversity;

(5) whenever possible, enter into long-term agreements in which the recipient country agrees to protect ecosystems or other wildlife habitats recommended for protection by relevant governmental or nongovernmental organizations or as a result of activities undertaken pursuant to paragraph

(6), and the United States agrees to provide, subject to obtaining the necessary appropriations, additional assistance necessary for the establishment and maintenance of such protected areas;

(6) support, as necessary and in cooperation with the appropriate governmental and nongovernmental organizations, efforts to identify and survey ecosystems in recipient countries worthy of protection;

(7) cooperate with and support the relevant efforts of other agencies of the United States Government, including the United States Fish and Wildlife Service, the National Park Service, the Forest Service, and the Peace Corps;

(8) review the Agency's environmental regulations and revise them as necessary to ensure that ongoing and proposed actions by the Agency do not inadvertently endanger wildlife species or their critical habitats, harm protected areas, or have other adverse impacts on biological diversity (and shall report to the Congress within a year after the date of enactment of this paragraph on the actions taken pursuant to this paragraph);

(9) ensure that environmental profiles sponsored by the Agency include information needed for conservation of biological diversity; and

(10) deny any direct or indirect assistance under this chapter for actions which significantly degrade national parks or similar protected areas or introduce exotic plants or animals into such areas.

(h) \77\ Annual Reports.--Each annual report required by section 634(a) of this Act shall include, in a separate volume, a report on the implementation of this section.

Annex B: SOW for the Analysis

SECTION C – DESCRIPTION / SPECIFICATIONS/STATEMENT OF WORK

C.1 BACKGROUND

Armenia has been selected as one of the pilot countries under the new joint USG foreign assistance planning process, known as the Country Assistance Strategy (CAS). The CAS will encompass all State and USAID programs in a joint five-year strategy. The CAS posits as its overall goal seeking to transform Armenia into a stable partner, at peace with its neighbors, that respects principles of democracy and where all members of society share the benefits of sustained economic growth. Over the next five years, with a robust assistance budget, a strong interagency U.S. presence and powerful incentives for development, the USG seeks to press a transformational diplomacy agenda on a broad range of issues. Among the priority objectives are:

- To develop Armenia's ability to be a constructive and peaceful regional neighbor
- To bolster those institutions that effectively promote democracy
- To improve Armenia's justice sector institutions and structure
- To increase Armenia's private sector competitiveness and economic sustainability
- To enhance Armenia's health and human services through innovative institution building to assist the Armenian people

The new USAID strategy in Armenia for 2009-2013, currently in draft, does not include a specific biodiversity conservation objective, nor does it have a direct focus on biodiversity issues. However, proposed program areas which might affect biodiversity directly or indirectly include:

- Local Government service provision – rehabilitation of water supply, solid waste management
- Improved quality of health care services – rehabilitation of and medical waste management issues in primary health care polyclinics.
- Management and marketing capacity of businesses – increased number of tourist with respective impact on biodiversity, especially in protected areas
- Banking and credit organizations – loans to businesses which might have potential impacts
- Public services and environment, particularly telecommunications and water – water supply, wastewater treatment facility, energy efficiency

With respect to USAID programs, the Country Assistance Strategies must include the biodiversity analysis as required by FAA 119. The findings of the analysis will provide necessary insight for future programmatic decision making required to develop the USG Country Assistance Strategy. The country specific analysis will also serve as a planning tool to assist USAID to identify stand alone and/or cross-cutting opportunities to promote sustainable, environmentally-sound employment, trade, investment and income interventions while integrating environment concerns into its overall programs.

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Upon completion of the analyses, the Mission will submit the report to the Bureau's Environmental Officer for final approval.

USAID Policies governing Environmental Procedures
The U. S. Foreign Assistance Act of 1961 Section 119 requires USAID to assess national needs for biodiversity and potential USAID contributions to these needs in all country strategy documents. Specifically, FAA Section 119(d), Country Analysis Requirements requires 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)."

This requirement is also articulated in USAID's Automated Directives System (ADS), Section 201.3.8.2 on, mandatory environmental analysis for strategic plans. The ADS regulations also indicate that while not required, an Operating Unit "can save time and be more efficient by including all aspects of environment when undertaking the mandatory biodiversity and tropical forestry work." For example, these environmental aspects may include topics such as water resources, urban environmental issues and private sector concerns.

C.2 OBJECTIVES

The purpose of this task order is to conduct an update of the country biodiversity analysis for Armenia. A biodiversity analysis was originally conducted in 2000 (http://www.biofor.org/documents/Armenia-Biodiversity-Report.pdf) with a Mission prepared Update Memo in 2003. This analysis will respond to requirements of Section 119(d) of the Foreign Assistance Act of 1961 (as amended) (FAA 119) and ADS 201.3.8.2 regarding biodiversity analysis for country strategic plans. The analysis is intended to assist the USAID Mission to Armenia during the strategic planning process by identifying necessary actions in the county to conserve biodiversity. Per FAA, Sec. 119(d), analysis will address the following:

(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.

C.3 STATEMENT OF WORK

The Contractor shall evaluate biodiversity concerns in Armenia and shall undertake the appropriate synthesis of the information addressing 1) actions necessary to conserve biodiversity, and 2) the extent actions proposed in the country strategic plans meet, or could meet, the biodiversity needs thus identified.

The Contractor shall perform the following activities:

A) Data Collection:

1. Prior to departure, get acquainted with already existing background information about Armenia including the 2000 USAID Biodiversity Analysis, 2003 Update Memo, and the 2000 UNECE Environmental Performance Report, the National Environmental Action Programs (NEAP I and II) and the Biodiversity Strategy Action Plan (BSAP) and other relevant host country and/or donor environmental reviews specific to the country's natural resources, ecological and biological specificities, current status of environment and biodiversity, and institutional organization. The Team and/or Team Leader should become knowledgeable about key stakeholders and donors in environment and biodiversity, legislation related to the environment and biodiversity, and other relevant information required for the country analysis. Principal donors include the WB, KFW, EU, SIDA, etc.

2. Prior to departure, the contractor shall hold meetings with the Bureau Environmental Officer (BEO) and Country Desk Officer, and other pertinent USAID Washington Technical Staff to gather relevant information on regional programs and Agency environmental regulations. In addition, meetings shall also be held with relevant USG Agencies active in Armenia and non-government organizations suggested by USAID/Armenia or the BEO. Face to face meetings are preferable though teleconferencing is possible.

3. The contractor should, prior to his/her arrival, consult with MEO and Mission personnel to identify stakeholders and local officials with whom he/she wishes to conduct the interviews and identify priority site visits.

4. Upon arrival in Armenia, the Contractor will hold a meeting with the USAID Program Officer, MEO, Mission staff to obtain detailed information about the programs, objectives, and goals under the Missions current and planned strategy. The Contractor and USAID Mission will discuss the planned activities required for the analysis as well as the approach that the Contractor will take during the performance.

5. The Contractor will hold meetings with the relevant local government institutions, agencies and Ministries. The Contractor will gather information, recommendations and experiences about past and planned activities from the local officials and persons directly involved in biodiversity issues. The Contractor will gather detailed information about changes in the country's specificities, such as protected areas and endangered species since the 2000 report.

6. The Contractor will hold meetings with other international donors, agencies and NGOs involved in environmental programs in Armenia and become well informed about ongoing and planned activities by other donors and agencies.

B) Analysis:

Based upon the review of documents, interviews, and site visits, summarize the status of biodiversity in Armenia. Summarize the social, economic, institutional, legal, and policy context for their use and conservation, including actions currently being taken by government, other

donors, NGOs, and the private sector. Identify the key direct and indirect threats to biodiversity. Identify the actions necessary to conserve and sustainable manage natural resources and biodiversity in Armenia in the current context based on analysis of Government, Donor, and NGO responses to meet these needs. Prepare a report on the status of biodiversity conservation efforts in Armenia and implications for USAID or other donor programming and environmental monitoring which shall define the actions necessary for conservation.

C) Report:
Prepare a report describing the analysis and conclusions. This report shall clearly meet the legal requirement of FAA Sec 119 by:

1) clearly articulating the actions necessary to conserve biodiversity in Armenia, and 2) clearly describing the extent to which USAID actions proposed in the new USG Country Assistance Strategy meet the needs identified. FAA Sections 119 do not require USAID to invest in conserving biological diversity, although it is encouraged more broadly to do so under these sections of the FAA.

The report, of between 40 and 60 pages in length (excluding annexes), shall include:

Title Page, including the date of completion of the analysis report

Table of Contents

A. Introduction, describing the purpose of the analysis and methods used in conducting it, including the timing of the analysis in relation to the timing of USG Country Assistance Strategy.

B. The current status of biodiversity in Armenia based on current and available information, including
a broad overview of major ecosystem types, highlighting important, unique aspects of the country's biodiversity, including important endemic& endangered species and their habitats, genetic diversity, agricultural biodiversity, ecological processes and ecosystem services, and values and economics of biodiversity and forests. This should also point out major threats to these ecosystems/species and the cause of the threat.

C. An overview of changes in the social, economic, and political context for sustainable natural resources management and the conservation of biodiversity and forests in Armenia, including the social and economic environment; institutions, policies, and laws affecting conservation; the national protected area system including all IUCN categories of protected areas; laws affecting the protection of endangered species; and participation in international treaties.

D. An overview table of the status and management of protected area system in Armenia including: an inventory of all declared and proposed areas (national parks, reserves and other protected areas).
The inventory will identify the institution responsible for the protection and management of each decreed area, its date of establishment, area, and the protection status of each (i.e., staff in place,

management plan published, etc.). In addition to this summary of the current protection and management status of each protected area, an overview of the major threats and challenges facing protected areas in Armenia, including vulnerability of areas to predicted changes in climate, and a brief summary of any recognized economic potential of these areas (including productive assets, environmental services and recreation and tourism opportunities) should be provided.

E. List of plant and animal species that are endangered or threatened with extinction and the broad main threats causing the endangerment (ie, habitat fragmentation, over-hunting, unsustainable fuelwood collection). Endangered species of particular social, economic or environmental importance should be highlighted along with potential actions to address conservation of remaining populations. Technical information resources such as the IUCN red list and their websites should be referenced for future Mission access as required. This section should not emphasize species counts, but look at the relation of endangered species and important habitat conservation areas and issues, and evaluate the pressure on those areas, including vulnerability to predicted changes in climate, and current efforts to mitigate pressures, including the participation and compliance with international treaties.
Recent, current, and potential *primary* threats to bi

F. An update and review of government, NGO, and donor programs and activities that contribute to conservation and sustainable natural resources management, and an assessment of their effectiveness, strengths, and weaknesses. Data may be consolidated in a summary table of Donor and NGO projects (w/ $ amounts) since 2000 (include implemented, ongoing and planned) related to/or impacting biodiversity conservation (direct and indirect). Identify gaps where USAID could best leverage funds.

G. An update to the threats to biodiversity and forests, including direct threats and indirect threats or root causes of the direct threats.

H An updated list or description of the actions necessary to conserve biodiversity and forests in Armenia, logically flowing from the review of the threats, and what is currently being done by government, NGO, and donor programs that address those threats.

I. An updated review of the proposed USAID/Armenia strategy and program, including all Objectives, followed by an analysis of the extent to which actions proposed for support by the USG CAS through USAID help meet the needs identified in (F) above. This section should also point out any threats to biodiversity and forests from activities proposed for USAID support, and suggest mitigating actions. It should also identify opportunities for cross-cutting, cross-sectoral linkages with proposed activities (for all proposed Objectives and Program Areas), especially those that would be low cost and/or would enhance the effectiveness of the proposed activities.

If any perceived areas of concern related to USAID's program and its contribution or impact arise during this assessment, the contractor shall provide views and suggestions directly to the Mission Environmental Officer in a separate briefing. [with the understanding that this information also goes in the report unless it is immediately resolved].

I. Annexes to the report should contain, at minimum
   a. A matrix which contrasts THREATS identified in the original 2000 report to ACTIONS TAKEN by the Host country, NGOs, and/or Donor community.
   b. A consolidated matrix paring the current THREATS identified, to ACTIONS needed, with EXTENT TO WHICH USAID addresses threats, & RECOMMENDATIONS for USAID to address threats
   c. Current IUCN Red List and Armenia Red Book data
   d. Environment-Related Legislation & Concepts, Plans, Programs, & Strategies (highlight changes since 2000)
   e. International Conventions and Treaties (highlight changes since 2000)
   f. The SOW for the analysis
   g. Biographical sketches of analysis Team members
   h. A list of persons contacted and their institutional affiliation
   i. Other background or supporting material as needed such as maps.
   j. All references used and cited in the report along with URLs used for information resources.

C.4 DELIVERABLES AND TASKS

1. The primary deliverable under this task order is an Analysis Report for USAID/Armenia that examines the biodiversity, natural resource management, and other related environmental issues and identifies contributions and/or potential contributions to meeting identified conservation needs by the Mission's proposed strategy. Per FAA, Sec. 119(d), the analysis must clearly address the following:

   (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.

2. A secondary deliverable will be produced to support the Mission in completing its part of the USG CAS. Once identified and available, the Team and/or Team Leader will review the Objectives and Priority Goals identified through the CAS process and provide summaries for the needs identified in the FAA 119 analysis and state how these needs will be addressed in the chosen objective

Tasks will include:
1. Within one week of Award, the Key Personnel will deliver a detailed proposed methodology and timeline for the 119 analysis.
2. Implement agreed upon methodology for the analysis, including appropriate document reviews, interviews, 1-2 site visits and associated data analysis. Site visits may include USAID participation.
3. Prepare draft report for review by BEO, MEO, USAID staff, and host country partners. USAID will review the draft focusing on sensitivities and overall strategic focus, not on specific technical findings.
4. Incorporate necessary edits and prepare final report for Mission Director and BEO approval.

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5. Deliver presentation of findings for an internal USAID/Embassy audience.

C.5 SCHEDULE AND LOGISTICS

Meetings must be held in person or via teleconference with the E&E Bureau Environmental Officer and other pertinent USAID Washington Technical Staff prior to departure. The Team and/or Team Leader will coordinate logistical arrangements with the USAID/Armenia Mission Environment Officer or her designee, and prepare a draft schedule of meetings and site visits acceptable to the Mission staff. .

The Mission will assist the Team and/or Team Leader by providing key references and contacts as well as logistical support where necessary. USAID/Armenia will also help facilitate meetings with donors, host government agencies, and NGOs, as well as other USAID staff to fully brief the Team and/or Team Leader on USAID's program and future vision for their strategy.

An exit briefing will be held with USAID/Armenia Mission Director, Program Staff, and MEO to discuss initial findings. At the Mission Directors discretion, Embassy personnel may also be invited as findings impact the CAS process.

A draft report will be submitted to USAID no later than 20 business days from the end of field activities. USAID Mission and the BEO will review and provide written comment on the draft. The final report is expected within 15 working days of receipt of USAID comments. The contractor will submit the final FAA 119 Analysis Update to USAID Armenia office electronically. The Mission will prepare a FAA 119 facesheet and submit the final document to the E&E Bureau Environmental Officer in Washington, DC for final approval.

END OF SECTION C

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Annex C: Biographical Sketches of Team Members

Karen Menczer, International Senior NRM Specialist, Team Leader

Ms. Menczer has over 25 years of experience in natural resources management and biodiversity conservation in Latin America and the Caribbean, Africa, Eastern Europe, Asia, and the United States covering a range of fields: protected areas, wetland and watershed management, wildlife management, sustainable forestry, community-based natural resources management (CBNRM), eco/nature tourism, and environmental impact assessment. She has worked with USAID and other donors, NGOs, governments, and communities to:

- Design environment strategies and activities;
- Implement, monitor, and evaluate environment/natural resource activities, ensuring focus is on achieving results;
- Conduct environmental reviews and environmental assessments (EAs, Programmatic and Strategic EAs) to ensure that development activities are environmentally sound and comply with USAID, local, and other pertinent regulations;
- Strengthen environment/natural resources policies, regulations, and institutions; and
- Implement and strengthen ecological monitoring and management in the field.

She has prepared Biodiversity Analyses for USAID Missions in Honduras, Paraguay, Uganda, Mexico, Cyprus, Ghana, and Southern Sudan.

Susanna Hakobyan, Armenian Senior NRM Specialist (Fauna)

Susanna Hakobyan is an ecologist with over 30 years of experience working in the areas of ecosystem productivity; biodiversity assessment and bio-monitoring of hydro-ecosystems; analysis of the influence of environmental factors on species composition and life cycles; protection and management of natural resources of hydro-ecosystems, including wetlands; and sustainable use of wetlands.

In 1999 the Ministry of Nature Protection appointed her as National Focal Point for Communication, Education and Public Awareness (CEPA) Program of the Convention on Wetlands (Ramsar, 1971). During 2000-2002 she headed the project Ecologo-economic Valuation of Armenian Wetlands: a Step towards the Elaboration of the National Wetland Policy funded by Ramsar SGF 1999.

She has also been involved in preparation of "Elaboration of a Vision of an Ecoregional Conservation Plan and Proposal of a Nature and Biodiversity Conservation Programme in the Caucasus Region" (2003/KfW/WWF Caucasus); Armenia's Second National Communication to the UN Framework Convention on Climate Change (UNFCCC, 2007), and the Second National Environmental Action Program (UNDP, 2007), and is responsible for coordination of Biological and Ecological Surveys for the project to establish Arpi National Park (WWF) in 2008.

Kamilla Tamanyan, Armenian Senior NRM Specialist (Flora)

Dr. Kamilla Tamanyan has over 30 years of experience in botany and nature protection. She currently works at the Institute of Botany of the National Academy of Sciences of Armenia. She worked as a national expert on the UNDP/GEF projects, "Conservation of Armenia's Agro-biodiversity," "4th National Report on

Biodiversity Conservation," and "Restoration of Lake Gilli," as well as on the World Bank Program, "Management of Natural Resources and Poverty Reduction." She is a co-author of the "Red Data Book of Armenia" (1st edition, 1989), "Flora of China" (Genus Asparagus, Missouri Botanical Garden Press, 2000, v. 24) and a book, "Reserves of the Caucasus" (Moscow, 1990). Now, she is a national coordinator of the "Red List of Caucasian Flora," (financed by CEPF, IUCN involved), and team leader of the botanical part of the "Red Data Book of Armenia" project (financed by MNP).

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Annex E: List of People Interviewed

Name	Organization/Position	Contact Information
Mohammad Latif	USAID/EE/EG Bureau Environmental Officer	mlatif@usaid.gov
Alicia Grimes	USAID/EGAT/NRM/B Natural Resources Management Advisor	agrimes@usaid.gov
Jeff Ploetz	USAID/EE/BEO Compliance Unit (BCU) Biodiversity Specialist	jploetz@usaid.gov
Mary Rowen	USAID/EGAT PLACE IQC Alternate CTO	mrowen@usaid.gov
Andrea Kutter	Global Environment Facility Senior Natural Resources Management Specialist	akutter@TheGEF.org
Peter Dewees	The World Bank Lead Environment Specialist, Sustainable Development Unit, Europe and Central Asia Region	pdewees@worldbank.org
Dr. Marina Vardanyan	USAID/Armenia, ER & E Office Natural Resources Management Specialist, Mission Environmental Officer	mvardanyan@usaid.gov
Cynthia Pruett	USAID/Armenia Acting Mission Director	cpruett@usaid.gov
Volodymyr Yatsenko	USAID/Armenia, Social Reform Office Social Sector Advisor	vyatsenko@usaid.gov
Haikanush Bagratunyan	USAID/Armenia, ER & E Office Financial Sector Specialist	hbagratunyan@usaid.gov
Eduard Mkrtchyan	USAID/Armenia, ER & E Office Commercial Law Advisor	emkrtchian@usaid.gov
Diana Avetyan	USAID/Armenia, ER & E Office Program Management Specialist (Tourism)	davetyan@usaid.gov
Simon Sargsyan, Ph.D.	USAID/Armenia, EG Office Program Management Specialist	ssargsyan@usaid.gov
John Caracciolo	USAID/Armenia, EG Business, Finance, & Enterprise Advisor (GDA Advisor)	Jcaracciolo@usaid.gov
Nara Ghazaryan	USAID/Armenia Democracy and Social Reform Office Program Specialist	naghazarian@usaid.gov
Rolf Anderson	USAID/Armenia EG Office	randerson@usaid.gov

	Director	
George Zarycky	USAID/Armenia Director, Democracy & Governance	gzarycky@usaid.gov
Mark Levinson	USAID/Armenia Democracy Advisor	mlevinson@usaid.gov
Arev Movsisyan	USAID/Armenia D & G Project Management Assistant	Amovsisyan@usaid.gov
Bella Markarian	USAID/Armenia D & G Governance Program Specialist	bmarkarian@usaid.gov
Anahit Martirosyan	USAID/Armenia D & G	(374 10) 494480
Pegor Papazian	USAID/Armenia Project Development Officer	ppapazian@usaid.gov
Astghik Grigoryan, MD	USAID/Armenia Health Project Management Specialist	agrigoryan@usaid.gov
Kimberly Waller, Ph.D.	USAID/Armenia Health Programs Manager	kwaller@usaid.gov
Gayane Grigoryan	USAID/Armenia Program Budget Specialist	ggrigoryan@usaid.gov
Tim Anderson	USAID/Armenia Program Officer	tanderson@usaid.gov
Dr. Karine Danielyan	NGO Association for Sustainable Humane Development Chairperson	ashd@freenet.am
David Morrison	Caucasus Protected Areas Fund Executive Director	dmorrison@caucasus-naturefund.org
Armen Martirosyan	UNDP Portfolio Analyst Environmental Governance	Armen.martirosyan@undp.org
Mher Sadoyan	Armenia Tree Project Director	mher@armeniatree.org
Anna Jenderedjian	Armenia Tree Project Environmental Education Program Manager	annaj@armeniatree.org
Sona Ayvazyan	Transparency International Executive Director	sona@transparency.am
Bardukh Gabrielyan	Institute of Hydroecology and Icthyology, NAS Director of Biological Sciences	gabrielb@sci.am
Evelina Ghukasyan, Ph.D.	Institute of Hydroecology and Icthyology, NAS Scientific Secretary & President, Environmental Survival	E_ghukasyan@yahoo.com
Dr. Dshkhuhi Sahakyan	Environmental Survival	esu@sci.am
Dr. Gohar H. Oganezova	NAS Botanical Institute & VP, Armenian Botanical Society	Marina-oganezova@rambler.ru
Dr, George Fayvush	NAS Botanical Institute Leading Scientific Researcher	gfayvush@yahoo.com
Robert Cardinalli	Institutional and Regulatory Strengthening of Water Management COP	Robert.cardinalli@paconsulting.com
Lusine Taslakyan	Institutional and Regulatory Strengthening of Water Management	Lusine.taslakyan@paconsulting.am

	Public Participation Specialist	
Arthur Drampian	Institutional and Regulatory Strengthening of Water Management Deputy COP	Arthur.drampian@paconsulting.am
Rick Albani	Institutional and Regulatory Strengthening of Water Management Sr. Water Resources Specialist	Rick.albani@paconsulting.am
Hayley Alexander	Competitive Armenian Private Sector COP	halexander@caps.am
Artak Ghazaryan	Competitive Armenian Private Sector Deputy Director	aghazaryan@caps.am
Dr. Armine Simonyan	MCA-Armenia Environment and Social Impact Officer	simonyana@mca.am
Karen Manvelyan, Ph.D.	WWF Armenia Director	kmanvelyan@wwfcaucasus.am
Siranush Galstyan	WWF Armenia Head of Conservation	sgalstyan@wwfcaucasus.am
Samvel Baloyan	The World Bank, NRM & PRP Protected Areas Management and Biodiversity Conservation Component Coordinator	nrmprp@web.am
Dr. Karen Jenderedjian	Ministry of Nature Protection Agency of Bioresources Mngmt. Head Division of Animal Resources Management	Government Building 3, Republic Square, 0010 Yerevan Tel: +(374)-10-580711; mobile: +(374)-91-431969> Fax: +(374)-10-527952; E-mail: jender@arminco.am
Ruzanna Davtyan	Ministry of Nature Protection International Cooperation Department	ruzikdav@rambler.ru
Siranush Muradyan	Ministry of Nature Protection Head of Division of Management of Dendro-parks	
Jennifer Lyman, Ph.D.	American University of Armenia Director, Acopian Center for the Environment	jlyman@aua.am
Thomas Lyman	American University of Armenia Acopian Center for the Environment	tlyman@aua.am
Meike Schafer	American University of Armenia GIS Specialist, Acopian Center for the Environment	meike@aua.am
Levan Janoian	ACE, Birds of Armenia Project Manager	boa@aua.am
Maro Kochinyan	ACE, Project & Education Coordinator	mkochinyan@aua.am
Petrosyan Ruben	Ministry of Agriculture of RA "Hayantar"	Green.land@web.am
Norik Badalyan	Sevan National Park Senior Specialist, Icthyology	
Basegyan Voroncov	Khosorov Forest State Reserve Deputy Director	

Danielyan Tatyana	Ministry of Nature Protection Head of Department of Biodiversity and Natural Resources	
Avagyan Alvina	Ministry of Agriculture National coordinator on genetic resources of Armenia	

Workshops Attended:

25 November.2008 – National Academy of Sciences of Armenia – Annual Meeting of Natural Sciences Division devoted to Biodiversity conservation.

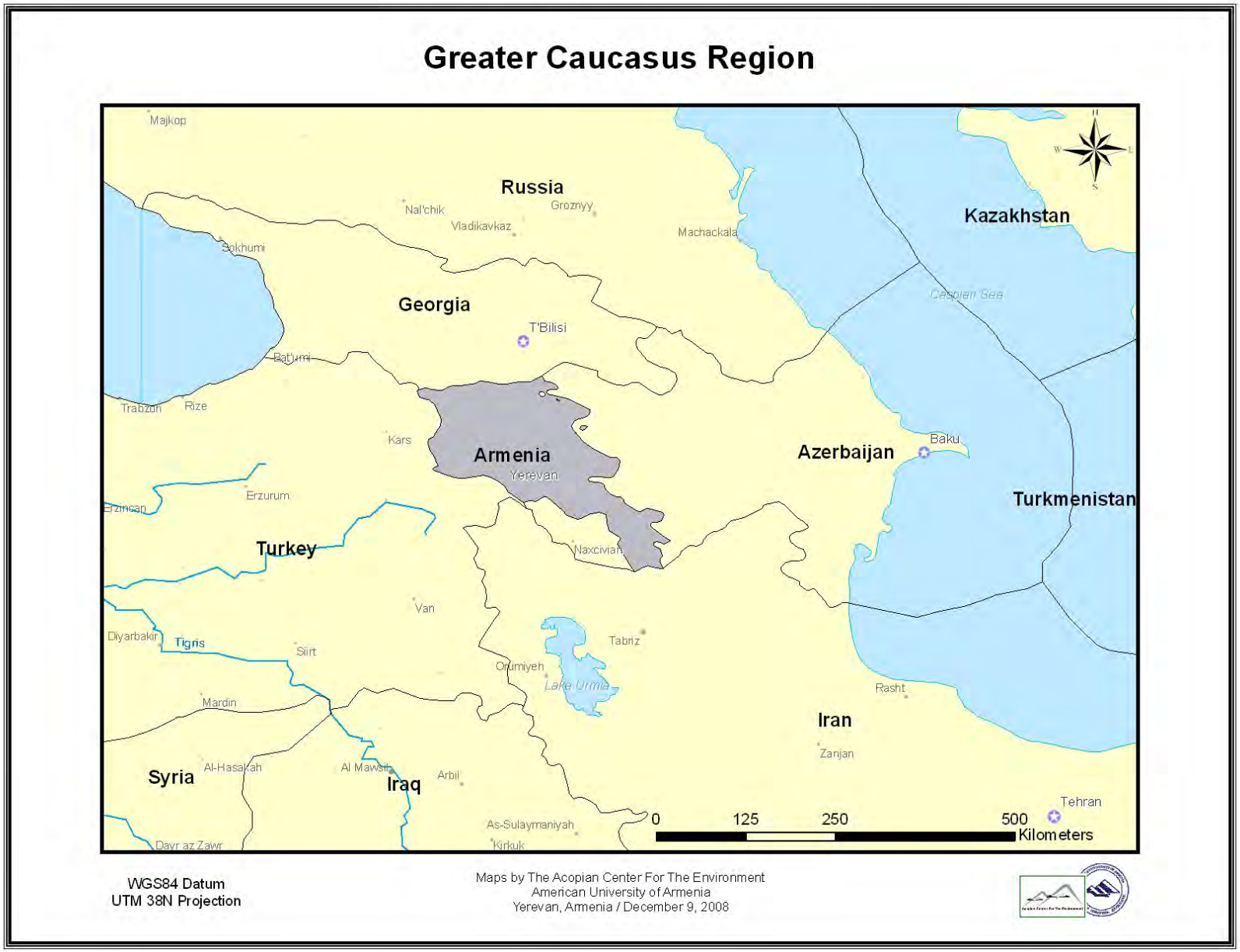
27 November.2008 – UNDP – Workshop on new UNDP/GEF program on especially protected nature areas of Armenia, with special attention to criteria for establishing new protected areas

Annex F: Maps Related to Biodiversity and Forests

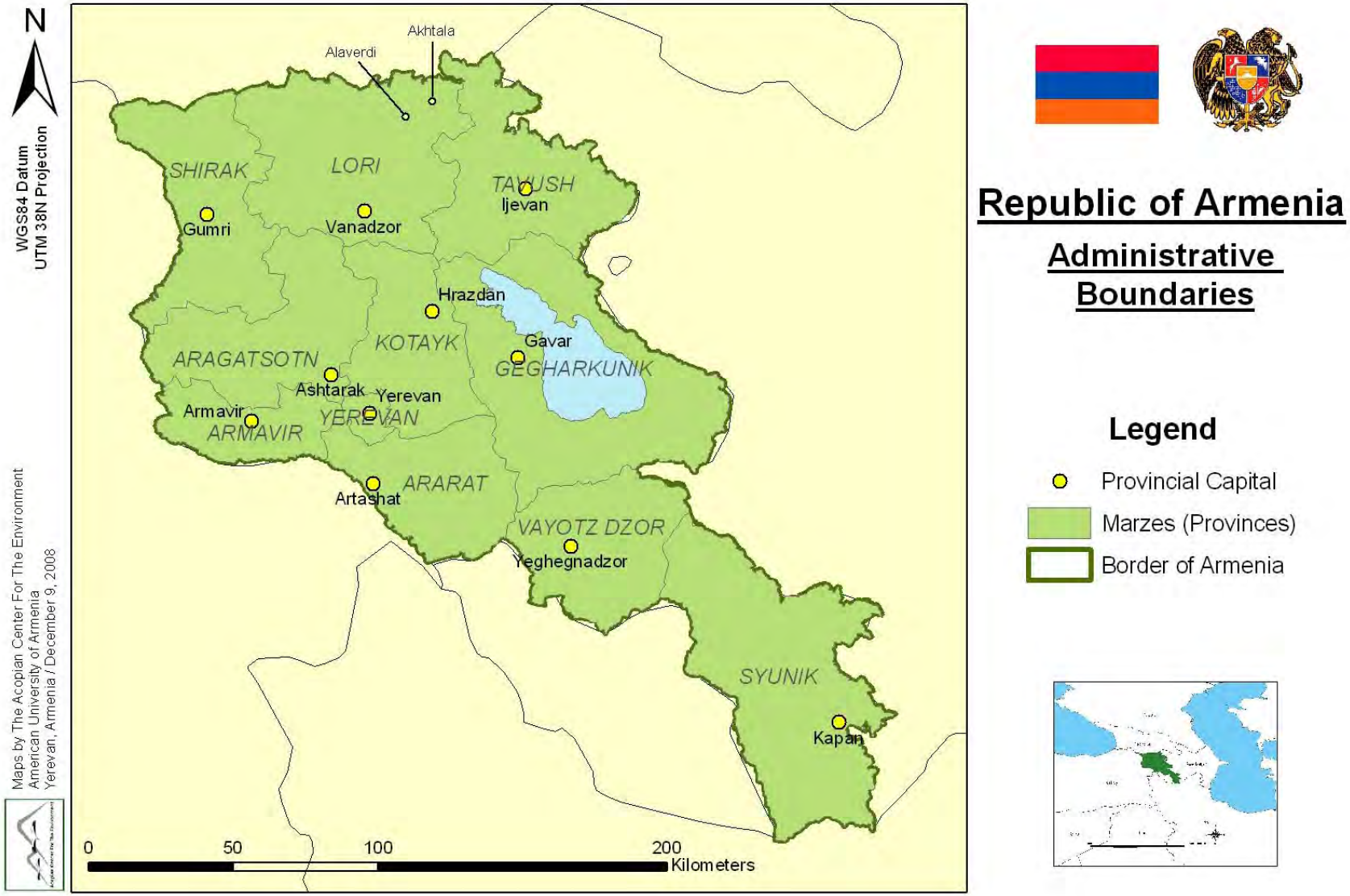
F-1 Greater Caucasus Region
F-2 Administrative Boundaries
F-3 Geological Features
F-4 Water Resources
F-5 Climate Zones
F-6 Precipitation
F-7 Soil Types
F-8 Vegetation Zones
F-9 Protected Areas
F-10 (1-5) Deforestation
F-11 Mining Sites
F-12 Mineral Resources

Also see MCC/MCA-Namibia road network map available from USAID/Armenia

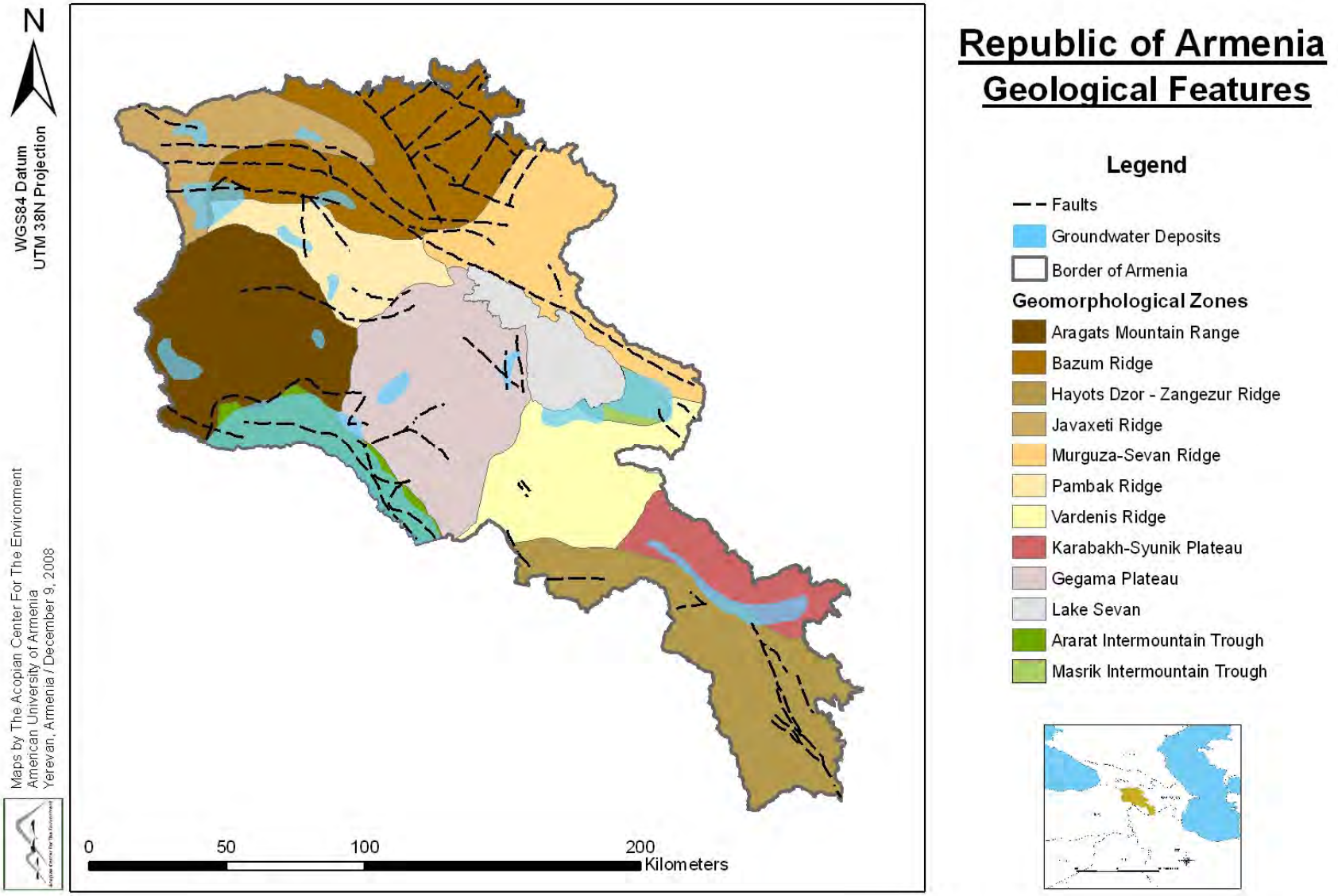
F-1 Greater Caucasus Region



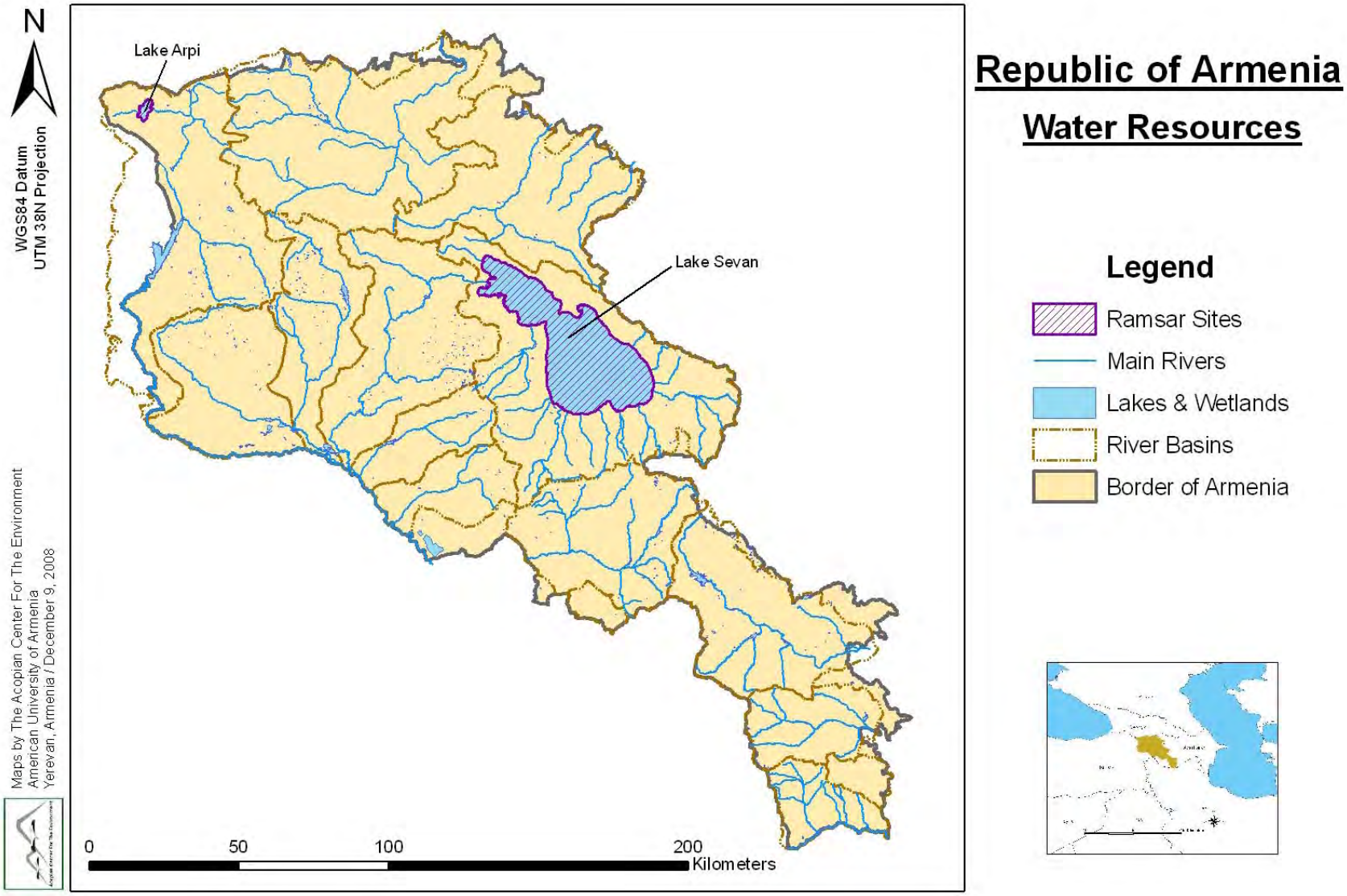
F-2 Administrative Boundaries



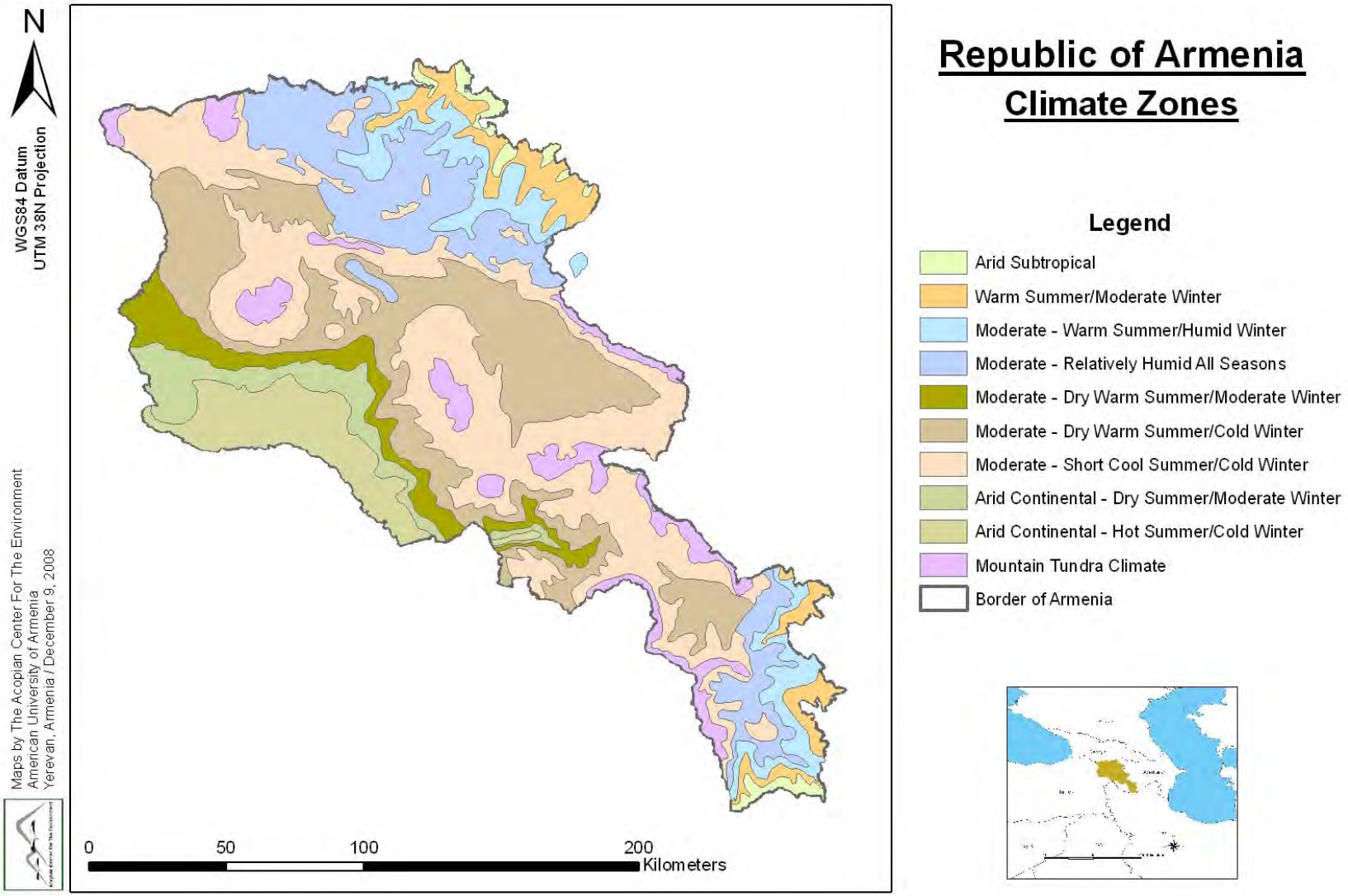
F-3 Geological Features



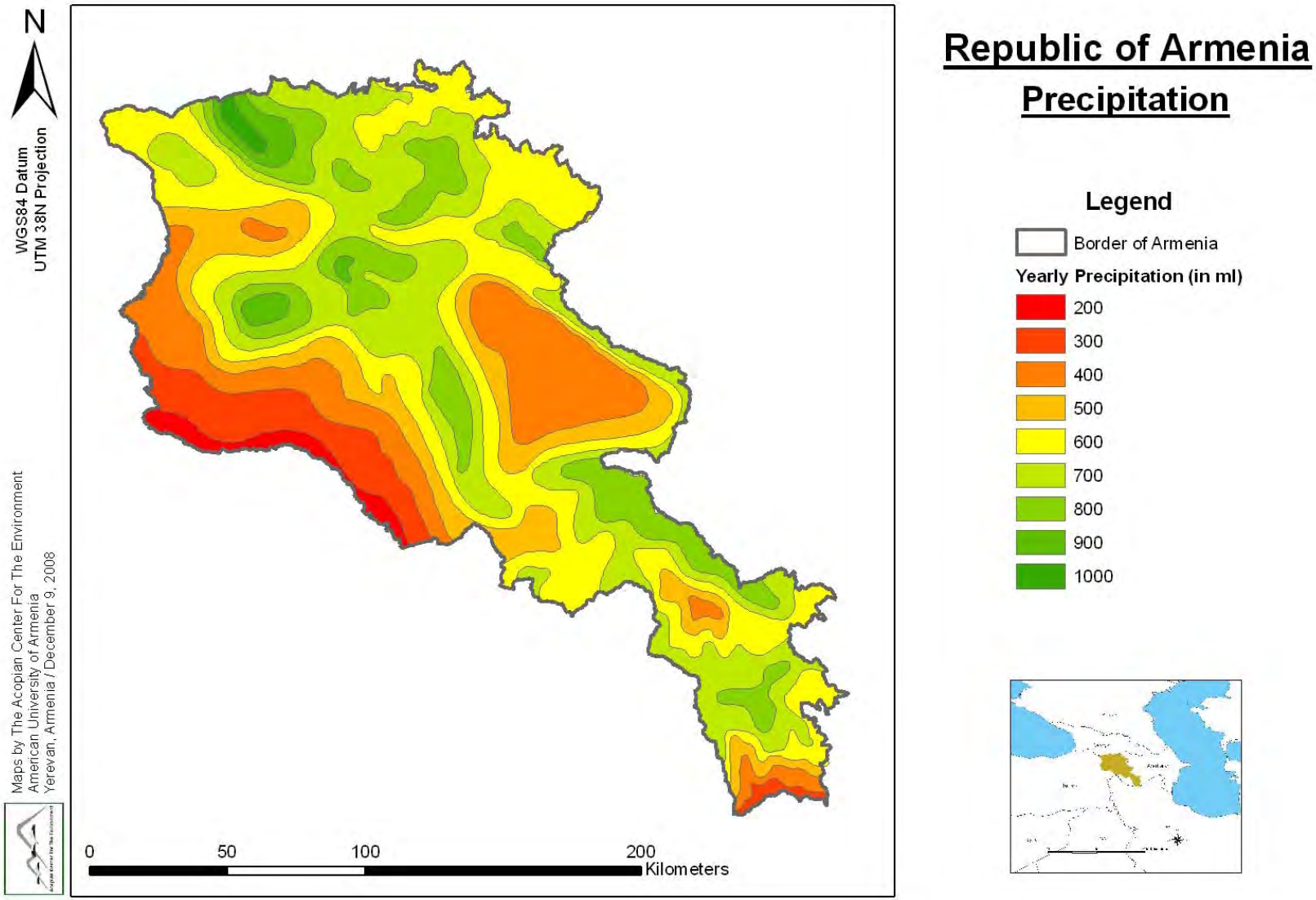
F-4 Water Resources



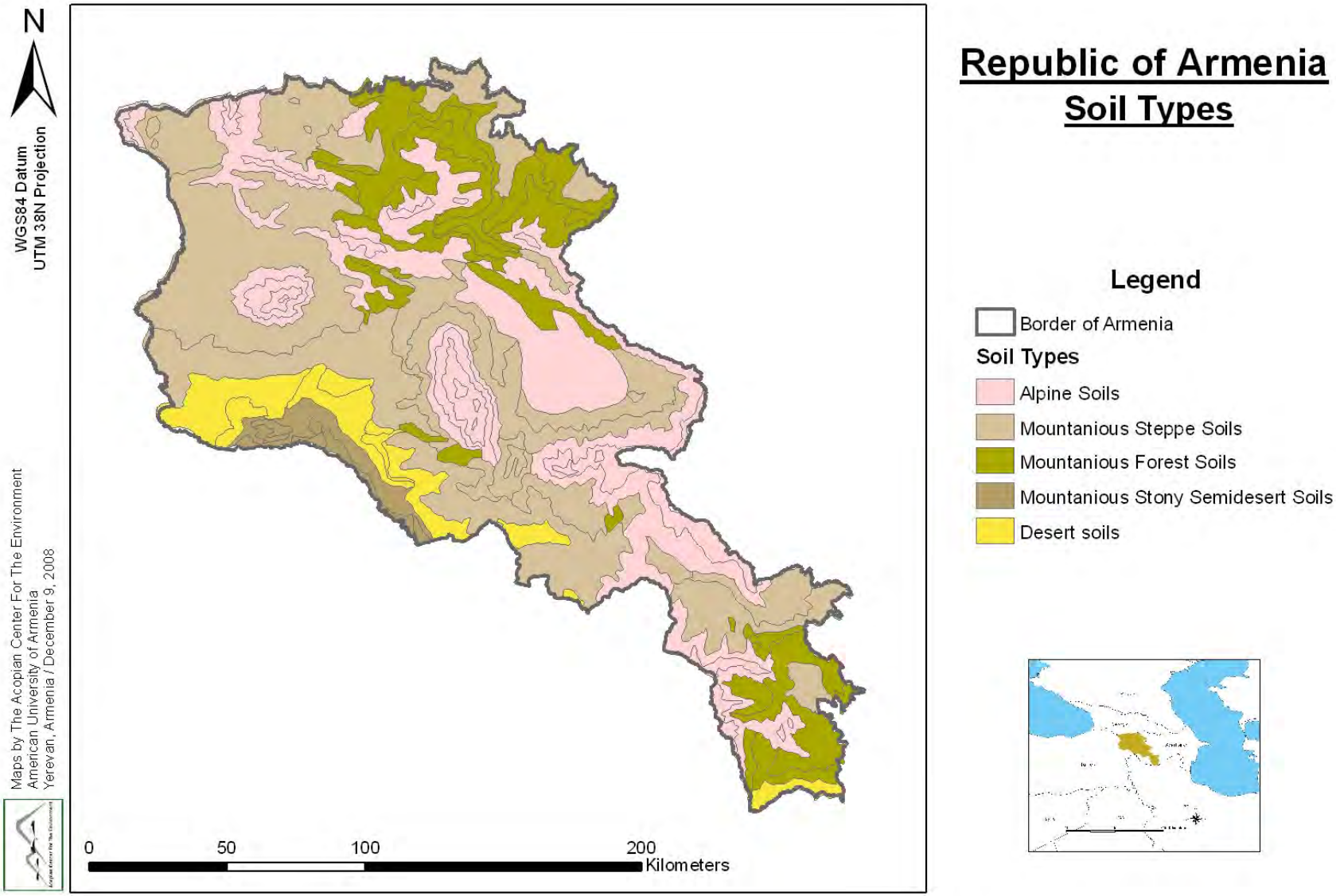
F-5 Climate Zones



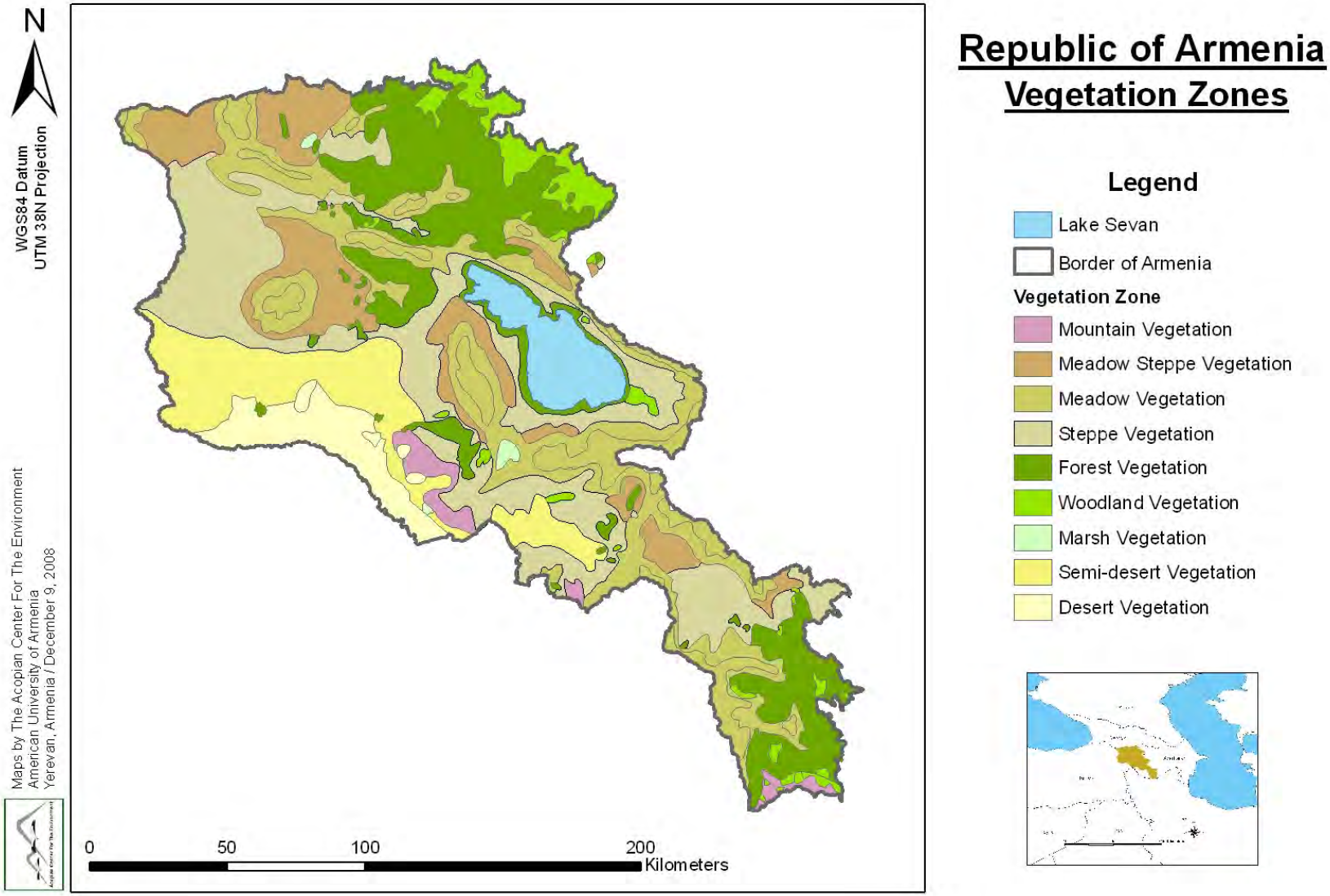
F-6 Precipitation



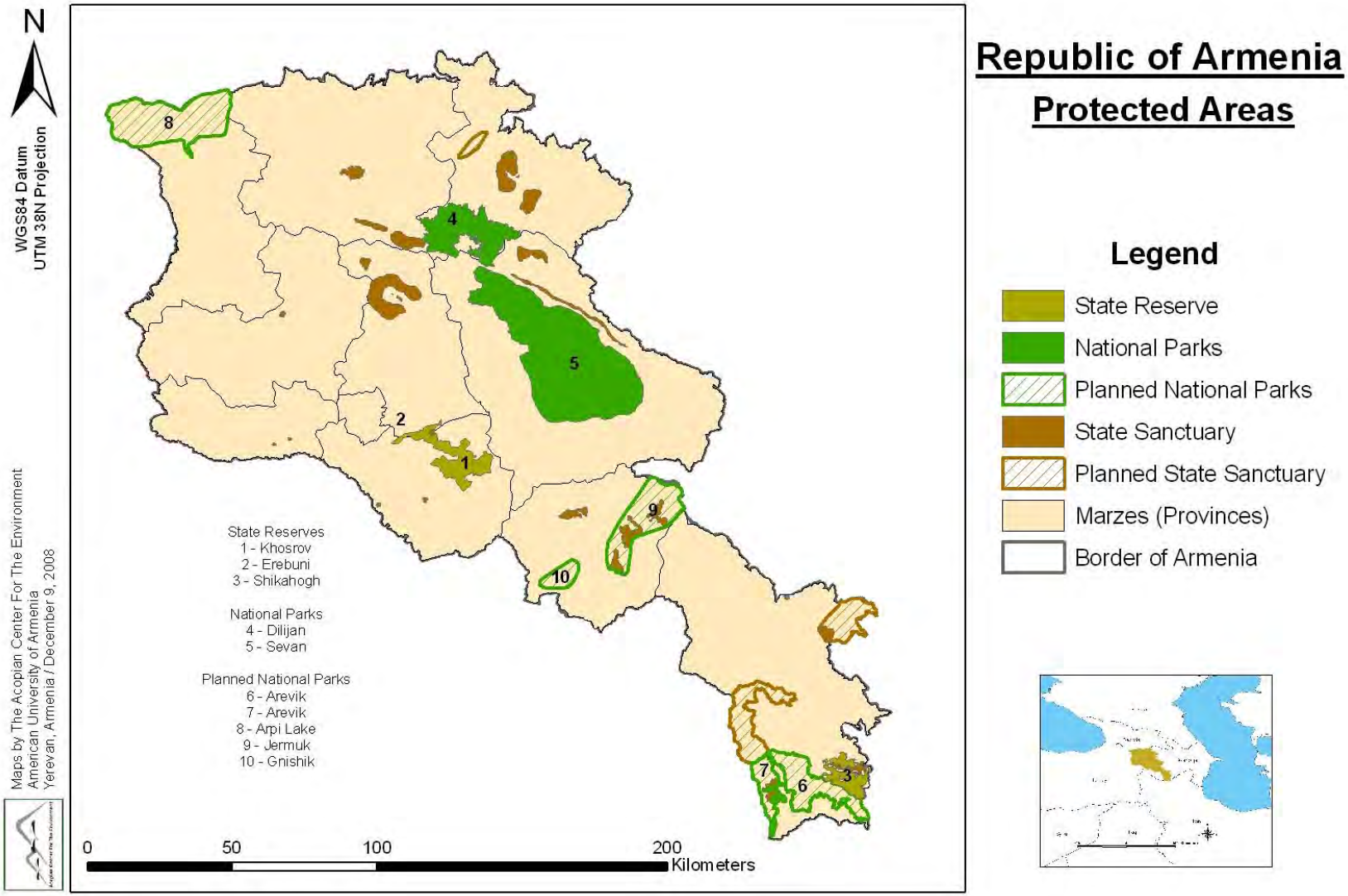
F-7 Soil Types



F-8 Vegetation Zones



F-9 Protected Areas



F-10.1 Deforestation from 4,000 to 1 B.C.

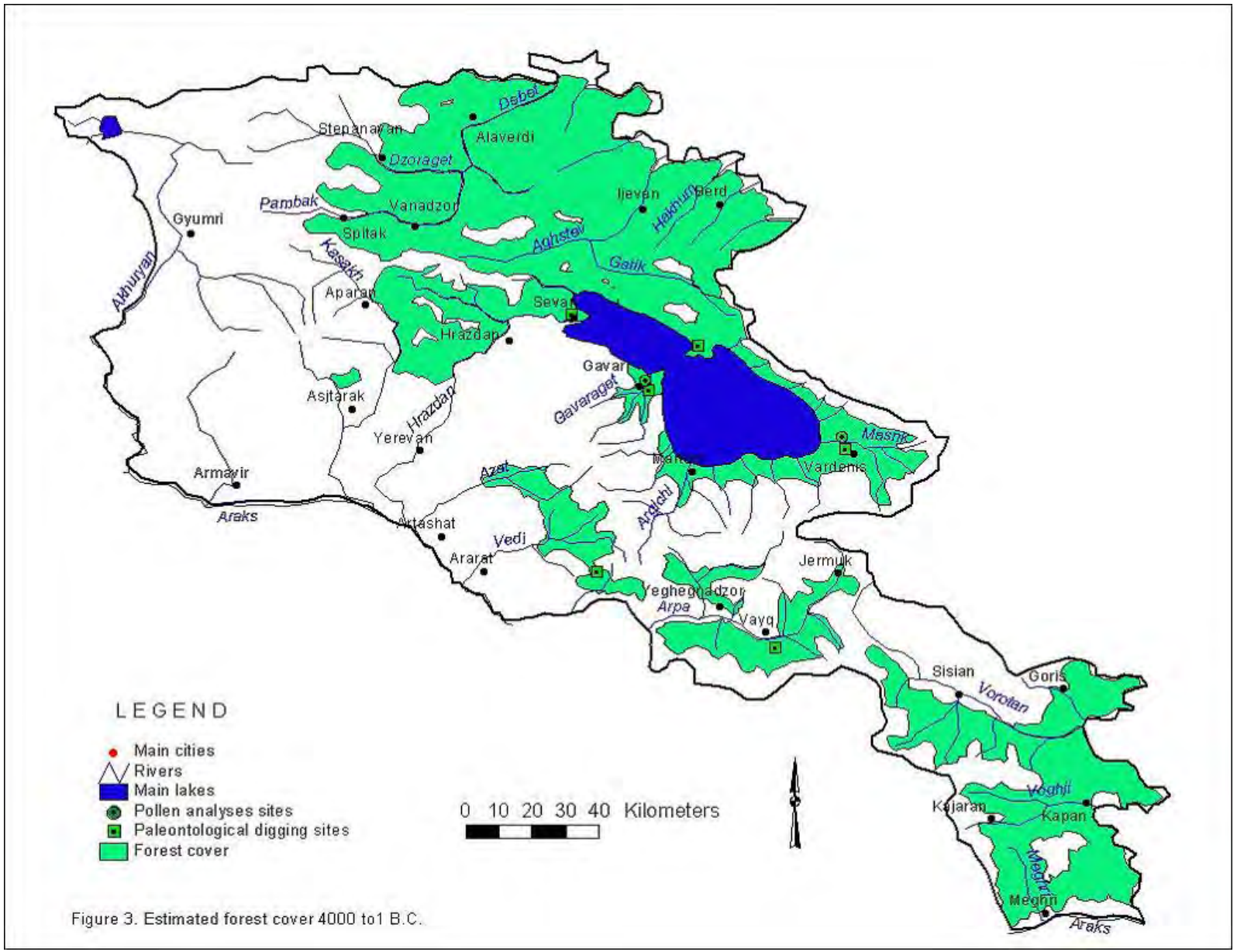


Figure 3. Estimated forest cover 4000 to1 B.C.

F-10.2 Deforestation in the 17th and 18th Centuries

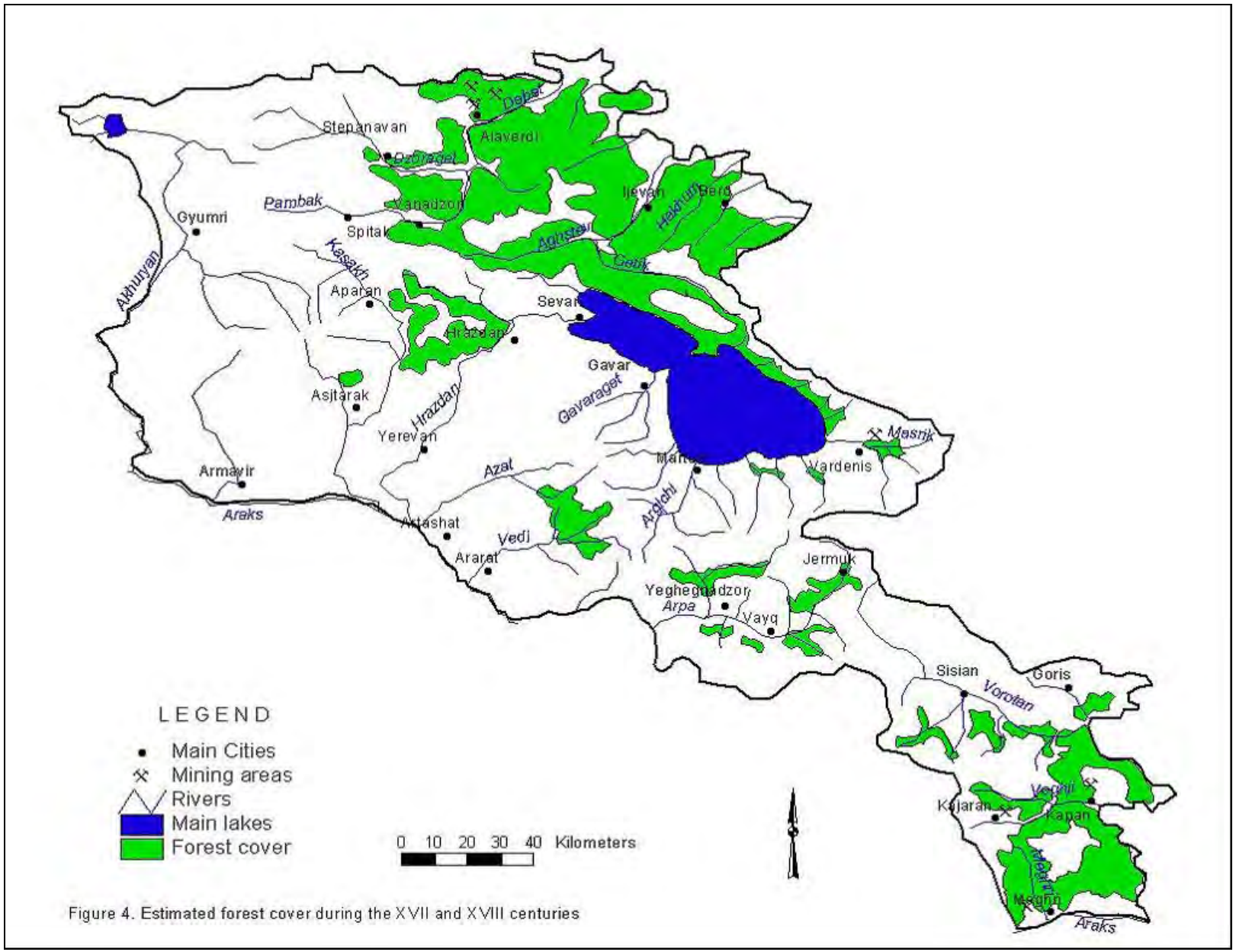


Figure 4. Estimated forest cover during the XVII and XVIII centuries

F-10.3 Deforestation in the 1960s

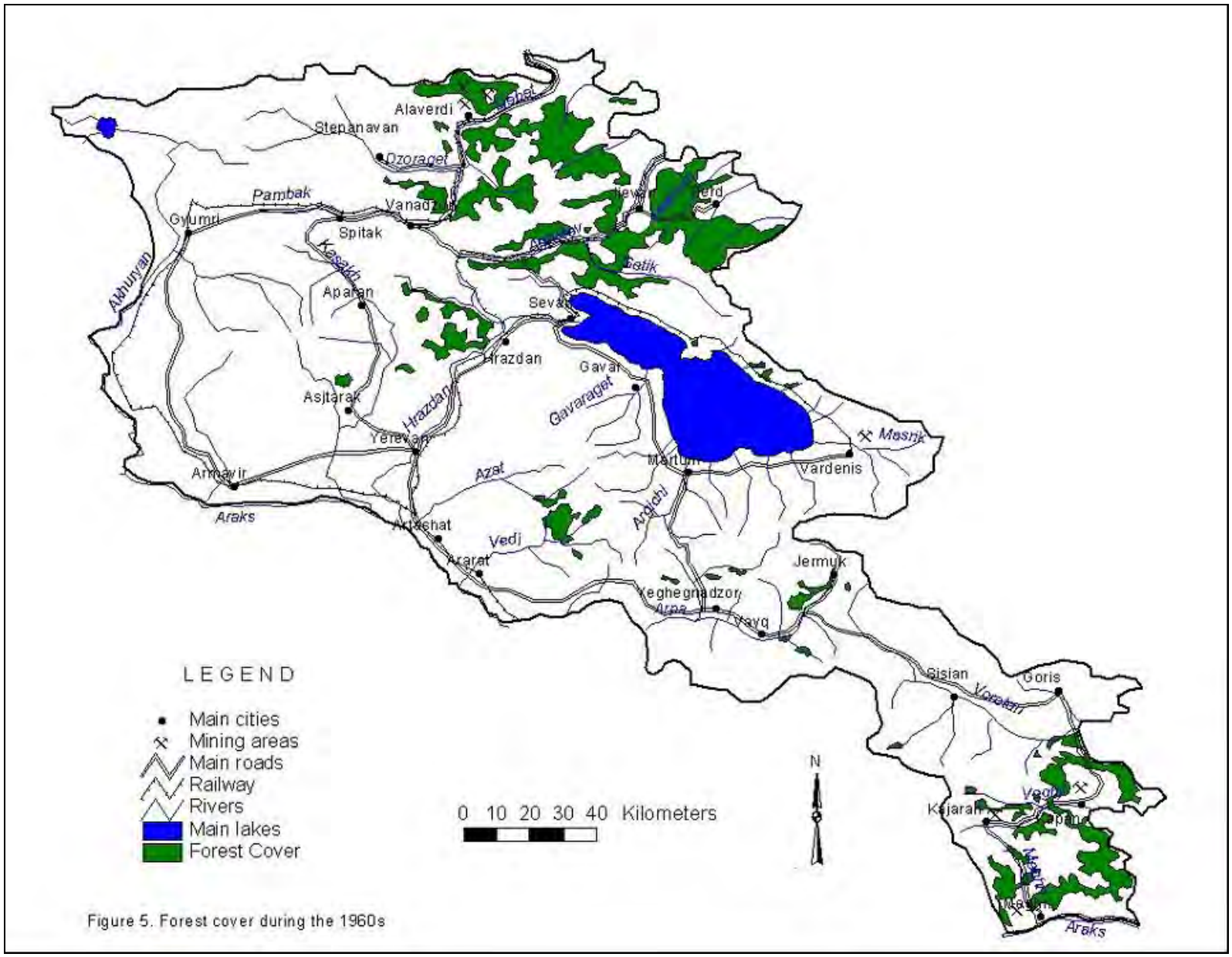


Figure 5. Forest cover during the 1960s

F-10.4 Deforestation in the 1980s

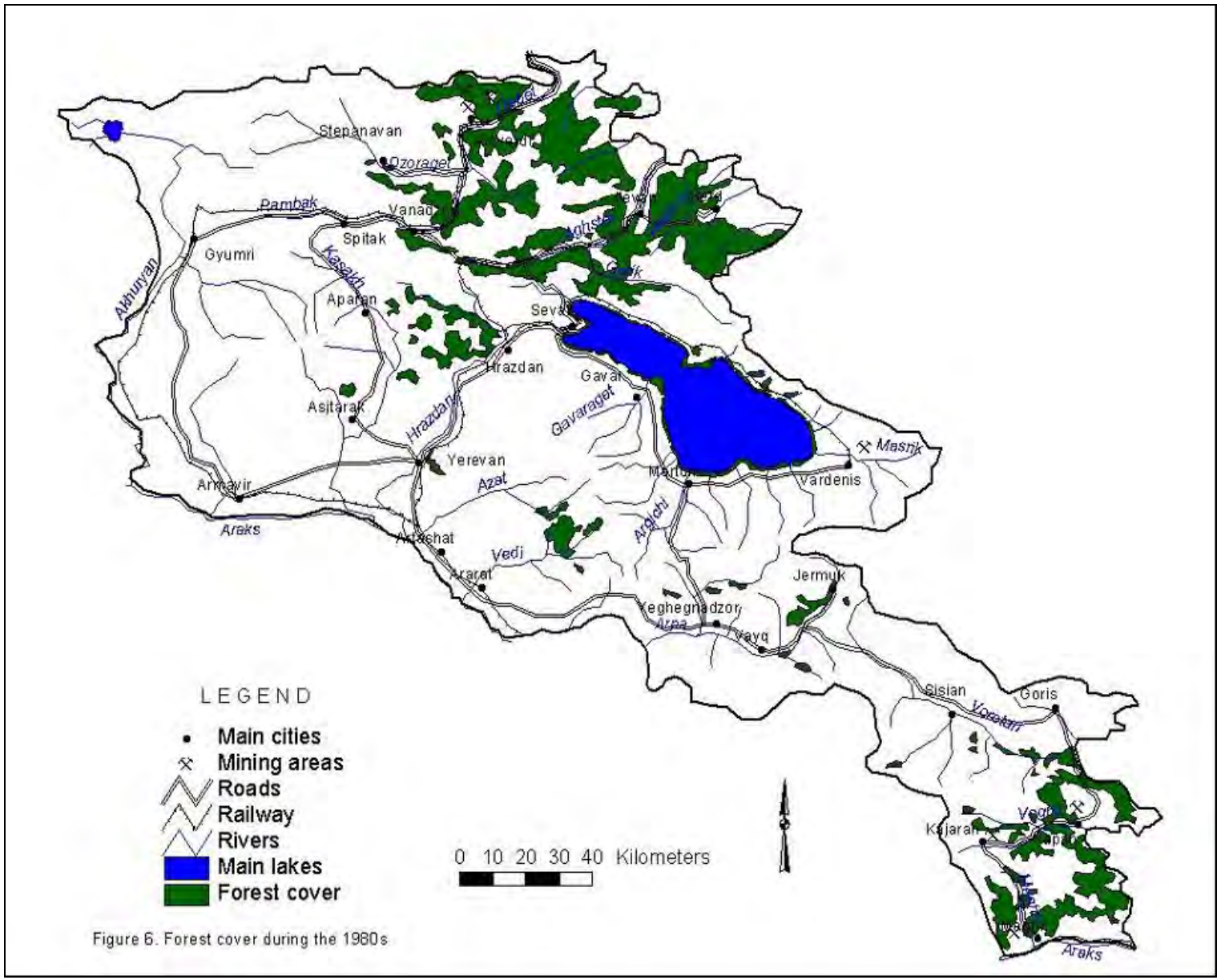
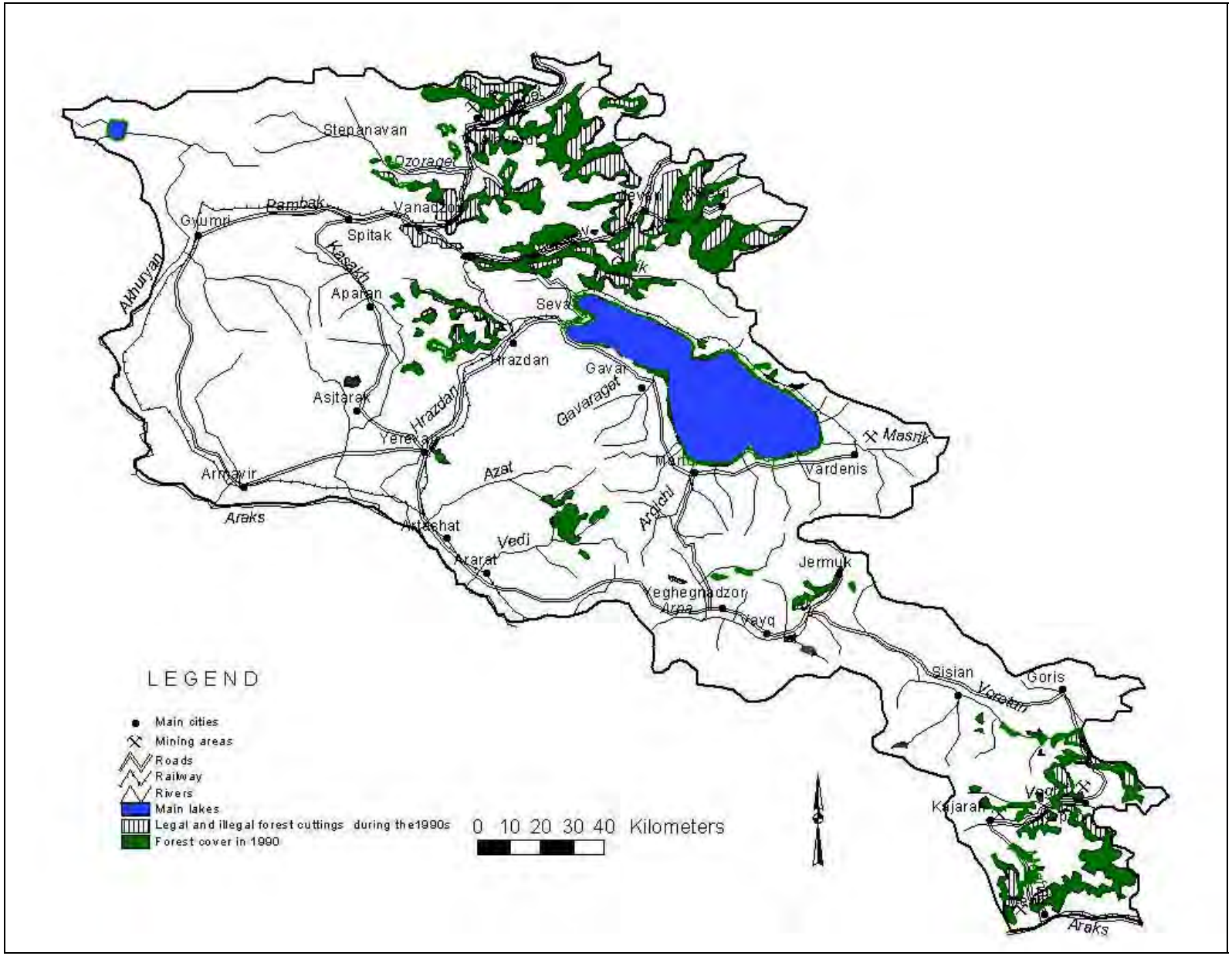
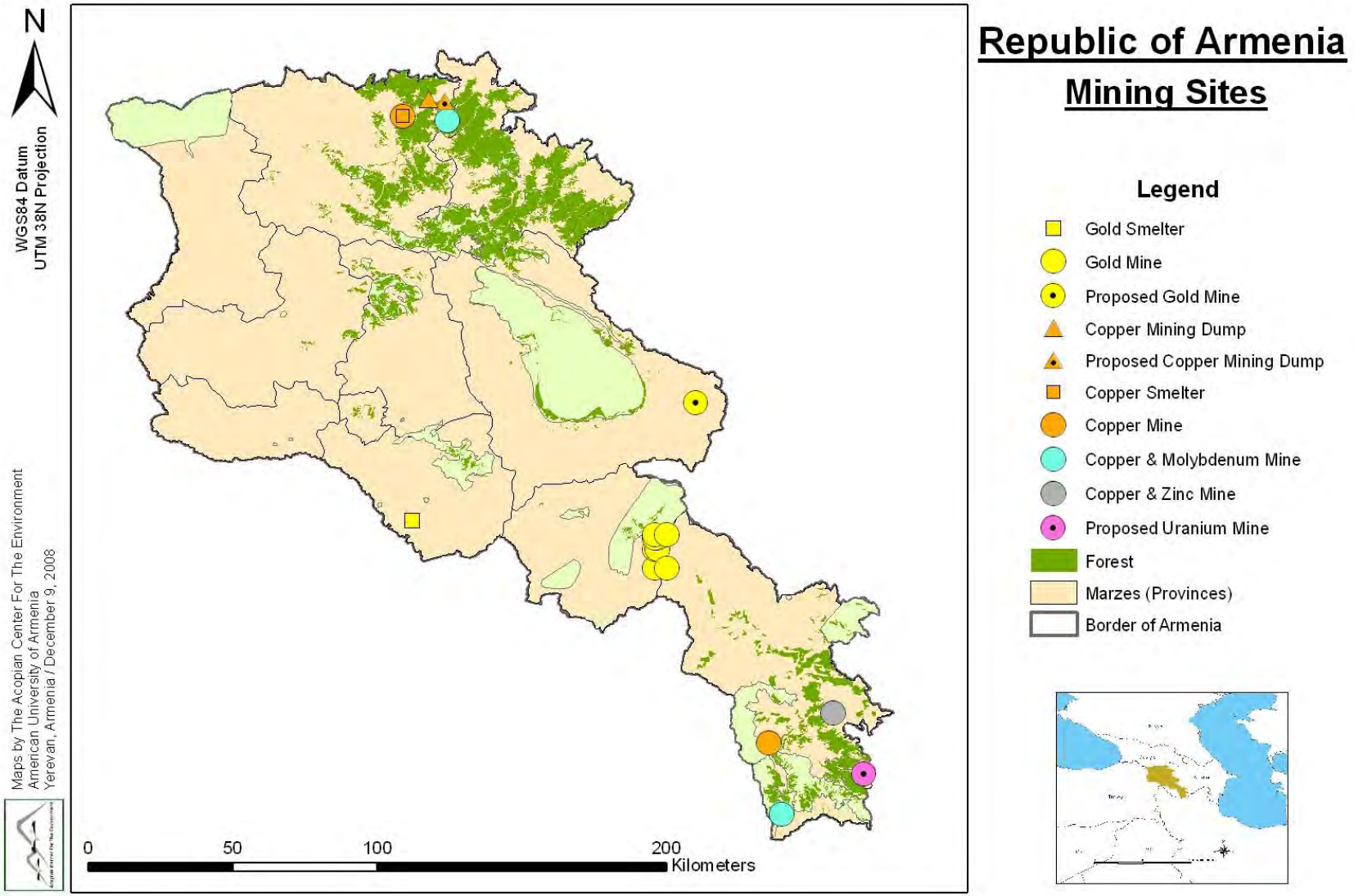


Figure 6. Forest cover during the 1980s

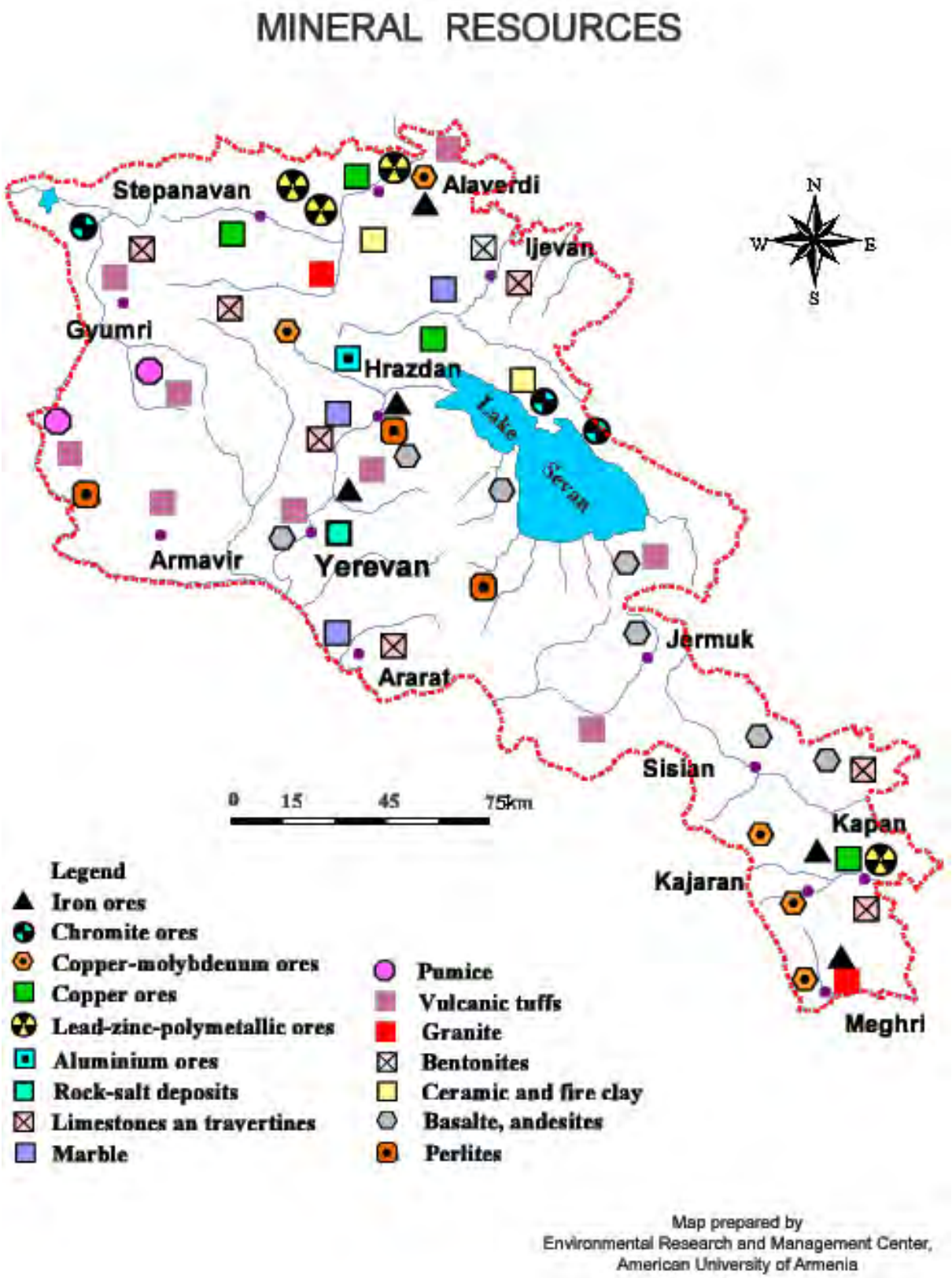
F-10.5 Deforestation in 1990



F-11 Mining Sites



F-12 Mineral Resources



Annex G: Main Features of Natural Ecosystems of Armenia

Ecosystem	Elevation	Precipitation	Temperature	Coverage	Dominant Vegetation	Representative Fauna
Deserts	400-1000	<300	10-12°	5-10%	*Calligonum polygonoides, Colpodium humile, Achillea tenuifolia, Erodium oxyrrhynchum, Seidlitzia florida, Salsola ericoides, Panderia pilosa, Camphorosma lessingii, Halocnemum strobilaceum, Halostachys caspica*	*Meriones dahli, Phrynocephalus persicus, Oenanthe finschii, Rhodopechis githaginea; Zuphium araxidis, Anisoplia reitteriana, Pharaonus caucasicus, Glaphyrus caucasicus, Cardiophorus araxicola, Sphenoptera vediensis*
Semi-deserts	400-1300	<350	10-12°	20-30%	*Artemisia fragrans, Capparis spinosa, Rhamnus pallasii, Kochia prostrata, Athraphaxis spinosa*	*Meriones tristrami (blackleri), M. vinogradovi, Allactaga elater, Vulpes vulpes,Calandrella rufescens, C. brachydactyla,Pterocles orientalis, Glareola pratincola,G. nordmanni, Circaetus ferox, Coracius garrulous, Eumeces schneideri, Mabuya aurata, Ophisops elegans, Vipera lebetina, Lacerta raddei, Eryx jaculus, Malpolon monspessulanus*
Arid open forests and shibliak	400-2300	400-500	9-10°	30-50%	*Quercus araxina, Pistacia mutica, Paliurus spina-christi, Juniperus polycarpos, Juniperus foetidissima, Juniperus oblonga, Rosa spinosissima, Spiraea crenata, Rhamnus pallasii*	*Martens foina, Mustela nivalis, Meles meles, Alaectoris chukar, Columba palumbis, Coluber ravergieri, Elaphe quatuorlineata, E. hohenackeri, Vipera raddei*
Mountain steppes	1000-2400	400-600	4-7°	40-60%	*Stipa tirsa, Stipa pulcherrima, Festuca valesiaca, Phleum*	*Vormela peregusna, Crocidura suaveolens, Rhinolophus hipposideros,*

					phleoides, Carex humilis	*Meles meles , Microtus arvalis, Falco tinnunculus, F. naumanni, Circus macrorus, Coturnix coturnix, Bufo viridis Lacerta armeniaca, L. dahli,*
Forests	550-2400	400-600	4-7°	0-40%	*Fagus orientalis, Quercus iberica, Quercus macranthera, Carpinus caucasica, Pinus kochiana*	*Ciddaria firmata, Bupalus piniarus, Talpa caeca orientalis Sciurus anomalus (persicus), Ursus arctos syriacus, Sus scrofa, Glis glis, Dryomys nitedula (tichomirovi), Felis silvestris, Lynx lynx, Garrulus glandarius, Fringilla coelebs, Prunella modularis, Picus viridis Dendrocopos major, Turdus merula*
Sub-alpine and alpine meadows	2200-3900	600-1000	1-5°	80-90%	*Dactylis glomerata, Phleum pratense, Hordeum violaceum, Festuca varia, Anemone fasciculata, Doronicum oblongifolium, Cephalaria gigantea, Scabiosa caucasica, Campanula tridentata, Taraxacum stevenii*	*Mustela nivalis, Sorex volnuchini, Microtus arvalis, Coronella austriac, Tetraogallus caspius, Pyrrhocorax graculus, P. pyrrhocorax,Gypaetus barbatus, Prunella ocularis,P. collaris, Vipera erivanensis, V. darevskii, Lacerta valentini,*
Wetlands	400-3800	Depends on altitude	Depends on altitude	-	*Phragmites australis, Typha latifolia, Bolboschoenus maritimus, Licat acutus, Cyperus fuscus, Aeluropus littoralis, Carex gracilis, Hippuris vulgaris, Trollius europaeus, Deschampria caespitosa, Potamogeton natans, Groenlandia densa, Cardamine uliginosa, Butomus umbellatus, Polygonum amphibium, Nymphoides peltatum, Nymphaea alba*	*Lutra lutra, Arvicola terrestris,* All waterfowl species registered in Armenia (Such as: *Phalacrocorax pygmaeus, Pelecanus crispus, Anser erythropus, Marmoronetta angustirostris, Aythya nyroca, Oxyura leucocephalis, Larus armenicus, Phalacrocorax carbo Ph. pygmaeus, Plegadis falcinellus, Haliaeetus albicilla, Cygnus olor, C. cygnus, Anas clypeata, Platalea leucorodia).* All fish and amphibian species, registered in Armenia.

						Natrix natrix
Petrofilous ecosystems	400-4000	Depends on altitude	Depends on altitude	10-60%	*Cerasus incana, Sempervivum transcaucasicum, Astragalus microcephalus, Cystopteris fragilis, Juniperus depressa, Cotoneaster integerrimus, Ephedra procera*	*Hystrix indica (leucura), Pipistrellus pipistrellus , Sitta tephronota, Crocidura gueldenstaedtii (russula), Ptyonoprogne rupestris, Delichon urbica, Pyrrhocorax pyrrhocorax, Columba livia, Petronia petronia, Alectoris chukar, Hippolais pallida, Sitta neumayer,S. tephronota Monticola saxatilis, Trachylepis (Mabuya) aurata , Laudakia caucasica, Eumeces (Novoeumeces) schneideri, Platyceps (Coluber) najadum, Hemorrhois (Coluber) ravergieri, Elaphe hohenackeri, Macrovipera (Vipera) lebetina obtusa, Telescopus fallax, Vipera (Montivipera) raddei*

Annex H: IUCN and Armenia Red Data Book Species

THE IUCN THREATENED SPECIES OF FAUNA OF ARMENIA
(Vulnerable, Endangered and Critically Endangered)

Species English and *scientific name*	Category	
	INVERTEBRATES	
Cerambyx cerdo *Cerambyx Longicorn*	VU	able Status: Vulnerable A1c+2c ver 2.3 (needs updating) A1c+2c ver 2.3 **Year Assessed:** 1996
Onychogomphus assimilis	VU	Vulnerable Status: Vulnerable A2ac+3c ver 3.1 **Year Assessed:** 2006
Apollo Butterfly *Parnassius apollo*	VU	Status: Vulnerable A1cde ver 2.3 (needs updating) 2008 IUCN Red List of Threatened Species. Downloaded on **20 December 2008**.
Rosalia Longicorn *Rosalia alpina*	VU	**Red List Category & Criteria:** Vulnerable A1c ver 2.3 **Year Assessed:** 1996
Predatory Bush Cricket *Saga pedo*	VU	**Red List Category & Criteria:** Vulnerable B1+2bd ver 2.3 **Year Assessed:** 1996
Zerynthia caucasica	VU	**Red List Category & Criteria:** Vulnerable A1ac, B1+2ac ver 2.3 **Year Assessed:** 2000
	Fishes	
Wild Common Carp Cyprinus carpio	VU	**Red List Category & Criteria: Vulnerable A2ce** ver 3.1 **Year Assessed: 2008**
	REPTILES	
Common Tortoise*Testudo graeca*	VU	**Red List Category & Criteria:** Vulnerable A1cd ver 2.3 **Year Assessed:** 1996
Vipera darevskii	CR	**Red List Category & Criteria:** Critically Endangered C2b ver 2.3 **Year Assessed:** 1996
Caucasian Viper *Vipera kaznakovi*	EN	**Red List Category & Criteria:** Endangered A1cd+2cd ver 2.3 **Year Assessed:** 1996
Meadow Viper *Vipera ursinii*	EN	**Red List Category & Criteria:** Endangered A1c+2c ver 2.3 **Year Assessed:** 1996
	BIRDS	
.Lesser White-fronted Goose *Anser erythropus*	VU	**2008 IUCN Red List Category** (as evaluated by BirdLife International - the official Red List Authority for birds for IUCN): **Vulnerable**
Marbled Teal *Marmaronetta angustirostris*	VU	**2008 IUCN Red List Category** (as evaluated EN by BirdLife International - the official Red List Authority for birds for IUCN): **Vulnerable**

White-headed Duck *Oxyura leucocephala*	EN	**2008 IUCN Red List Category** (as evaluated by BirdLife International - the official Red List Authority for birds for IUCN): **Endangered**
Dalmatian Pelican *Pelecanus crispus*	VU	**2008 IUCN Red List Category** (as evaluated by BirdLife International - the official Red List Authority for birds for IUCN): **Vulnerable**
Lesser Kestrel *Falco naumanni*	VU	**2008 IUCN Red List Category** (as evaluated by BirdLife International - the official Red List Authority for birds for IUCN): **Vulnerable**
Saker Falcon *Falco cherrug*	EN	**2008 IUCN Red List Category** (as evaluated by BirdLife International - the official Red List Authority for birds for IUCN): **Endangered**
Egyptian Vulture *Neophron percnopterus*	EN	**2008 IUCN Red List Category** (as evaluated by BirdLife International - the official Red List Authority for birds for IUCN): **Endangered**
Greater Spotted Eagle *Aquila clanga*	VU	**2008 IUCN Red List Category** (as evaluated by BirdLife International - the official Red List Authority for birds for IUCN): **Vulnerable**
Eastern Imperial Eagle *Aquila heliaca*	VU	**2008 IUCN Red List Category** (as evaluated by BirdLife International - the official Red List Authority for birds for IUCN): **Vulnerable**
Great Bustard *Otis tarda*	VU	**2008 IUCN Red List Category** (as evaluated by BirdLife International - the official Red List Authority for birds for IUCN): **Vulnerable**
Houbara Bustard *Chlamydotis undulata*	VU	**2008 IUCN Red List Category** (as evaluated by BirdLife International - the official Red List Authority for birds for IUCN): **Vulnerable**
Sociable Lapwing *Vanellus gregarius*	CR	**2008 IUCN Red List Category** (as evaluated by BirdLife International - the official Red List Authority for birds for IUCN): **Critically Endangered**
Imperial Eagle *Aquila Heliaca*	VU	**2008 IUCN Red List Category** (as evaluated by BirdLife International - the official Red List Authority for birds for IUCN): **Vulnerable ver 3.1**
Red-Breasted Goose *Branta Ruficollis*	EN	Endangered A2bcd+3bcd+4bcd ver 3.1 **Year Assessed:** 2008 **Assessor/s** BirdLife International
Marbled Teal, Marbled Duck *Marmaronetta angustirostris*	VU	Vulnerable A2cd+3cd+4cd ver 3.1 **Year Assessed:** 2008 **Assessor/s** BirdLife International
MAMMALS		
Armenian Whiskered Bat *Myotis hajastanicus*	CR	Red List Category & Criteria: Critically Endangered D ver 3.1 **Year Assessed:** 2008
Capra aegagrus *Wild Goat*	VU	Red List Category Vulnerable A2cd ver 3.1 **Year Assessed:** 2008
Dahl's Jird *Meriones dahli*	EN	Endangered B1ab(iii) ver 3.1 **Year Assessed:** 2008
Mehely's Horseshoe *Batrhinolophus Mehelyi*	VU	**Red List Category & Criteria:** Vulnerable A4c ver3.1 **ear Assessed:** 2008

Spermophilus citellus *European Ground Squirrel*	VU	Red List Category & Criteria: Vulnerable A2bc ver 3.1 Year Assessed: 2008
Marbled Polecat *Vormela peregusna*	VU	Red List Category & Criteria: Vulnerable A2c ver 3.1 Year Assessed: 2008
Armenian Birch Mouse *Sicista armenica*	EN	Red List Category & Criteria: Endangered B1ab(iii) ver 3.1 Year Assessed: 2008
Caucasian Leopard, (West Asian Leopard) *Panthera pardus ssp. saxicolor*	EN	Red List Category & Criteria: Endangered C2a(i) ver 3.1 Year Assessed: 2008

ARMENIAN RED DATA BOOK AND ALIEN SPECIES OF ANIMALS

*alien species Armenian Red Data listed species

FISHES

Siberian Sturgeon	**Acipenser baeri*
Whitefish	**Coregonus lavaretus*
Brown Trout	*Salmo trutta m. fario*
Sevan Trout	*Salmo ischchan*
Rainbow Trout	**Parasalmo mykiss*
Grass Carp	**Ctenopharygodon idella*
Black Carp	**Mylopharyngodon piceus*
Sevan Barbel	*Barbus goctschaicus*
Sunbleak	**Leucaspius delineatus*
Silver Carp	**Hypophthalmichtys molitrix*
Bighead	**Aristichthys nobilis*
Crucian Carp	**Carassius auratus*
Pseudorasbora	**Pseudorasbora parva*
Spotted Catfish	**Ictalurus punctatus*
Gambusia	**Gambusia affinis*
Caucasian Goby	**Knipowitschia caucasica*
Monkey Goby	**Neogobius fluviatilis*

AMPHIBIANS

Syrian Spadefoot Toad	*Pelobates syriacus*

REPTILES

Mediterranean Spur-thighed Tortoise	*Testudo graeca*
Persian Toadhead Agama / Sunwatcher Lizard	*Phrynocephalus persicus*
Steppe Racerunner	*Eremias arguta*
Golden Grass Mabuya	*Trachylepis (Mabuya) aurata*
Dwarf Lizard	*Lacerta (Parvilacerta) parva*
Schneider's Skink	*Eumeces (Novoeumeces) schneideri*
Transcaucasian Ratsnake	*Elaphe hohenackeri*
European Cat Snake	*Telescopus fallax*
Radde's/Armenian Rock Viper	*Vipera (Montivipera) raddei*

BIRDS

Great Cormorant	*Phalacrocorax carbo*
Pygmy Cormorant	*Phalacrocorax pygmaeus*
Great White Pelican	*Pelecanus onocrotalus*
Dalmatian Pelican	*Pelecanus crispus*
Great Egret	*Ardea (Egretta) alba*
Glossy Ibis	*Plegadis falcinellus*
Eurasian Spoonbill	*Platalea leucorodia*
Greater flamingo	*Phoenicopterus rubber*
Osprey	*Pandion haliaetus*
Red Kite	*Milvus milvus*
White-tailed Eagle	*Haliaeetus albicilla*
Lammergeier	*Gypaetus barbatus*
Eurasian Griffon	*Gyps fulvus*
Cinereous Vulture	*Aegypius monachus*
Short-toed Snake-Eagle	*Circaetus gallicus*
Northern Harrier	*Circus cyaneus*
Pallid Harrier	*Circus macrourus*
Montagu's Harrier	*Circus pygargus*
Levant Sparrowhawk	*Accipiter brevipes*
Steppe Eagle	*Aquila nipalensis*
Imperial Eagle	*Aquila heliaca*
Golden Eagle	*Aquila chrysaetos*
Red-footed Falcon	*Falco vespertinus*
Merlin	*Falco columbarius*
Lanner Falcon	*Falco biarmicus*
Saker Falcon	*Falco cherrug*
Peregrine Falcon	*Falco peregrinus*
White-headed Duck	*Oxyura leucocephala*
Mute Swan	*Cygnus olor*
Whooper Swan	*Cygnus cygnus*
Greylag Goose	*Anser anser*
Common Shelduck	*Tadorna tadorna*
Gadwall	*Anas streperа*
Northern Shoveler	*Anas clypeata*
Marbled Teal	*Marmaronetta angustirostris*
White-winged Scoter	*Melanitta fusca*
Caucasian Grouse	*Tetrao mlokosiewiczi*
Caspian Snowcock	*Tetraogallus caspius*

Common Crane	*Grus grus*
Eurasian Oystercatcher	*Haematopus ostralegus*
Black-winged Stilt	*Himantopus himantopus*
Pied Avocet	*Recurvirostra avosetta*
Sociable Lapwing	*Chettusia gregaria*
Armenian Gull	*Larus armenicus*
Boreal Owl	*Aegolius funereus*
Blue-cheeked Bee-eater	*Merops persicus*
Black Woodpecker	*Dryocopus martius*
Woodchat Shrike	*Lanius senator*
Bluethroat	*Luscinia svecica*
White-throated Robin	*Irania gutturalis*
Finsch's Wheatear	*Oenanthe finschii*
Rufous-tailed Wheatear	*Oenanthe xanthoprymna*
Rufous-tailed Rock-Thrush	*Monticola saxatilis*
Blue Rock-Thrush	*Monticola solitarius*
Barred Warbler	*Sylvia nisoria*
Orphean Warbler	*Sylvia hortensis*
Eurasian Penduline-tit	*Remiz pendulinus*
Sombre Tit	*Parus lugubris*
Eastern Rock-Nuthatch	*Sitta tephronota*
Wallcreeper	*Tichodroma muraria*
Grey-necked Bunting	*Emberiza buchanani*
Red-billed Bunting	*Emberiza Emberiza caesia*
Trumpeter Finch	*Rhodopechys githagineus*
Pale Rock-Finch	*Carpospiza brachydactyla*
White-winged Snowfinch	*Montifringilla nivalis*
Yellow-billed Chough	*Pyrrhocorax graculus*
Common Raven	*Corvus corax*

MAMMALS

Long-eared Hedgehog	*Hemiechinus (Erinaceus) auritus*
Natterer's bat	*Myotis nateren*
Eastern Barbastelle Bat	*Barbastella leucomelas*
Large Bentwing Bat	*Miniopterus schreibersii*
Southern Horseshoe Bat	*Rhinolophus euryale*
Mehely's Horseshoe Bat	*Rhinolophus mehelyi*
European Free-tailed Bat	*Tadarida teniotis*
Indian Porcupine	*Hystrix indica (leucura)*

Coypu	**Myocastor coypus*
Armenian Birch Mouse	*Sicista (caucasica) armenica*
Dahl's Jird	*Meriones meridianus dahli*
Muskrat	**Ondatra zibethicus*
Armenian mouflon	*Ovis orientalis gmelini*
Bezoar Goat	*Capra aegagrus*
Brown Bear	*Ursus arctos syriacus*
Marbled Polecat	*Vormela peregusna*
European Otter	*Lutra lutra*
Wildcat	*Felis silvestris*
Pallas's Cat, Manul	*Felis manul*
Leopard	*Panthera pardus*

List of species included in the Red Data Book of Armenia (Flora) (1990)

1.1 Pteridophyta

1.2 Ophioglossaceae

1. Botrychium lunaria/ L. /Sw.
2. Ophioglossum vulgatum L.

Polypodiaceae

1. Adiantum capillus-veneris L.
2. Cheilanthes pteridioides /Reich./ C. Christ
3. Matteuccia struthiopteris /L./ Tod.
4. Pteridium tauricum V. Krec. ex Grossh.
5. Thelypteris palustris Schott

1.3 Salviniaceae

1. Salvinia natans /L./ All.

1.4 Gymnospermae

Cupressaceae

1. Juniperus excelsa Bieb.subsp. polycarpos /C. Koch/ Takht.
2. J. foetidissima Willd.
3. J. sabina L.

Taxaceae

1. Taxus baccata L.

1.5 Angiospermae

Aceraceae

1. Acer laetum C.A. Mey.
2. A. trautvetteri Medw.

Alismataceae

1. Alisma lanceolatum With.
2. Sagittaria sagittifolia L.
3. S. trifolia L.

Amaryllidaceae

1. Galanthus alpinus Sosn.
2. G. transcaucasicus Fomin
3. Sternbergia colchiciflora Waldst. et Kit.
4. S. fischeriana /Herb./ M. Roem.

Anacardiaceae

1. Pistacia mutica Fisch. et C. A. Mey.

Apiaceae

1. Actinolema macrolema Boiss.
2. Aphanopleura trachysperma Boiss.
3. Bupleurum koso-poljanskyi Grossh.
4. B. pauciradiatum Fenzl ex Boiss.
5. B. sosnowskyi Manden.
6. Carum komarovii Karjag.
7. Dorema glabrum Fisch. et C. A. Mey.
8. Eryngium wanaturii Woronow
9. Falcaria falcarioides /Bornm. et H. Wolff/
10. Ferula persica Willd.
11. F. szowitsiana DC.
12. Hohenackeria excapa /Stev./ Koso-Pol.
13. Lisaea papyracea Boiss.
14. Oenanthe sophiae Schischk.
15. Opopanax persicus Boiss.
16. Peucedanum caucasicum /Bieb/ C. Koch
17. P. zedelmeyerianum Manden.
18. Prangos arcis - romanae Boiss. et Huet
19. P.lophoptera Boiss.
20. P.uloptera DC
21. Seseli grandivittatum /Somm. et Lev./ Schischk.
22 S. leptocladum Woronow
23. Smyrniopsis armena Schischk
24. Stenotaenia daralaghezica /Takht./ Schischk.
25. Szovitsia callicarpa Fisch. et C.A. Mey.

Araceae

1. Acorus calamus L.

Aristolochiaceae

1. Aristolochia iberica Fisch. et C.A. Mey. ex Boiss.

Asclepiadaceae

1. Periploca graeca L.

Asteraceae
(Compositae)

1. Amberboa moschata / L./ DC.
2. A. sosnovskyi Iljin
3. Calendula arvensis L.
4. Centaurea arpensis /Czer./ Czer.
5. C. erivanensis /Lipsky/ Bordz.
6. C.hajastana Tzvel.
7. C.leuzeoides /Jaub. et Spach/ Walp.
8. C. phaeopappoides Bordz.
9. C. takhtajanii Gabr. et Tonjan
10. Cephalorrhynchus kirpicznikovii Grossh.
11. Chardinia macrocarpa C.Koch
12. Cousinia tenella Fisch. et C.A. Mey.
13. Doronicum balansae Cavill.
14. Gundelia tournefortii L.
15. Helichrysum pallasii /Spreng./ Ledeb.
16. Hieracium pannosum Boiss.
17. Inula aucherana DC.
18. Lactuca takhtadzhianii Sosn.
19. Saussurea salsa /Pall./ Spreng.
20. Sonchus araraticus Naz. et Bars.
21. Steptorhamphus czerepanovii Kirp.
22. S. persicus /Boiss/ O.et B. Fedtsch.
23. Tanacetum kotschyi /Boiss./ Grierson
24. Tomanthea carthamoides /DC./ Takht.
25. T. daralaghezica /Fomin/ Takht.
26. Tripleurospermum grossheimii /Fed./ Pobed.

Boraginaceae

1. Paracaryum laxiflorum Trautv.

Brassicaceae

1. Alyssum hajastanum V.Avet.
2. A. xanthocarpum Boiss.
3. Didimophysa aucheri Boiss.
4. Draba bryoides DC.
5. Isatis arnoldiana N.Busch
6. I. Ornithorhynchus N. Busch
7. I. sevangensis N. Busch
8. I.takhtadjanii V. Avet.
9. Peltariopsis grossheimii N. Busch
10. P. planisiliqua /Boiss./ N. Busch
11. Physoptychis caspica /Habl./ V. Boczanceva
12. Pseudovesicaria digitata /C. A. Mey./ Rupr.
13. Sameraria glastifolia /Fisch. et C. A. Mey/ Boiss.
14. S. odonthopohora Bordz.
15. Thlaspi zangezurum Tzvel.

Caesalpiniaceae

1. Cercis griffithii Boiss.

Campanulaceae

1. Campanula erinus L.
2. C. karakuschensis Grossh.
3. C. massalskyi Fomin
4. Legousia falcata /Ten. / Fritsch.

5. Symphyandra zangezura Lipsky

Caprifoliaceae

1. Sambucus tigranii Troitzk.

Caryophyllaceae

1. Acanthophyllum pungens /Bunge/ Boiss.
2. Allochrusa bungei Boiss.
3. Coronaria flos- cuculi /L./ A. Br.
4. Dianthus cyri Fisch. et C. A. Mey.
5. D. inamoenus Schischk.
6. D. libanotis Labill.
7. D. parviflorus Boiss.
8. Gypsophila aretioides Boiss.
9. G. takhtadzhanii Schischk. ex Ikonn.
10. G. virgata Boiss.
11. Telephium oligospermum Steud. ex Boiss.

Celastraceae

1. Euonymus velutina Fisch. et C. A. Mey.

Chenopodiaceae

1. Beta lomatogona Fisch. et C. A. Mey.
2. B. macrorrhiza Stev.
3. Bienertia cycloptera Bunge
4. Girgensohnia oppositiflora /Pall./ Fenzl
5. Halanthium kulpianum /C. Koch/ Bunge
6. Halotis pilifera / Mog./ Botsch.
7. Microcnemum coralloides /Loscos et Pardo/ Font Quer
8. Salsola tamamschjanae Iljin
9. Spinacia tetrandra Stev.

Convolvulaceae

1. Convolvulus calvertii Boiss.
2. C. commutatus Boiss.

Corylaceae

1. Carpinus schuschaensis H. Wincl.
2. Corylus colurna L.

Crassulaceae

1. Rosularia chrysantha /Boiss./ Takht.

Cucurbitaceae

1. Citrullus colocynthis /L./ Schrad.

Cyperaceae

1. Carex bohemica Schreb.
2. C. cilicica Boiss.
3. Dichostylis micheliana /L./ Nees
4. Eleocharis transcaucasica Zinserl.

Dipsacaceae

1. Cephalaria nachiczevanica Bobr.
2. C. tchihatchevii Boiss.

Ebenaceae

1. Diospyros lotus L.

Empetraceae

1. Empetrum hermaphroditum Hagerup

Ericaceae

1. Rhododendron caucasicum Pall.

Euphorbiaceae

1. Andrachne rotundifolia C. A. Mey.
2. Euphorbia eriophora Boiss.
3. E. grossheimii Prokh.

Fabaceae

1. Astragalus aduncus Willd.
2. A. campylosema Boiss.
3. A. eriopodus Boiss.
4. A. fraxinifolius DC.
5. A. gjunaicus Grossh.
6. A. goktschaicus Grossh.
7. A. garmmocalyx Boiss. et Honen.
8. A. karakuschensis Gontsch.
9. A. kirpicznikovii Grossh.
10. A. macrourus Fisch. et C.A. Mey.
11. A. massalskyi Grossh.
12. A. meyeri Boiss.
13. A. ordubadensis Grossh.
14. A. paradoxus Bunge
15. A. persicus Fisch. et C.A. Mey. ex Bunge
16. A. refractus C. A. Mey.
17. A. saganlugensis Trautv.
18. A. schuschensis Grossh.
19. Cicer anatolicum Alef.
20. C. minutum Boiss. et Hohen.
21. Colutea komarovii Takht.
22. Coronilla cretica L.
23. Glycyrrhiza echinata L.
24. G. glabra L.
25. Hedysarum elegans Boiss. et Huet
26. H.micropterum Bunge
27. H. sericeum Bieb.
28. Lathyrus vinealis Boiss. et Noe
29. Lens ervoides / Brign./ Grande
30. L. orientalis /Boiss./ Hand.- Mazz.
31. Oxytropis karjaginii Grossh.
32. O. lazica Boiss.
33. Trifolium sebastiani Savi
34. Trigonella capitata Boiss.
35. Vavilovia formosa /Stev./ Fed.
36. Vicia cappadocica Boiss. et Bal.

Fagaceae

1. Castanea sativa Mill.
2. Quercus infectoria Oliv. subsp. boissieri /Reut./O.Schwarz
3. Q. robur L. subsp. pedunculiflora /C. Koch/Menits.

Frankeniaceae

1. Frankenia pulverulenta L.

Fumariaceae

1. Corydalis marschalliana Pers.

Grossulariaceae

1. Ribes achurjani Mulk.
2. R. armenum Pojark.

Hydrangeaceae

1. Philadelphus caucasicus Koehne

Hypericaceae

1. Hypericum armenum Jaub. et Spach
2. H. eleonorae Jelen.
3. H. formosissimum Takht.

Iridaceae

1. Crocus adamii J. Gay
2. C. speciosus Bieb.
3. Gladiolus atroviolaceus Boiss.
4. G. caucasicus Herb.
5. G. halophilus Boiss. et Heldr.
6. G. italicus Mill.
7. G. kotschyanus Boiss.
8. G. tenuis Bieb.
9. Iris caucasica Hoffm.
10. I.elegantissima Sosn.
11. I. furcata Bieb.
12. I. grossheimii Woronow ex Grossh.
13. I. imbricata Lindl.
14. I. lycotis Woronow
15. I. musulmanica Fomin
16. I. paradoxa Stev.
17. I. prilipkoana Kem.-Nath.
18. I. pseudocaucasica Grossh.
19. I. pumila L.
20. I. reticulata Bieb.

Juglandaceae

1. Juglans regia L.

Juncaceae

1. Juncus tenuis Willd.

Lamiaceae

1. Dracocephalum botryoides Stev.
2. Eremostachys macrophylla Montbr. et Auch.ex Benth.
3. Marrubium purpureum Bunge
4. Micromeria fruticosa /L./ Druce subsp. serpyllifolia /Bieb./ Davis
5. Nepeta lamiifolia Willd.
6. N. teucriifolia Willd.
7. Salvia grossheimii Sosn.
8. S. pachystachya Trautv.
9. S.spinosa L.
10. S. suffruticosa Montbr. et Auch. ex Benth.
11. Stachys cretica L.
12. Teucrium canum Fisch. et C.A. Mey.

Lemnaceae

1. Lemna polyrrhiza L.

Lentibulariaceae

1. Utricularia intermedia Hayne

Liliaceae

1. Allium akaka Gmel.
2. A. callidictyon C. A. Mey. ex Kunth
3. A. derderianum Regel
4. A. scabriscapum Boiss. et Kotschy
5. Asphodeline dendroides /Hoffm./ Woronow ex Grossh.
6. A. lutea /L./ Reichenb.
7. A. taurica /Pall. ex Bieb./ Kunth
8. Colchicum speciosum Stev.
9. C. szovitsii Fisch. et C. A. Mey.
10. C. umbrosum Stev.
11. Fritillaria kurdica Boiss. et Noe
12. F. lutea Mill.
13. Gagea improvisa Grossh.
14. G. stipitata Merckl. ex Bunge
15. Merendera candidissima Miscz. ex Grossh.
16. M. mirzoevae Gabr.
17. M. raddeana Regel
18. M. sobolifera C. A. Mey.
19. M. trigyna /Adam/ Woronov
20. Muscari pallens Bieb.
21. Nectaroscordum tripedale /Trautv./ Grossh.
22. Ornithogalum tempskyanum Freyn et Sint.
23. Rhinopetalum gibbosum /Boiss./ A. Los. et Vved.
24. Scilla atropatana Grossh.
25. S. mischtschenkoana Grossh.
26. S. rosenii C. Koch
27. Smilax excelsa L.
28. Tulipa biflora Pall.
29. T. confusa Gabr.
30. T. florenskyi Woronow
31. T. julia C. Koch
32. T. sosnowskyi Akhverdov et Mirzoeva
33. T. sylvestris L.

Linaceae

1. Linum anatolicum Boiss.
2. L. seljukorum Davis

Malvaceae

1. Alcea karsiana /Bordz./ Litv.
2. A. sophiae Iljin
3. A. sosnovskyi Iljin
4. Malvella sherardiana /L./ Jaub. et Spach

Menyanthaceae

1. Menyanthes trifoliata L.

Moraceae

1. Ficus carica L.

Najadaceae

1. Najas minor L.

Nitrariaceae

1. Nitraria schoberi L.

Nymphaeaceae

1. Nuphar luteum /L./ Smith.
2. Nymphaea alba L.
3. N. candida J. et C. Presl

Onagraceae

1. Chamerion stevenii /Boiss./ Holub

Orchidaceae

1. Anacamptis pyramidalis /L./ Rich.
2. Cephalanthera damasonium /Mill./ Druce
3. C. epipactoides Fisch. et C. A. Mey.
4. C. rubra /L./ Rich.
5. Corallorhiza trifida Chatel.
6. Dactylorhiza cataonica /Fleischm./ Holub
7. D. euxina /Nevski/ Czer.
8. D. iberica /Bieb. ex Willd./ Soo
9. D. romana /Seb. ex Mauri/ Soo
10. D. sanasunitensis /Fleischm./ Soo
11. Epipactis veratrifolia Boiss. et Hohen.
12. Epipogium aphyllum /F. W. Schmidt/ Sw.
13. Limodorum abortivum /L./ Sw.
14. Listera ovata /L./ R. Brown
15. Ophrys caucasica Woronow ex Grossh.
16. O. oestrifera Bieb.
17. Orchis coriophora L.
18. O. laxiflora Lam.
19. O. mascula /L./ L.
20. O. morio L. subsp. picta /Lois./ Aschers. et Graebn.
21. O. palustris Jacq.
22. O. punctulata Stev. ex Lindl. subsp. schelkovnikowii /Woronow/ Soo
23. O. purpurea Huds.
24. O. simia Lam.
25. O. stevenii Reichenb. f.
26. Platanthera bifolia /L./ Rich.
27. P. chlorantha /Cust./ Reichenb.
28. Steveniella satyrioides /Stev./ Schlecht.
29. Traunsteinera sphaerica /Bieb./ Schlecht.

Paeoniaceae

1. Paeonia tenuifolia L.

Papaveraceae

1. Papaver bracteatum Lindl.
2. P. orientale L.
3. P. paucifoliatum /Trautv./ Fedde

Platanaceae

1. Platanus orientalis L.

Plumbaginaceae

1. Acantholimon araxanum Bunge
2. A. avenaceum Bunge
3. A. calvertii Boiss.
4. A. fedorovii Tamamsch. et Mirz.
5. A. gabrieljanae Mirz.
6. A. vedicum Mirz.

7. Limonium carnosum /Boiss./ O. Kuntze
8. L. meyeri /Boiss./ O. Kuntze

Poaceae

1. Aegilops crassa Boiss.
2. Amblyopyrum muticum /Boiss./ Eig
3. Arrhenatherum kotschyi Boiss.
4. Enneapogon persicus Boiss.
5. Erianthus ravennae /L./ Beauv.
6. Hordeum spontaneum C.Koch
7. Imperata cylindrica /L./ Beauv.
8. Phalaris paradoxa L.
9. Puccinellia grossheimiana Krecz.
10. Rhizocephalus orientalis Boiss.
11. Secale vavilovii Grossh.
12. Triticum araraticum Jacubcz.
13. T. boeoticum Boiss.
14. T. urartu Thum. ex Gandil.

Polemoniaceae

1. Polemonium caeruleum L.

Polygonaceae

1. Calligonum polygonoides L.
2. Rheum ribes L.

Potamogetonaceae

1. Potamogeton trichoides Cham. et Schlecht.

Primulaceae

1. Asterolinon linum - stellatum /L./ Duby
2. Cyclamen vernum Sweet
3. Primula amoena Bieb.
4. P. cordifolia Rupr.
5. P. komarovii A. Los.
6. P. woronowii A. Los.

Punicaceae

1. Punica granatum L.

Ranunculaceae

1. Clematis orientalis L.
2. C. vitalba L.
3. Ranunculus lomatocarpus Fisch. et C. A. Mey.
4. R. villosus DC.

Resedaceae

1. Reseda globulosa Fisch. er C. A. Mey.

Rhamnaceae

1. Zizyphus jujuba Mill.

Rosaceae

1. Amygdalus nairica Fed. et Takht.
2. Crataegus pontica C. Koch
3. Potentilla porphyrantha Juz.
4. Pyrus
5. Rosa hemisphaerica Herrm.
6. Sorbus hajastana Gabr.
7. S. luristanica /Bornm./ Schonb. – Temesy

Rubiaceae

1. Asperula affinis Boiss. et Huet
2. Galium decaisnei Boiss.
3. G. kiapazi Manden.
4. G. valantioides Bieb.
5. Neogaillonia szovitsii /DC./ Lincz.

Salicaceae

1. Populus euphratica Oliv.

Santalaceae

1. Thesium compressum Boiss.
2. T. szovitsii DC.

Scrophulariaceae

1. Linaria pyramidata /Lam./ Spreng.
2. Scrophularia amplexicaulis Benth.
3. S. atropatana Grossh.
4. S. takhtajanii Gabr.
5. Verbascum agrimoniifolium /C. Koch/ Hub. – Mor.
6. V. formosum Fisch. ex Schrank
7. V. hajastanicum Bordz.
8. V. nudicaule /Wydl./ Takht.
9. V. paniculatum E. Wulff

Solanaceae

1. Atropa belladonna L.
2. Lycium anatolicum A. Baytop et R. Mill
3. Physochlaina orientalis /Bieb./ G. Don f.

Sparganiaceae

1. Sparganium minimum Wallr.

Staphyleaceae

1. Staphylea pinnata L.

Tamaricaceae

1. Tamarix florida Bunge
2. T.meyeri Boiss.
3. T. octandra Bunge

Thymelaeaceae

1. Stelleropsis magakjanii /Sosn./ Pobed.

Ulmaceae

1. Zelkova carpinifolia /Pall./ C. Koch

Valerianaceae

1. Centranthus longiflorus Stev.
2. Valeriana eriophylla /Ledeb./ Utkin
3. Valerianella kotschyi Boiss.

Violaceae

1. Viola caucasica Kolenati
2. V. somchetica C. Koch

Vitaceae

1. Vitis sylvestris C. C. Gmel.

Zygophyllaceae

1. Tetradiclis tenella /Ehrenb./ Litv.

Annex I: Armenian Endemic Plant and Animal Species

Ecosystem	Flora	Fauna
Deserts	*Astragalus holophyllus*	*Meriones dahlia*
Semi-deserts	*Centaurea arpensis, Allochrusa takhtadjanii, Bufonia takhtajanii, Papaver roseolum, Cotoneaster armenus, Verbascum horticolum*	*Shadinia akramovskii, Gabbiella araxana, Phytodrymadusa armeniaca, Nocarodes armenus, Zodarion petrobium*
Arid open forests and shibliak	*Smyrniopsis armena, Cousinia fedorovii, Cousinia takhtajanii, Isatis sevangensis, Polygala urartu, Amygdalus nairica, Crataegus armena, Crataegus zangezura, Pyrus gergerana*	*Sphenoptera khosrovica, Sph. geghardica, Anthaxia tractata, A. superba*
Mountain steppes	*Centaurea fajvuschii, Centaurea hajastana, Centaurea takhtajanii, Centaurea tamanianae, Scorzonera aragatzi, Scorzonera safievii, Tragopogon armeniacus, Tragopogon segetus, Myosotis daralaghezica, Merendera greuteri, Onobrychis takhtajanii, Alcea grossheimii, Bromopsis zangezura, Polygala urartu, Centaurea leuzeoides, Centaurea takhtajanii,*	*Omophlus armeniacus*
Forests	*Myosotis daralaghezica, Colchicum goharae, Merendera mirzoevae, Ribes armenum, Polygala urartu, Cotoneaster armenus, Pyrus complexa, Pyrus daralaghezi, Pyrus elata, Pyrus hajastana, Pyrus sosnowskyi, Pyrus tamamschianae, Pyrus voronovii, Rosa sosnovskyana, Rosa zangezura, Rubus takhtadjanii, Rubus zangezurus,*	Approximately 30 beetle species
Sub-alpine and alpine meadows	*Grossheimia caroli-henrici, Scorzonera aragatzi, Symphytum hajastanum, Colchicum ninae, Erodium sosnowskianum, Ornithogalum gabrielianae, Gladiolus hajastanicus,*	*Vipera darevskii*

Ecosystem	Flora	Fauna
	Poa greuteri, Trisetum geghamense, Ranunculus aragazi,	
Wetlands	*Sonchus araraticus, Linum barsegianii,*	2 fish species (Sevan trout)
Petrofilous ecosystems	*Allium struzlianum, Allium vasilevskajae, Onosma gehardica, Sameraria odontophora, Thlaspi zangezuricum, Silene chustupica, Astragalus agasii, Astragalus bylowae, Astragalus coelestis, Oxytropis armeniaca, Hypericum eleonorae, Scrophularia takhtajianii),*	*Darevskia armeniaca, Darevskia rostombekovi, Darevskia dahli, Darevskia portchinskii, Darevskia raddei, Darevskia nairensis, Darevskia valentinae, Chylotomus alexandri, Sphaerobothris aghababiani, Asias aghababiani, Mallosia caucasica*

Annex J: Wild Relatives of Principal Crops of Armenia

CROP NAME	Species name	CROP NAME	Species name
CEREALS		**LEGUMES**	
Wheat	Triticum araraticum Jakubz.	Lentil	*Lens orientalis* (Boiss.) Schmalh.
	T. boeoticum Boiss.		*L. ervoides* (Brign.) Grande
	T.urartu Thum.ex Gandil.	Liquorice	*Glycyrrhiza glabra* L.
Aegilops	*Aegilops crassa* Boiss.		*G. echinata* L.
	A. tauschii Cosson	Pea	P. sativum L. subsp. humile (Holmb.) Greut., Matthäs & Risse
	A. umbelullata Zhuk.		
	A. cylindrica Host		P. elatius M. Bieb.
	A. triuncialis L.		Vavilovia formosa (Steven) Fed.
	A. biuncialis Vis.	Grass pea	*Latirus cicera* L.
		Bitter vetch	*Vicia ervilia* (L.) Willd.
	IRISTATA WILLD.		
	A. columnaris Zhuk.	**OIL and/or FIBER CROPS**	
	A. mutica (Boiss.) Eig.	Safflower	Carthamus oxyacanthus
Rye	*Secale vavilovii* Grossh.		C. gypsicola Iljin
	S. montanum Guss.	Turnip	*Brassica rapa* L.
Barley	*Hordeum spontaneum* C.Koch	Rape	*Brassica napus* L.
	H. glaucum Steud.	Flax	*Linum bienne* Mill.
	H. murinum L.	Gold of pleasure	*Camelina sativa* L.
	H. geniculatum All.	Hemp	*Cannabis sativa* L.
	H. marinum Huds.	**CONDIMENTS**	
	H. violaceum Boiss. et Huet	Thyme	*Thymus kotschyanus* Boiss. & Hohen
	H. bulbosum L.	Summer savory	*Satureja hortensis* L.
	H. brasdanicum Gandil.	Tarragon	*Artemisia dracunculus* L.
FRUITS CROPS		Sumac	*Rhus coriaria* L.
Mountain ash	*Sorbus aucuparia* L.	Wormwood	***Artemisia absinthium* L.**
	S. haiastana Gabr.	Lemon balm	*Melissa officinalis* L.
	S. takhtadjanii Gabr.	Caraway	*Carum carvi* L.
	S. subfusca (Ledeb) Boiss.	Oregano	*Origanum vulgare* L.
Crataegus	*Crataegus orientalis* Pallas ex M. Bieb.	Brown mustard	*Brassica juncea* (L.) Czern.
	***C. pontica* C.Koch**	Hop	*Humulus lupulus* L.
Apple	*Malus orientalis* Uglitzk.	Coriander	*Coriandrum sativum* L.
Grape vine	*Vitis sylvestris* C.C.Gmelin	Mints	*Mentha longifolia* (L.) L.
Currants	*Ribes biebersteinii* Berland. ex DC.		*M. pulegium* L.

	R. armenum Pojark.			*M. arvensis* L.
Diospyros	*Diospyros lotus* L.		**VEGETABLES**	
Plum	*Prunus domestica* L.		Spinach	*Spinacia tetrandra* Steven ex M. Bieb.
	P. divaricata Ledeb.			*Beta vulgaris* subsp. *maritima* (L.) Arcang
	P. spinosa L.			*B. lomatogona* Fisch. et C.A.Mey
Pear	*Pyrus caucasica* Fed.			*B. macrorrhiza* Steven
	P. syriaca Boiss.			*B. corolliflora* Zoss. ex Battler
	P. takhtadzhianii Fed.		Carrot	*Daucus carota* L.
	P. medvedevii Rubtzov		Asparagus	*Asparagus officinalis* L.
	Mespilus germanica L.			*A. verticillatus* L.
Cornelian cherry	*Cornus mas* L.			*A. persicus* Baker
Pomegranate	*Punica granatum* L.		Garden cress	Lepidium sativum L.
Silver berries	*Elaeagnus angustifolia* L.		Chicory	*Cichorium intybus* L.
	E. orientalis L.		Leek	*Allium ampeloprasum* L.
	Ficus carica L.		Purslane	*Portulaca oleracea* L.
Wood strawberry	*Fragaria vesca* L.		Sorrel	*Rumex acetosa L.*
Raspberry	*Rubus idaeus* L.			*R. crispus* L.
Quince	*Cydonia oblonga* Mill.		Watermelon	*Citrullus colocynthis* (L.) Schrad.
Apricot	*Armeniaca vulgaris* Lam.			*Cucumis melo* L. subsp. *agrestis* (Naud.) Pangalo
Sea buckthorn	*Hippophaë rhamnoides* L.			
	Ziziphus jujuba Mill.			*Raphanus raphanistrum* L.
Rosa	*Rosa hemispherica* J. Herrm.		**NUT CROPS**	
Sweet cherry	*Cerasus avium* (L.) Moench		Almond	*Amygdalus nairica* Fed.&Takht.
Sour cherry	*Cerasus vulgaris* Mill.			*A. fenzliana* (Fritsch) Lipsky.
Bird cherry	*Padus racemosa* (Lam.) Gilib.		Hazel	*Corylus avellana* L.
Gooseberry	*Grossularia reclinata* (L.) Mill.		Walnut	*Juglans regia* L.

Annex K: Specially Protected Nature Areas of Armenia and their Main Protected Objects

No	Name	Date of establishment and No. of decree	Area and location	Management Entity	Staff in place, code, management plan	Protected object
State Reserves						
1	Khosrov Forest	13Sept1958, ArmSSR Council of Ministers Decree No. 341	23,878 ha Ararat Marz	MNP, Khosrov Forest State Reserve SNCO	Staff 71 employees Code approved Management plan approved	Protection of the Azat River water resources, juniper and oak, arid mountain vegetation (>50% of the flora of Armenia), rare animals (210 vertebrate species, 60 endemic species)
2	Shikahogh	13Sept1958, ArmSSR Council of Ministers Decree No. P-341 (the size of the territory approved 07Sept2006, Government Decree No. 1401-N)	12,137 ha Syunik Marz	MNP, Shikahogh State Reserve SNCO	Staff 33 employees Code approved. Management plan is awaiting approval.	Protection of oak, hornbeam and oak-hornbeam forests, oriental beech, yew, oriental plane and animals. 1074 species of vascular plants, Bezoar goat, Indian porcupine, Caucasian leopard
3	Erebuni	27May1981, ArmSSR Council of Ministers Decree No. 324	89 ha Kotayk Marz	MNP, Reserve-park Complex SNCO	Staff 3 employees Code approved Management plan is being developed.	Protection of the wild-growing relatives of cereals
National Parks						
4	Sevan	14March1978, ArmSSR Communist Party and Council of Ministers Decree No. 125 (the size of the territory approved 19Jan2007, Government Decree No. 205-N)	147,456 ha Gegharkunik Marz	MNP, Sevan National Park SNCO	Staff 212 employees Code approved Management plan approved	Protection of fresh water resources of the lake, fish stocks, natural and historical-architectural complexes; recreation and tourism activities
5	Dilijan	19Jan.2002, Government Decree No. 165, on the basis of Dilijan state reserve established by 13Sept1958, ArmSSR Council of Ministers Decree No. P-341(the size of the territory approved 19Jan2007, Government Decree No. 204-N)	33,765 ha Tavush Marz	MNP, Dilijan National Park SNCO	Staff 93 employees Code approved Management plan approved	Protection of oak and beech forests, medieval historical-architectural monuments

			State Sanctuaries		
6 Akhnabat Yew Grove	29Jan1959, ArmSSR Council of Ministers Decree No 20	25 ha Tavush Marz	MNP, Dilijan National Park SNCO	The staff of Gosh district (15 employees) is in charge Code approved No management plan	Relict yew (300-400 year old trees)
7 Pine of Banx	29Jan1959, ArmSSR Council of Ministers Decree No 20	4 ha Kotayk Marz	MoA, Hayantar SNCO (Hrazdan Forest Enterprise)	No special staff No Code No management plan	American pine of Banx
8 Aragats Alpine	29Jan1959, ArmSSR Council of Ministers Decree No 20	300 ha Aragatsotn Marz	Ministry of Economy, Institute of Physics	No special staff No Code No management plan	Alpine meadows, glacial Lake Kari
9 Arzakan and Meghradzor	16Nov1971, ArmSSR Council of Ministers Decree No 375	13,532 ha Kotayk Marz	MoA, Hayantar SNCO (Hrazdan Forest Enterprise)	No special staff No Code No management plan	Rare forest animals
10 "Arjatkhleni" Hazelnut	13Sept1958, ArmSSR Council of Ministers Decree No 341	40 ha Tavush Marz	MoA, Hayantar SNCO (Ijevan Forest Enterprise)	No special staff No Code No management plan	Relict hazelnut, yew
11 Boghakar	10August1989, ArmSSR Council of Ministers Decree No 400	2,728 ha Syunik Marz	MoA, Hayantar SNCO (Meghri Forest Enterprise)	No special staff No Code No management plan	Endemic and rare flora and fauna species
12 Gangzakar upper Aghdan	16Nov1971, ArmSSR Council of Ministers Decree No 375	6,813 ha Tavush Marz	MoA, Hayantar SNCO (Ijevan Forest Enterprise)	No special staff No Code No management plan	Forest animals
13 Getik	16Nov1971, ArmSSR Council of Ministers Decree No 375	5,728 ha Gegharkunik Marz	MoA Hayantar SNCO (Chambarak Forest Enterprise)	No special staff No Code No management plan	Forest animals

14	Juniper Open Woodlands of Sevan	13Sept1958, ArmSSR Council of Ministers Decree No 341	3,312 ha Gegharkunik Marz	MNP, Sevan National Park SNCO	Staff of Varenis branch (37 employees) is in charge Code approved No management plan	Relict juniper and oaks, various species of plants and animals
15	Goris	1972	1,850 ha Syunik Marz	MoA, Hayantar SNCO (Goris Forest Enterprise)	No special staff No Code No management plan	Forest animals
16	Goravan Sands	29Jan1959, ArmSSR Council of Ministers Decree No 20	95 99 ha Ararat Marz	MNP, Khosrov Forest State Reserve SNCO	Staff 2 employees Code approved No management plan	Sand desert ecosystem with unique species of plants and animals
17	Gyulagarak Pine	13Sept1958, ArmSSR Council of Ministers Decree No 341	2,576 ha Lori Marz	MoA, Hayantar SNCO (Stepanavan Forest Enterprise)	No special staff No Code No management plan	Relict pine Forests
18	Yeghegis	16Nov1977, ArmSSR Council of Ministers Decree No 375	4,200 ha Vayots Dzor Marz	MoA, Hayantar SNCO (Yeghegnadzor Forest Enterprise)	No special staff No Code No management plan	Forest animals
19	Ijevan	19April1971, ArmSSR Council of Ministers Decree No 212	5,908 ha Tavush Marz	MoA, Hayantar SNCO (Ijevan Forest Enterprise)	No special staff No Code No management plan	Forest animals
20	Gandzakar-upper Aghdan	19April1971, ArmSSR Council of Ministers Decree No 212	6,813 ha Tavush Marz	MoA, Hayantar SNCO (Ijevan Forest Enterprise)	No special staff No Code No management plan	Forest animals
21	Hankavan hydrological	23March1981, ArmSSR Council of Ministers Decision No 148	9,350 ha Kotayk Marz	MoA, Hayantar SNCO	No staff No Code No management plan	Hankavan mineral water

22 Her-Her open Woodland	13Sept1958, ArmSSR Council of Ministers Decree No 341	6,139 ha Vayots Dzor Marz	MoA, Hayantar SNCO (Yeghegis Forest Enterprise)	No special staff No Code No management plan	Relict juniper forest
23 Margahovit	19April1971, ArmSSR Council of Ministers Decree No 212	3,368 ha Lori Marz	MoA, Hayantar SNCO (Gugark Forest Enterprise)	No special staff No Code No management plan	Forest animals
24 Caucasian Rose-bay	29Jan1959, ArmSSR Council of Ministers Decree No 20	1,000 ha Lori Marz	MoA, Hayantar SNCO (Gugark Forest Enterprise)	No special staff No Code No management plan	Relict Caucasian rhododendron
25 Ararat Vordan Karmir	03Feb1987, ArmSSR Council of Ministers Decree No 61	219 85 ha Armavir Marz	MNP, Reserve-park Complex SNCO	Staff 6 employees Code approved No management plan	Endemic insect Cochineal
26 Jermuk	13Sept1958, ArmSSR Council of Ministers Decree No 341	3,865 ha Vayots Dzor Marz	MoA, Hayantar SNCO (Jermuk Forest Enterprise)	No special staff No Code No management plan	Oak forests, rare animals
27 Jermuk hydrological	23March1981, ArmSSR Council of Ministers Decree N148	18,000 ha Vayots Dzor Marz	MoA, Hayantar SNCO	No staff No Code No management plan	Jermuk mineral water
28 Plane Grove	29Jan1959, ArmSSR Council of Ministers Decision No 20	64 2 ha Syunik Marz	MNP, Shikahogh State Reserve SNCO	Staff 5 employees Code approved No management plan	Only natural grove of oriental plane in the Caucasus
29 Sev Lich	12Oct2001, Government Decree No 976, on the basis of Sev Lich state reserve established by 15Oct1987, ArmSSR Council of Ministers Decree No 717	240 ha Syunik Marz	MNP, Reserve-park Complex SNCO	No staff No Code No management plan	Water resources of volcanic lake, alpine meadows, important plant and animal species
30 Khor Virap	25Jan2007, Decision of Government of RA No 925-N	50 28 ha Ararat marz	MNP, Khosrov Forest State Reserve SNCO	Staff 3 employees Code approved No management plan	Wetland ecosystems and typical wetland species of plants and animals

Planned Protected Areas

31	Zangezur State Sanctuary	about 15,000 ha Syunik Marz	Protection of rare and threatened flora and fauna species: Caucasian leopard, bezoar goat, Armenian mouflon
32	Arevik National Park	about 29,000 ha Syunik Marz	Protection of landscape and biodiversity; 1500 species of vascular plants, 245 species of vertebrates
33	Lake Arpi National Park	about 60,000 ha Shirak Marz	Protection of unique biodiversity of Javakhq-Shirak Plateau and Lake Arpi Basin; stopover and nesting area for migratory birds The only habitat in the world for Darevsky's viper
34	Jermuk National Park	Vayots Dzor Marz	Protection of natural mineral springs and habitats for the Caucasian leopard, bezoar goat, reptiles
35	Vorotan State Sanctuary	about 24,000 ha Syunik Marz	Protection of natural ecosystems, landscape, and biodiversity; recreational capacities and natural heritage
36	Gnishik National Park	about 15,000 ha Vayots Dzor Marz	Protection of rich biodiversity of rare and endemic species, unique hydrological and geological objects 960 species of vascular plants, 240 species of vertebrates
37	Kirants State Sanctuary	Tavush Marz	Protection of rich landscape diversity; ecotourism development

Annex L: Comparison of Threats to SPNAs Recorded in the Biodiversity Assessment for Armenia (2000) with the Current Situation

Threats to SPNAs (2000)	**Current Situation (2008)**	
	Progress	**Challenges**
Many important and characteristic ecosystems are not represented within the PA network.	- "Strategy on Developing Specially Protected Areas and National Action Plan 2003-2010" proposes to establish 11 new SPNAs. - Establishment of Khor Virab State Sanctuary in 2007 - Project, "Establishment of Lake Arpi National Park" funded by KfW (Germany) launched in 2006 - Proposals for establishment of Arevik, Jermuk, and Gnishik National Parks and Kirants, Zangezur, and Vorotan State Sanctuaries are in progress.	Additional IBAs and other important habitats must still be included in the PA network. Main challenges to accomplishing this are budgetary and staff limitations.
The borders of PAs have not been designed appropriately to take into account factors such as topography, altitudinal variation, and distribution patterns.	Since 2005, activities aimed at revision and accurate definition of boundaries, and mapping of PAs are being undertaken, funded from the state budget. This is projected to be completed in 2012. Maps and border delineation of Sevan and Dilijan National Parks were approved by Government in 2007. Maps and border delineation of Khosrov and Shikahogh have been submitted for approval.	Even in cases where there are maps and accurate definition of boundaries, it is important to protect against land use changes and land usurpation, inappropriate livestock grazing, unsustainable forest product collection, poaching, and other illegal/unsustainable activities, especially in sanctuaries.

The protection status of state reserves and conservation areas is generally not enforced, and human activities such as farming and recreation occur in reserves.	Some positive changes occurred: human activities such as farming, logging, poaching, illegal fisheries, land usurpation, and hay making have decreased in most SPNAs.	Positive changes must be maintained; challenges are as above. In addition, the economic crisis and the consequent high unemployment could exacerbate the problem of illegal activities.
PAs lack effective administration and conservation management regimes, and have insufficient staff and resources.	Approved management plans have been developed and approved for Sevan and Dilijan National Parks. Approval is pending for management plans for Khosrov Forest and Shikahogh State Reserves; and the management plan for Erebuni State Reserve is being developed.	No sanctuary has a management plan, and only six of them (Sev Lich, Vordan Karmir, Plane Grove, Gorovan Sands, Khor Virap, and Gilan) have their approved statutes. In spite of some positive steps, the situation remains similar to 2000. Once management plans are approved, implementation will be a challenge, including staff capacity and funding limitations.
The legal framework for PA management is poor or totally lacking, and regulations or limits on use of natural resources do not exist.	- New law on "Specially Protected Nature Areas" (2006) - "Strategy on Developing Specially Protected Areas and National Action Plan 2003-2010" approved in 2002 by the Government Decree No. 54 - Regulations on SPNA monitoring were adopted by Government Decree N 1044-N of 30 August 2007 - Codes of 13 SPNAs have been developed and approved as of December 2008	All PAs must have approved management plans (except for natural monuments); management plans must be implemented. All natural monuments must have passports. Law enforcement continues to be weak. Sustainable use of natural resources and community benefit from PAs are still limited.
Natural monuments have not yet been officially registered and an inventory of sites has not been completed.	The list of Armenian natural monuments was approved by the Government Decree N 967 - N of 14 August 2008	The administrative responsibility is still uncertain, and protection of monuments is lacking. The list of Armenian natural monuments should be enlarged and additional studies are required for expansion of the list and for adequate protection.

Annex M: Priority Conservation Areas (PCAs) of Armenia According to Caucasus Ecoregion Conservation Plan

(From: PRIORITY CONSERVATION AREAS AND CORRIDORS IN THE CAUCASUS ECOREGION, ECP-2006)

MEGHRI
Location: Southeastern part of the Lesser Caucasus mountain chain, Meghri Mountain Range, left bank of Araz (Araks) River
Longitude: 46o 22'04" Latitude: 39o 02'59"
Area: 74,931 ha
Econet: Lesser Caucasus
Countries: Armenia
Main Biomes: Forest, high mountain
Main Habitats: Forest – 38,718 ha (51.67%), including 24,447 ha of southeast Caucasian middlemountain
beech forests alternating with hornbeam-oak forests and secondary grasslands, and 14,272 ha of southeastern Caucasian low-mountain hornbeamoak, oak forests, and secondary dry shrublands (open communities of juniper); total high mountain habitats – 22,346 ha (29.82%), including 16,667 ha (22.24%) of Caucasian sub-alpine meadows, tall-herbaceous communities, elfin woods, and thickets; 12,304 ha (16.42%) of grasslands, mainly mixed with Armenian-Iranian low-mountain semi-deserts and dwarf-shrub vegetation – 11,674 ha (15.58%)
Land Use/Land Cover: Urban areas and rural settlements – 587 ha (0.78%); farmlands – 27,135 ha (36.21%); summer pastures – 13,695 ha (18.28%); rivers – 550 ha (0.73%); shrublands - 20 ha (0.03%); actual forest cover - 32,944 ha (43.97% of PCA's area)

ZANGEZUR
Location: Southeastern part of the Lesser Caucasus mountain chain, Zangezur Range
Longitude: 45o 50'12" Latitude: 39o 06'22"
Area: 206,674 ha
Econet: Lesser Caucasus
Countries: Armenia, Azerbaijan/Nakhchyvan Autonomy
Main Biomes: High mountain, semi-deserts
Main Habitats: Total high mountain habitats – 104,256 ha (50.44%), including 50,272 ha of Caucasian sub-alpine meadows, tall-herbaceous communities, and thickets, and 34,637 ha of mountain plateau stony deserts, semi-deserts, and dry dwarfshrub

vegetation; rock vegetation – 9,320 ha (4.51%), surrounded by 84,982 ha (41.12%) of semi-arid landscapes, including 77,310 ha (37.41%) of low-mountain semi-deserts and dwarf-shrub vegetation
Land Use/Land Cover: Urban areas and rural settlements – 2,100 ha (1.02%); farmlands (arable lands) – 95,205 ha (46.07%); pastures (mainly summer) – 86,843 ha (42.01%); rocks – 9,320 ha (4.51%); rivers – 1,315 ha (0.64%); actual forest cover – 11,891 ha (5.75%)
Protected Areas: Three PAs totaling 42,728 ha (20.67%); IUCN II: Ordubad National Park – 12,131 ha (5.87%) (Azerbaijan); other PAs: sanctuaries – Bokhara (Armenia) – 2,728 ha (1.34%), Ordubad (Azerbaijan) – 27,869 ha (13.49%); total other PAs – 30,597 ha (14.80%)
Key Phenomena: Habitat and migration corridor of large ungulates and carnivores (Panther pardus) along the Lesser Caucasus
Focal Species: Panther pardus, Ursus arcos, Capra aegagrus, Ovis ammon, Tetrao mlokosiewiczi, Pelobates syriacus
Species of Special Concern: Rhinolophus mehelyi, R. euryale, Lutra lutra
Population Density: Low
Resource Dependence: High
Threats: Poaching, overgrazing
CEPF Site Outcomes: Meghri (124), Ordubad Sanctuary (126), Ordubad (128)

ARASBARAN
Location: Southeastern end of the Lesser Caucasus mountain chain, right bank of Araz (Araks) River Longitude: 46o 42'18" Latitude: 38o 53'13"
Area: 148,196 ha
Econet: Lesser Caucasus Forest
Countries: Iran
Main Biomes: High mountain, forest
Main Habitats: Total high mountain habitats – 106,562 ha (71.91%), including 75,705 ha (51.08%) of Iranian upper and middle plateau with steppes and semi-deserts and 30,857 ha (20.82%) of Near East high-mountain landscapes with meadows-steppes and fragments of sub-alpine meadows; semi-arid landscapes – 29,744 ha (20.07%), including 16,638 ha of Armenian-Iranian low-mountain semi-deserts, dwarf-shrub vegetation, and partly shrublands; as well as Botriochloa and Stipa steppes, dry shrublands (shibliak), dwarf-shrub (phrygana) vegetation, and semidesert – 6,012 ha, and southern Caucasian middle-mountain meadows, meadow-steppes, and steppes, dry shrublands, and dwarf-shrub vegetation – 7,093 ha (4.79%)
Land Use/Land Cover: Rural settlements – 2,245 ha (1.51%); farmlands – 60,943 ha (41.12%); winter pastures – 12,286 ha (8.29%); summer pastures – 28,388 ha (19.16%); rocks – 545 ha (0.37%); rivers – 1,247 ha (0.84%); actual forest cover – 42,542 ha (28.71%)
Protected Areas: One PA: Arasbaran (Biosphere Reserve) – 72,460 ha (48.89%)
Key Phenomena: Rare plant community (Quercus araxina); important habitats for Capra aegagrus, Ovis ammon
Focal Species: Capra aegagrus, Ovis ammon, Ursus arctos, Panthera pardus, Aquila heliaca, Marmaronetta angustirostris, Oxyura leucocephala, Tetrao mlokosiewiczi
Species of Special Concern: Rhinolophus mehelyi, R. hipposideros; Lutra lutra, Lynx lynx
Population Density: Moderate
Resource Dependence: Moderate, high in parts
Threats: Forest fragmentation, illegal logging, illegal hunting, overgrazing
CEPF Site Outcomes: Karakose (160)

NORAVANK
Location: Middle part of eastern section of the Lesser Caucasus mountain chain, Noravank River Valley
Longitude: 45o 18'48" Latitude: 39o 38'06"
Area: 24,430 ha
Econet: Lesser Caucasus
Countries: Armenia
Main Biomes: High mountain
Main Habitats: Total high mountain habitats – 12,821 ha (52.48%), including mountain meadows, high mountain steppes, and meadow-steppes – 9,051 ha (37.05%), and Caucasian alpine grasslands – 1,917 ha (7.85%); lower belts - 11,565 ha (47.34%) of semi arid ecosystems – Armenian-Iranian low-mountain semideserts and dwarf-shrub vegetation
Land Use/Land Cover: Rural settlements – 147 ha (0.60%); farmlands (mainly arable lands) – 13,522 ha (55.36%); summer pastures – 10,023 ha (41.02%); rocks – 575 ha (2.35%); open juniper woodlands – 163 ha (0.67%)
Protected Areas: None
Key Phenomena: Important habitats of large mammals
Focal Species: Panthera pardus, Ovis ammon, Capra aegagrus
Species of Special Concern: Rhinolophus euryale, Lynx lynx
Population Density: Low
Resource Dependence: High
Threats: Overgrazing, poaching
CEPF Site Outcomes: Noravank (125)

AGRI DAGI AND ARMASH
Location: Agri (Ararat) Mountain, the Araz (Araks) River Valley, between the town of Artashat in Armenia and Agh Gul Lake in Iran, forms the eastern border, the western border is the western slopes of Zor Dagi Mountain
Longitude: 44o 21'48" Latitude: 39o 41'28"
Area: 271,669 ha
Econet: Javakheti-Asia Minor, Kura- Araz (Araks) Lowlands and Iori Basin
Countries: Turkey, Armenia, Azerbaijan, Iran
Main Biomes: Mountain steppes
Main Habitats: Total mountain landscapes – 256,975 ha (94.59%), including 31,011 ha of high mountain landscapes (mainly Caucasian alpine grasslands – 21,793 ha) and 225,964 ha (or 83.18% of PCA's area) of middle mountain landscapes including 90,163 ha of Anatolian middle and upper mountain steppes and 68,958 ha of Agri Dagi (Ararat) mountain plateau stony deserts, semi-deserts, and dry dwarfshrub vegetation
Land Use/Land Cover: Rural settlements – 944 ha (0.35%); farmlands – 152,798 ha (56.25%); pastures (summer – 33,516 ha and winter – 63,430 ha) – 96,946 ha (35.69%); barren and rocky area – 6,416 ha (2.36%); mires - 8,365 ha (3.08%); lakes – 2,902 ha (1.06%), rivers – 2,500 ha (0.92%); forests – 797 ha (0.29%)
Protected Areas: One PA, IUCN II: Agri Mountain National Park – 80,908 ha (29.78%) (Turkey)
Key Phenomena: Congregations of waterfowl, habitats of narrow-ranged snakes and mammals
Focal Species: Ursus arctos, Ovis ammon, Capra aegagrus, Marmaronetta angustirostris, Oxyura leucocephala, Phalacrocorax pygmeus
Species of Special Concern: Rhinolophus hipposideros, R. euryale, Myotis schaubi; Lutra lutra
Population Density: Low

Resource Dependence: High
Threats: Overgrazing
CEPF Site Outcomes: Armash (145), Armash Fish-Farm (147), Maku (149), Agh-Gel (150), Igdir Plain
(154), North-East Ararat (158), Ararat (159)

KHOSROV
Location: Southeastern from Yerevan city, Gegam Mountain Range in the southern part of central Armenia
Longitude: 44o 56'27" Latitude: 40o 06'15"
Area: 201,590 ha
Econet: Javakheti-Asia Minor
Countries: Armenia
Main Biomes: High mountain
Main Habitats: Total high mountain habitats – 147,026 ha (72.93%), including 59,001 ha of mountain meadows, high mountain steppes, and meadow-steppes, 44,452 ha of Caucasian alpine grasslands, and 31,278 ha of Armenian volcanic highlands with steppes and meadow-steppes mixed with wetlands; freshwater ecosystems mainly mires – 1,047 ha); more than 25% – Armenian-Iranian low-mountain semi-deserts and dwarf-shrub vegetation (25,646 ha) and dry grasslands, totaling – 51,232 ha
Land Use/Land Cover: Rural settlements – 538 ha (0.27%); farmlands – 11,418 ha (5.66%); pastures (winter) – 41,994 ha (20.83%); pastures (summer) – 123,415 ha (61.22%); rocks – 2,191 ha (1.09%); shrub communities – 17,654 ha (8.76%); lakes and reservoirs – 256 ha (0.13%); mires – 791 ha (0.39%); forests – 3,333 ha (1.65%)
Protected Areas: Two PAs totaling 29,396 ha (14.58%); IUCN I-II: Khosrov Forest Strict Nature Reserve – 29,196 ha (14.48%); other PAs: Sands of Gorovan Sanctuary – 200 ha (0.10%)
Key Phenomena: Important site for migration of large mammals; juniper woodlands with rare relict species
Focal Species: Panthera pardus, Ursus arctos, Ovis ammon, Capra aegagrus, Aegypius monachus, Pelobates syriacus.
Species of Special Concern: Rhinolophus mehelyi, R. hipposideros, Myotis schaubi
Population Density: Low
Resource Dependence: Moderate
Threats: Habitat fragmentation, poaching, overgrazing
CEPF Site Outcomes: Khosrov NR (120), Gndasar (121), Armash (145), Goravan Sands Sanctuary (146)

PAMBAK-SEVAN
Location: Northern section of the eastern part of Lesser Caucasus mountain chain, around Lake Sevan, Pambak Range in central Armenia
Longitude: 45o 02'33" Latitude: 40o 41'33"
Area: 552,691 ha
Econet: Lesser Caucasus, Javakheti-Asia Minor
Countries: Armenia
Main Biomes: Forest, high mountain, freshwater
Main Habitats: Forest – 179,080 ha (32.40%), including 147,552 ha of southeastern Caucasian middle-mountain beech forests alternating with hornbeam-oak, partly with pine forests and secondary grasslands; forested area – 195,618 ha (35.39%), including plantations; total high mountain habitats – 171,431 ha (31.02%), including 133,251 ha of Caucasian sub-alpine meadows and thickets;

semiarid landscapes – 75,436 ha (13.65%), including 36,847 ha of southern Caucasian middle-mountain meadows, meadow-steppes, and steppes, dry shrublands, and dwarf-shrub vegetation
Land Use/Land Cover: Urban areas and rural settlements – 8,439 ha (1.53%), including 6,392 ha of rural settlements (villages); farmlands – 95,022 ha (17.19%); summer pastures – 123,809 ha (22.40%); winter pastures – 25 ha; rocks – 3,038 ha (0.55%); lakes and reservoirs – 126,741 ha (22.93%), including 125,759 ha of Lake Sevan; shrub communities – 1,825 ha (0.33%); forests – 193,792 ha (35.07%)
Protected Areas: 11 PAs totaling 236,891 ha; IUCN II: Dilijan National Park – 24,000 ha (4.34%); other PAs: Sevan National Park – 150,100 ha (27.16%); sanctuaries – Idjevan – 7,800 ha (1.41%), Gandzakar – 6,800 ha (1.23%), Getik – 6,000 ha (1.09%), Juniper Forests – 3,312 ha (0.6%), Rose Bay Rhododendron – 10,000 ha (1.81%), Margaovit – 5,000 ha (0.9%), Hankavan – 9,350 ha (1.69%), Arzakan and Meghradzor – 14,500 ha (2.63%), Banx Pine – 4 ha, Akhnabat – 25 ha (both less than 0.001%); total other PAs – 212,891 ha (38.5%) Key Phenomena: Rare plant communities (Sambucus tigranii, Quercus araxina); habitat of endemic Sicista armenica
Focal Species: Ursus arctos, Capra aegagrus, Aquila heliaca, Tetrao mlokosiewiczi
Species of Special Concern: Rhinolophus hipposideros, R. mehelyi, Barbastella barbastellus; Lynx lynx, Lutra lutra
Population Density: Moderate, partly high
Resource Dependence: High
Threats: Illegal logging, illegal fishing, unsustainable water use and improper irrigation, overgrazing
CEPF Site Outcomes: Dsegh-Haghartsin-Pambak Chain and Dilijan NP (117), Lake Sevan (118), Shakhdag Range (119), Ara Mount (173)

JAVAKHETI
Location: Javakheti Highland and Javakheti Mountains, between Childir, Kartsakhi (Hozapini) and Paravani lakes
Longitude: 43o 35'53" Latitude: 41o 12'11"
Area: 322,994 ha
Econet: Javakheti-Asia Minor
Countries: Georgia, Armenia, Turkey
Main Biomes: High mountain, freshwater
Main Habitats: Total high mountain habitats – 287,574 ha (89.03%), including 169,322 ha (52.42% of PCA's area) of Caucasian sub-alpine meadows, tall-herbaceous communities, elfin woods, and thickets; other main habitats: Javakheti-Armenian plateau with steppe and meadow-steppe vegetation – 78,303 ha (24.24%) and Caucasian alpine grasslands and rhododendron thickets – 39,949 ha (12.37%); freshwater ecosystems – 25,447 ha (7.88%), including 23,760 ha of lakes
Land Use/Land Cover: Rural settlements – 5,096 ha (1.58%); arable lands – 83,456 ha (25.84%); summer pastures – 208,305 ha (64.5%); rocks – 690 ha (0.21%); lakes and reservoirs – 23,760 ha (7.35%); mires – 1,688 ha (0.52%)
Protected Areas: None
Key Phenomena: Stopover site for migratory birds, large aggregations of migratory birds; breeding place of waterbirds, including large population of white stork (Ciconia ciconia) and an isolated breeding population of White-Winged Scoter (Melanitta fusca)
Focal Species: Capra aegagrus, Aquila heliaca.
Species of Special Concern: Lutra lutra
Population Density: Low
Resource Dependence: Moderate
Threats: Improper irrigation, overgrazing
CEPF Site Outcomes: Javakheti Range (Arm) (104), Amasia (106), Paravani Lake (107), Javakheti Range (Geo) (108), Saghamo Lake (109), Madatapa Lake (110), Bugdasheni

Lake (111), Khanchali Lake (112), Kartsakhi Lake (113), Aktas Lake (114), Erakatar (115), Childir Lake (116)

IGDIR PLAIN AND ARMAVIR
Location: Upper part of Araz (Araks) River valley
Longitude: 43o 20'59" Latitude: 40o 02'33"
Area: 403,170 ha
Econet: Javakheti-Asia Minor, Kura- Araz (Araks) Lowlands and Iori Basin
Countries: Turkey, Armenia
Main Biomes: High mountain, freshwater
Main Habitats: Total high mountain habitats – 370,328 ha (91.85%), including 226,787 ha (56.25% of PCA's area) of Anatolian middle- and upper-mountain steppes and 118,791 ha (29.46%) of mountain plateau landscapes with stony deserts, semideserts, and dry dwarf-shrub vegetation; freshwater ecosystems – 27,296 ha (6.77%), mainly floodplains with wetlands, forests and grasslands, and salt marshes – 24,232 ha (6.01%)
Land Use/Land Cover: Urban areas and rural settlements (mainly rural settlements) – 7,467 ha (1.85%); farmlands (mainly arable lands) – 224,504 ha (55.68%); pastures (winter) – 102,762 ha (25.48%); pastures (summer) – 46,153 ha (11.45%); rocks – 12,766 ha (3.17%); rivers – 3,940 ha (0.98%); lakes – 1,358 ha (0.34%); mires – 1,483 ha (0.37%); forests – 2,737 ha (0.68%)
Protected Areas: Two PAs totaling 18,800 ha (4.66%): Vordan Karmir Sanctuary (Armenia) – 200 ha (0.05%), Kaghizman (Turkey) – 18,600 ha (4.61%)
Key Phenomena: Rare plant communities (Sambucus tigranii, Zelkova carpinifolia)
Focal Species: Ursus arctos, Capra aegagrus, Rupicapra rupicapra, Marmaronetta angustirostris, Aegypius monachus
Species of Special Concern: Myotis schaubi, Rhinolophus hipposideros, R. mehelyi, R. ferrumequinum; Lutra lutra
Population Density: Moderate, high in parts
Resource Dependence: High
Threats: Overgrazing
CEPF Site Outcomes: Araks River (144), Igdir Plain (154), Karakose (157)
Priority Conservation Corridors (ECP)

MANGLISI – PAMBAK-SEVAN
Location: Between Manglisi and Pambak-Sevan PCAs, Trialeti Mountain Chain
Longitude: 44o 16'18" Latitude: 41o 26'12"
Area: 124,359 ha
Countries: Georgia, Armenia

Main Biomes: Forest
Main Habitats: Southeastern Caucasian middle-mountain beech forests alternating with hornbeam-oak, pine forests, and secondary grasslands – 97,923 ha (78.74%) and southeastern Caucasian low-mountain hornbeam-oak forests, oak forests, and secondary dry shrublands – 19,774 ha (15.9%); Javakheti-Armenian Plateau steppe and meadow-steppe vegetation – 2,627 ha (2.11%); actual forest cover – 109,377 ha (87.95%)
Land Use/Land Cover: Urban areas – 401 ha (0.32%); rural settlements – 3,007 ha (2.42%); farmlands – 10,102 ha (8.12%), summer pastures – 1,129 ha (0.91%)
Protected Areas: None
Key Phenomena: Locally significant for wildlife migrations and gene flow
Focal Species: Ursus arctos

Species of Special Concern: Rhinolophus hipposideros, Myotis emarginatus, Barbastella barbastellus, Lynx lynx
Threats: Illegal logging, overgrazing
CEPF Site Outcomes: None

JAVAKHETI – IGDIR PLAIN AND ARMAVIR
Location: Between Javakheti and Igdir Plain and Armavir PCAs, Arpachay River Valley on the border between Armenia and Turkey
Longitude: 43o 34'53" Latitude: 40o 35'24"
Area: 221,531 ha
Countries: Turkey, Armenia
Main Biomes: High mountain, freshwater
Main Habitats: Agri Dagi (Ararat) mountain plateau stony deserts, semi-deserts, and dry dwarfshrub vegetation – 81,348 ha (36.72%); Javakheti-Armenian Plateau steppe and meadow-steppe vegetation – 73,674 ha (33.26%); Anatolian middle and upper mountain steppe – 34,050 ha (15.37%); freshwater habitats within the Armenian highland volcanic plateau landscapes with steppes and meadow-steppes mixed with wetlands – 13,216 ha (5.97%); reservoirs and ponds – 4,564 ha (2.06%)
Land Use/Land Cover: Rural settlements – 4,350 ha (1.96%); farmlands – 107,557 ha (48.55%); vineyards and orchards – 5,576 ha (2.52%); summer pastures – 12,905 ha (5.83%); winter pastures – 74,595 ha (33.67%); rock and scree communities – 9,136 ha (4.12%)
Protected Areas: None
Key Phenomena: Regionally significant wildlife migration and gene flow among populations
Focal Species: Capra aegagrus, Ursus arctos
Species of Special Concern: Rhinolophus mehelyi, R. hipposideros, R. euryale, Myotis emarginatus, Lutra lutra
Threats: Overgrazing
CEPF Site Outcomes: Amasia (106), Araks River (144), Ani (175)

PAMBAK-SEVAN – MOUNT GYAMYSH
Location: Between Pambak-Sevan and Mount Gyamysh PCAs, on mountains along the Armenia-Azerbaijan border
Longitude: 45o 29'09" Latitude: 40o 39'06"
Area: 120,500 ha
Countries: Armenia, Azerbaijan
Main Biomes: Forest
Main Habitats: Southeastern Caucasian middle-mountain beech forests alternating with hornbeam-oak and pine forests and secondary grasslands – 63,790 ha (52.94%); southeastern Caucasian low-mountain hornbeam-oak and oak forests, and secondary dry shrublands – 18,502 ha (15.35%); Caucasian upper-mountain birch and pine forests – 17,313 ha (14.37%); Caucasian sub-alpine meadows, tall-herbaceous communities, elfin woods, and thickets – 15,457 ha (12.83%); actual forest cover – 68,381ha (56.75%)
Land Use/Land Cover: Rural settlements – 3,406 ha (2.83%); farmlands – 32,734 ha (27.17%); summer pastures – 15,978 ha (13.26%)
Protected Areas: None
Key Phenomena: Locally important for wildlife migration and gene flow among populations
Focal Species: Ursus arctos, Tetrao mlokosiewiczi
Species of Special Concern: Rhinolophus mehelyi, R. hipposideros, R. euryale, Myotis emarginatus, Barbastella barbastellus, Lynx lynx, Lutra lutra
Threats: Illegal hunting, illegal logging, overgrazing
CEPF Site Outcomes: None

PAMBAK-SEVAN – KHOSROV
Location: Between Pambak-Sevan and Khosrov PCAs
Longitude: 44o 52'16" Latitude: 40o 28'53"
Area: 38,897 ha
Countries: Armenia
Main Biomes: High mountain
Main Habitats: Armenian high mountain steppe and meadow-steppe, transitional to mountain meadows – 21,959 ha (56.45%); Armenian highland steppe and meadow-steppe with wetlands on volcanic plateau – 5,094 ha (13.1%); southern Caucasian middle-mountain steppes, dry shrublands, and dwarf-shrub vegetation with mountain semi-desert – 9,855 ha (25.34%)
Land Use/Land Cover: Cities – 614 ha (1.58%); rural settlements – 1,446 ha (3.72%); farmlands, pastures, and hayfields – 22,880 ha (58.82%); summer pastures – 13,809 ha (35.50%)
Protected Areas: One PA: Sevan National Park (IUCN I-II) – 529 ha (1.36%)
Key Phenomena: Locally important for wildlife migration and gene flow among populations
Focal Species: Ursus arctos, Pelobates syriacus
Species of Special Concern: Rhinolophus mehelyi, R. hipposideros, R. euryale, Myotis emarginatus, Barbastella barbastellus
Threats: Illegal hunting, illegal logging, overgrazing
CEPF Site Outcomes: Dsegh-Haghartsin-Pambak Chain and Dilijan National Park (117)

IGDIR PLAIN AND ARMAVIR – AGRI DAGI AND ARMASH
Location: Between Igdir Plain and Armavir and Agri Dagi (Ararat) and Armash PCAs, the border between Armenia and Turkey in the Araz (Araks) River Valley
Longitude: 44o 30'27" Latitude: 39o 55'45"
Area: 14,661 ha
Countries: Turkey, Armenia
Main Biomes: Freshwater
Main Habitats: Agri Dagi (Ararat) mountain plateau with stony deserts, semi-deserts, and dry dwarf-shrub vegetation – 9,033 ha (61.61%); floodplain wetlands, grasslands, and salt marshes – 5,625 ha (38.37%)
Land Use/Land Cover: Rural settlements – 164 ha (1.12%); farmlands – 6,314 ha (43.07%); vineyards
– 709 ha (4.84%); winter pastures – 6,803 ha (46.40%); rivers and mires – 671 ha (4.57%)
Protected Areas: None
Key Phenomena: Regionally important wildlife migration and gene flow among populations
Focal Species: None
Species of Special Concern: Rhinolophus mehelyi, R. hipposideros, R. euryale, Myotis emarginatus, Lutra lutra
Threats: Overgrazing
CEPF Site Outcomes: Armash (145), Igdir Plain (154), North-East Ararat (158)

NORAVANK – BICHANEK
Location: Between Noravank and Bichanek PCAs, on the border between Armenia and Nakhchyvan (Azerbaijan)
Longitude: 45o 26'07" Latitude: 39o 31'52"
Area: 39,837 ha
Countries: Armenia, Azerbaijan
Main Biomes: High mountain

Main Habitats: Armenian highland volcanic plateau with steppe and meadow-steppe interspersed with wetlands – 13,526 ha (33.95%); Caucasian sub-alpine meadows, tall-herbaceous communities, elfin woods, and thickets –- 4,802 ha
(12.05%); Armenian-Iranian low-mountain semi-deserts, dwarf-shrub vegetation, and shrublands in areas – 12,852 ha (32.26%); rock and scree communities –
103 ha
Land Use/Land Cover: Rural settlements – 660 ha (1.66%); farmlands – 24,041ha (60.35%), including
11,489 ha of farmlands with orchards; summer pastures – 14,450 ha (36.27%);
dry open woodland – 583 ha (less than 2%)
Protected Areas: None
Key Phenomena: Regionally important wildlife migration and gene flow among populations
Focal Species: Ovis ammon, Capra aegagrus, Panthera pardus, Ursus arctos
Species of Special Concern: Lynx lynx, Rhinolophus mehelyi, R. hipposideros, R. euryale, Myotis emarginatus
Threats: Illegal hunting, overgrazing
CEPF Site Outcomes: None

KHOSROV – NORAVANK
Location: Between Khosrov and Noravank PCAs, on the border between Armenia and Nakhchyvan (Azerbaijan)
Longitude: 45o 05'37" Latitude: 39o 44'56"
Area: 15,338 ha
Countries: Armenia, Azerbaijan
Main Biomes: High mountain
Main Habitats: Armenian-Iranian low-mountain semi-deserts, dwarf-shrub vegetation, and shrublands in areas – 14,033 ha (91.49%); rock and scree communities – 902 ha (5.88%)
Land Use/Land Cover: Rural settlements – 253 ha (1.65%); farmlands, pastures, and hayfields – 10,763 ha (70.17%); orchards – 106 ha (0.69%); summer pastures – 999 ha (6.51%); winter pastures – 2,314 ha (15.08%)
Protected Areas: None
Key Phenomena: Regionally important wildlife migration and gene flow among populations
Focal Species: Ovis ammon, Capra aegagrus, Panthera pardus.
Species of Special Concern: Lynx lynx, Rhinolophus mehelyi, R. hipposideros, R. euryale, Myotis emarginatus
Threats: Illegal hunting, overgrazing
CEPF Site Outcomes: Noravank (125), Sardarak Caves (129)

KHOSROV – BICHANEK
Location: Between Khosrov and Bichanek PCAs, central Armenia
Longitude: 45o 30'49" Latitude: 39o 47'09"
Area: 92,171 ha
Countries: Armenia
Main Biomes: High mountain
Main Habitats: Armenian mountain meadow and high mountain steppe and meadow-steppe – 23,747 ha (25.76%); Caucasian sub-alpine landscapes with a combination of meadows, tall-herbaceous communities, elfin woods, and thickets – 15,602 ha
(16.93%), Caucasian alpine landscapes with grasslands and rhododendron thickets – 14,815 ha (16.07%); southern Caucasian middle-mountain meadows, meadow-steppe and steppe, dry shrublands, and dwarf-shrub vegetation –

19,259 ha (20.89%), Armenian-Iranian low-mountain landscapes with semideserts, dwarf-shrub vegetation, and shrublands in areas – 13,114 ha (14.23%); rock and scree communities – 459 ha (0.50%); actual forest cover – 3,960 ha (4.29%)
Land Use/Land Cover: Rural settlements – 1,050 ha (1.14%); farmlands, pastures, and hayfields – 14,383 ha (15.60%); summer pastures – 72,296 ha (78.44%)
Protected Areas: Three Pas totaling 14,204 ha (15.41%): Eghegnadzor Sanctuary – 4,200 ha (4.56%), Djermuk Sanctuary – 3,865 ha (4.19%), and Herher Juniper Forest Sanctuary – 6,139 ha (6.66%)
Key Phenomena: Regionally important seasonal migration of wildlife and gene flow among populations
Focal Species: Ovis ammon, Capra aegagrus, Panthera pardus, Ursus arctos
Species of Special Concern: Rhinolophus mehelyi, R. hipposideros, R. euryale, Myotis emarginatus
Threats: Illegal hunting, overgrazing
CEPF Site Outcomes: Djermuk (122)

BICHANEK – ZANGEZUR
Location: Between Bichanek and Zangezur PCAs on the Armenian-Nakhchyvan (Azerbaijan) border
Longitude: 45o 55'53" Latitude: 39o 22'34"
Area: 22,277 ha
Countries: Armenia, Azerbaijan
Main Biomes: High mountain
Main Habitats: Caucasian sub-alpine meadows, tall-herbaceous communities, elfin woods, and thickets – 13,195 ha (59.23%); Caucasian alpine landscapes with grasslands and rhododendron thickets – 8,304 ha (37.28%); total high mountain habitats – 21,499 ha (96.51%)
Land Use/Land Cover: Rural settlements – 96 ha (0.43%); farmlands, pastures, and hayfields – 664 ha (2.98%); summer pastures – 20,867 ha (93.67%)
Protected Areas: None
Key Phenomena: Regionally important seasonal migration of wildlife and gene flow among populations
Focal Species: Capra aegagrus, Ovis ammon, Panthera pardus, Ursus arctos, Tetrao mlokosiewiczi
Species of Special Concern: Rhinolophus mehelyi, R. hipposideros, R. euryale, Myotis emarginatus, Lynx lynx
Threats: Illegal hunting, overgrazing
CEPF Site Outcomes: None

MOUNT GYAMYSH – MEGHRI – ARASBARAN
Location: Between Mount Gyamysh, Meghri, and Arasbaran PCAs, eastern Lesser Caucasus
Longitude: 46o 47'32" Latitude: 39o 35'35"
Area: 427,191 ha
Countries: Armenia, Azerbaijan
Main Biomes: Forest
Main Habitats: Southeastern Caucasian middle-mountain beech forests alternating with hornbeam-oak, partly with pine forests and secondary grasslands – 229,984 ha (53.84%); southeastern Caucasian low-mountain hornbeam-oak forests, oak forests, and secondary dry shrublands – 60,914 ha (14.26%), southeastern Caucasian sub-Mediterranean foothill hornbeam-oak forests and woodlands and Botriochloa steppes – 9,823 ha (2.3%); Caucasian upper-mountain birch and pine forests – 9,589 ha (2.24%); actual forest cover – 229,734 ha (53.78%); total high mountain habitats – 75,203 ha (17.60%), including 61,956 ha (14.50%) ha of Caucasian sub-alpine meadows, tall-herbaceous

communities, elfin woods, and thickets and 13,247 ha (3.1%) of Caucasian alpine grasslands and rhododendron thickets; rock and scree communities – 1,449 ha (0.34%); southern Caucasian middle-mountain meadows, meadow-steppes, and steppes, dry shrublands, and dwarf-shrub vegetation – 25,336 ha (5.93%)
Land Use/Land Cover: Rural settlements – 7,438 ha (1.74%); farmlands, pastures, and hayfields – 92,508 ha (21.65%); orchards – 33,041 ha (7.73%); summer pastures – 62,247
ha (14.57%)
Protected Areas: Five PAs totaling 83,393 ha (19.52%); IUCN I: Bastichay Strict Nature Reserve – 2,703 ha; other PAs – 80,690 ha (18.89%): Lachyn, Dashalti, Gubadly, Arazboyu sanctuaries
Key Phenomena: Regionally important seasonal migration of wildlife and gene flow among populations
Focal Species: Cervus elaphus maral, Capra aegagrus, Ursus arctos, Panthera pardus, Tetrao mlokosiewiczi
Species of Special Concern: Rhinolophus mehelyi, R. hipposideros, R. euryale, Myotis emarginatus, Lynx lynx, Lutra lutra
Threats: Illegal hunting, illegal logging, overgrazing
CEPF Site Outcomes: Dashalti Strict Nature Reserve (179), Gubadly Sanctuary (182), Lapchin Sanctuary (183), Mount Giamysh (189)

Annex N: Summary of Actions Taken By Government, NGOs, and Donors

The programs and activities listed herein are a sample of the numerous actions taken by the RA Government, NGOs, and donors to address biodiversity conservation.

Government of Armenia: Programs and Activities that Contribute to Biodiversity Conservation

The principle actions taken by Government to address biodiversity conservation are included below. Government of Armenia activities are discussed in relation to biodiversity threats (USAID Biodiversity Analysis, 2000) in the matrix below.

(1) NEAP-2 was elaborated in 2007, and was launched in December 2008. One of the main differences between NEAP-1 and NEAP-2 is that the Action Plan for NEAP-2 is more realistic and the main source of funding is the RA State Budget (rather than relying on donors).

(2) The Government of Armenia developed an Action Plan for conserving Lake Sevan.

(3) In 2004, together with other Caucasus republics, Armenia was included in the EU's "European Neighborhood Policy" (ENP). Based on the interests of the country and priority issues, Armenia submitted its recommendations to be included in the Armenia-EU Action Plan developed within ENP, which will reinforce the direction of Armenian environmental cooperation with European countries.

(4) In 2002, the MNP implemented the "Needs assessment for the capacity enhancement for biodiversity" project (UNDP/GEF).

(5) The MNP elaborated the "Strategy on Developing Specially Protected Areas and National Action Plan 2003-2010," which was approved by the Government in 2002. Guided by this strategy and action plan, as of December 2008, Government has:
- developed and approved standard Codes (Charters) for all three state reserves, the two national parks, and all eight state sanctuaries that are administered by the MNP
- under the framework of the State budget mid-term projects, developed proposals for establishment of six new PAs (Arevik state reserve; Gnishik/Arpi and Jermuk National Parks; Kirants and Vorotan Natural Parks; and Khor Virap State Sanctuary)
- declared Khor Virap Marsh (52.8 ha) a Ramsar site and state sanctuary in 2007
- developed and approved in 2008 the establishment and maintenance of SPNA cadastre
- revised boundary specifications and mapping of SPNAs (including Khosrov Forest State Reserve, Erebuni State Reserve, and Sochut, Vanadzor, Soranner, and Ijevan dendroparks)
- developed natural monument inventory and passport program

(6) In March 2006, the project "Conservation of biodiversity of the Caucasus Ecoregion" – with the support of WWF was approved at the summit of the ministers of Caucasus countries (see below).

NGO Activities

NGO activities are discussed in relation to biodiversity threats (USAID Biodiversity Analysis, 2000) in the matrix below.

Some NGOs focus on specific areas:

- Armenian Forests and Armenia Tree Project (ATP) work in field of forest restoration;
- Environmental Survival and Professional and Entrepreneurial Orientation Union in the field of hydro-ecosystem research, management, and training;
- Center for Armenia's Bird Lovers and Armenian Society for the Protection of Birds (ASPB) in the field of bird protection;
- Ecotourism Association in the field of ecotourism development.

Biodiversity awareness projects are being implemented by NGOs (Khazer, Armenian Botanical Association Professional and Entrepreneurial Orientation Union, Sustainable Human Development).

The NGOs, Ecolur, Eco-News, and Environmental Journalists Union play an important role in environmental protection by raising public awareness through television, Internet, and the press.

Transparency International (TI), with support from USAID, established Anti-Corruption, Advocacy and Assistance Centers. These assist civil society to bring environmental cases to court, and help promote environmental justice.

The Regional Environmental Centre for the Caucasus (REC Caucasus) operates with core support from the EU and funding from the US, Switzerland, and other countries. REC assists Armenia, Azerbaijan, and Georgia in solving environmental problems, supports building civil society, promotes public participation in decision making, and helps develop the free exchange of information.

The International Union for the Conservation of Nature (IUCN) South Caucasus Office, as part of "Countdown 2010," is developing and publishing guidelines, methodologies and protocol templates for a set of five priority biodiversity indicators; and supporting and advising government institutions responsible for biodiversity monitoring in their efforts to create national biodiversity monitoring schemes. IUCN is also promoting ecotourism in the south Caucasus, and is helping to conserve the PA network and strengthen capacity of natural resources professionals.

WWF is the largest NGO and the main international NGO working in biodiversity conservation in Armenia (funding levels were unavailable). WWF implements several projects in Armenia and in the Caucasus region. (see Matrix):

Donor Activities

Key donor-funded biodiversity projects are discussed below and are presented in the matrix in relation to threats from the original Biodiversity Analysis.

(1) Armenia has cooperated with the GEF since 16 June 1994. Armenia was the first country to start the "National capacities self-assessment" process as a follow-up to the Capacity Development Initiative approved by the GEF Council.

(2) Since 2008, Armenia has been included in the GEF Small Grant Programme (SGP), which is currently elaborating a strategy, and will start project implementation in 2009.

(3) Following Armenia's ratification of the Aarhus Convention in 2002, the Office for Security and Cooperation in Europe (OSCE) supported the opening of nine public environmental information centers (known as Aarhus Centres) throughout the country. The centers follow a unique model of cooperation between the State, the public, and the international community and serve as a forum to discuss environmental issues. This effort is part of a movement to promote the key principles of the Aarhus Convention, which calls for the protection of a person's right to access information, justice, and to allow public participation in environmental matters.

(4) KfW supports the Ecoregional Nature Conservation Programme (Phase I) in Armenia, Azerbaijan, and Georgia. The first phase, concentrating on the Javakheti region in Armenia and Georgia, will establish two adjacent national parks and will examine whether additional bird sanctuaries should be established in Armenia. Also planned is the establishment of a national park and a sanctuary in Samur-Yalama in Azerbaijan. In addition, the newly established Transboundary Joint Secretariat (TJS), which is based in Tbilisi (Georgia), supports the preparation and coordination of the projects and ensures the cross-border exchange of experience. The first phase of the project aims at reducing the pressure on the biodiversity in the Javakheti and Samur-Yalama regions and at supporting and developing an eco-regional model to maintain the biodiversity in the Southern Caucasus. The total cost during the four-year implementation period is estimated to amount to around EUR 7.0 million (not including contributions by the governments).

(5) Royal Norwegian Government is supporting IUCN's efforts to develop biodiversity monitoring schemes for the southern Caucasus countries, and supporting IUCN in helping to conserve the PA network and strengthen capacity of natural resources professionals.

(6) The Millennium Challenge Account (the Armenian arm of the USG's Millennium Challenge Corporation) oversees a five-year, $235.65 million Compact that is focused on the goal: the reduction of rural poverty through a sustainable increase in the economic performance of the agricultural sector. Armenia plans to achieve this goal through strategic investments in rural roads, irrigation infrastructure, and technical and financial assistance to improve the supply of water and to support farmers and agribusinesses. Although MCA does not directly contribute to biodiversity, within the framework of the Irrigated Agriculture Project the program will recover about 24,000 hectares of arable land by rehabilitating the Ararat Valley drainage infrastructure. Due to expansion of irrigated agriculture and other human activities over the past 50 years, the Ararat Valley has undergone significant ecological changes. For the MCA supported drainage system rehabilitation, the aim is to avoid negative impacts of the past. To this end, MCA has supported several studies, among them, field research and analysis of Ararat Valley ecology to determine the value of the wetlands, and the effect of drainage system rehabilitation on groundwater levels and on wetlands. Final design of the Ararat Valley drainage system rehabilitation component will depend on the outcome of the field studies. MCA rural road rehabilitation activities could impact biodiversity. **USAID should coordinate with MCA to ensure that mitigation measures are implemented that will protect critical habitat of endangered and threatened species.**

The environmental and social impact assessment process that MCA is implementing is a model for public participation and for taking the public's concerns into account. The MCA program is incorporating into program design the protection of the environment and socio-economic integrity of the communities affected by the canals, gravity irrigation schemes, reservoirs, and pumping stations that are being constructed, repaired, and in some cases, decommissioned. Findings of social and environmental assessments will be posted on the MCA website, and they will be available to interested organizations and to the public. In addition, MCA is supporting the preparation of an

electronic database that will be combined with the overall GIS for the project, and this will be available to the public over the internet.

(7) The MacArthur Foundation supported the creation of the Regional Council for Biodiversity Conservation and Sustainable Use in the Caucasus as a follow up to its project with WWF on elaborating initiatives for conserving the region's biodiversity (CEPF and WWF continue to support to the Council). Special attention is paid by the Council to programs for preventing the consequences of climate change, preserving biodiversity, protecting the ozone layer, introducing ecologically clean technologies, and harmonizing environmental legislation.

(8) The Regional Environmental Center-Caucasus (REC-Caucasus) and its Armenian branch (established 24 March 2000) includes representatives of Armenian government, scientific organizations, and NGOs in its regional consultative body. Among the many projects the Armenian branch of REC-Caucasus has implemented, some of the most successful are: *Pilot projects of Caucasus mountainous regions sustainable development – Agenda 21*, and *Development of Local Environmental Action Plan* for Ararat, Kajaran and Vardenis towns.

(9) From 2002 to January 2009, the World Bank and the GEF have funded the *Natural Resources Management and Poverty Reduction Project*. The main objective of the project is to alleviate rural poverty and promote sustainable natural resource management practices in degraded hilly and mountainous areas of Armenia. The project aims to help prevent further deterioration of the natural resource base (soil, water, forests, fisheries, and biodiversity) and raise local incomes. The Protected Areas Management and Biodiversity Conservation Component is intended to protect and enhance the unique mountain, forest, lake, and grassland ecosystems in Tashir and Gegharkunik marzes of Armenia, including habitats that host regionally and globally important biodiversity and endemism in Southern Caucasus. In particular, under this component management plans for of Dilijan and Lake Sevan National Parks have been developed.

(10) Caucasus Protected Areas Fund (CPAF) is supported by the German government through the German development bank, KfW, and along with WWF and Conservation International, sponsors conservation in the Caucasus. The CPAF helps finance operating costs of national parks, nature reserves, and other types of PAs.

(11) In 2005, the FAO project, *Sustainable Development Strategy of Mountains and High Mountains* developed the "Strategy of effective use of the natural resources and conservation of the environment."

(12) UNEP-WCMC is supporting the implementation of the GEF funded project *"In-situ Conservation of Crop Wild Relatives through Enhanced Information Management and Field Application,"* (2002), which is managed by Biodiversity International. The project helps to ensure the safe and effective conservation of crop wild relatives and their increased availability for crop improvement in Armenia, Bolivia, Madagascar, Sri Lanka, and Uzbekistan, and developed an international information system to support crop wild relatives' conservation throughout the world.

(13) Preservation, management and monitoring of water resources have been selected as priority area in the period of 2004-2008 by the USAID in Armenia. Assessment of monitoring needs and preparation of support projects are underway within the framework of the "Sustainable Management of Water Resources" project implemented by USAID through PA Consulting Company.

(14) The *Program for Institutional and Regulatory Strengthening of Water Management* (USAID-funded project implemented by PA Government Services Inc., 2004-2008) has supported the institutional development and strengthening of Basin Management Organizations (BMOs) and the establishment

of Basin Public Councils providing a public voice for water users and other stakeholders on basin planning and development. The Program supported development of a Model Guide for River Basin Management Planning in Armenia, which was elaborated in October 2008. As part of this, an attempt was made to address biodiversity and habitat protection issues in the context of river basin management.

THREATS (identified in the "Biodiversity Assessment for Armenia, 2000") compared to ACTIONS TAKEN by Armenia, NGOs, and/or donors

THREATS identified in the "Biodiversity Assessment for Armenia, 2000"	**Actions Taken by Government**	**Actions Taken by NGOs**	**Actions Taken by Donors**
1. Habitat loss and degradation due to expansion of human activities such as intensive agriculture, uncontrolled livestock grazing, urban and industrial development	-The Strategy on Developing Specially Protected Areas and National Action Plan, was approved by the Government of RA on 29.12.2002/ (UNDP/GEF) -- The law of the RoA "On fauna" 03.05.2000 - The law of the RoA "on Lake Sevan"14.06.2001 -The law of the RoA "On the annual programme for restoration, preservation, reproduction and use of Lake Sevan ecosystem"27.12.2001 - The law of the RoA "On the complex programme for restoration, preservation, reproduction and use of Lake Sevan ecosystem" 27.12.2001 - The law of the RoA "On wastes" 24.11.2004 - The law of the RoA "On	- Project Biodiversity Conservation in Caucasus Ecoregion 1999-2000, WWF - Creating an Ecoregion-wide Strategy for a Long Term Conservation and Sustainable Use of Biological Resources in the Caucasus (Armenia, Azerbaijan, Georgia) 2002-2004 (3 years) WWF -Conservation of the Leopard in the Caucasus Ecoregion , 2002-2004, (3 years) WWF -Caucasus Ecoregion: Recovery of Bezoar Goat in its Natural Range 2004 (36 months) WWF - Critical Ecosystems Partnership Fund (CEPF) implemented a large-scale project on identifying the territories, eco-corridors, and the most endangered species that need urgent conservation. - Assistance to establishment of new Protected Area Arevik in Southern Armenia 2005 -2009 Ecotourism Association NGO/(CEPF) Assistance to establish new protected area Zangezur in Southern Armenia, 2006-2009 Khustup NGO/ (CEPF) -"Environmental Survival" NGO has implemented "Reduction of negative impact of tannery industry on the ecosystem of the river Hrazdan" (ARD/USAID) -Promoting Sustainable Resource Use Among Local	- National Capacity Self-Assessment For Global Environmental Management 01.02.2003 31.10.2004 UNDP/GEF, RA Government - "Natural Resource Management and Poverty Reduction Project" 2002, WB -Sustainable Water Management for Enhanced Environment Quality in Armenia Nov.2000 –May 2004 USAID/ ARD -In the framework of Caucasian Initiative "Nature and Biodiversity Conservation Program in the Caucasus Region" Elaboration of a Vision of an Ecoregional Conservation Plan August 2002-May 2003, German Federal Ministry of Economic Cooperation and Development (BMZ)/KFW -In-situ Conservation of Crop Wild Relatives through Enhanced Information Management and Field Application (FSP) (Armenia, Bolivia, Madagascar, Shri Lanka, Uzbekistan), 03.2004- 02.2009 (5 years). GEF/UNDP, IPRGI, BMZ, IUCN

	environmental supervision" 11.04.2005 - The law of the RoA "On tariffs for compensation of damages caused to fauna and flora as a result of environmental violations" 03.05.2005 - Development of National Biosafety Framework for Armenia 01.01.2003 01.07.2004 UNEP, RA Government -The Forest Code of the Republic of Armenia (the first Code was adopted in 01.11.1994) 24.10.2005 -Study of the Present State of Populations of Amphibians and Reptiles as a base for Updating of Red Data List of Armenia and IUCN, 2006-2008, Institute of Zoology NANRA/CEPF -National Red book and prepare materials for the Caucasus Red Book and IUCN's red list, 2005-2007,Institute of Zoology NAN RA/CEPF - SECOND NATIONAL ENVIRONMENTAL ACTION PROGRAMME of RA (NEAP-2), approved in August 2008	Communities Near Protected Areas in Southern Armenia, 2007-2008 "Fund for Biodiversity Conservation of Armenian Highland/ (CEPF) - Feasibility study of establishment of Arpi National Park, 2006-2007, "Biodiversity and Landscape Conservation Union" NGO/ CEPF - The status of Armenian mouflon (*Ovis ammon gmelinii*) and bezoar goat (*Capra aegagrus*) in Armenia and implications for conservation of these ungulates 2006-2007, "Fund for Biodiversity Conservation of Armenian Highland"/CEPF - Estimation of the conditions of Meriones Dahlii's world population and elaboration of recommendations for species conservation, 2006-2008 "Nature Rights Protection" NGO/CEPF	- Identifying Priority Territories for the Creation of Biosphere Reserves, Creation of a Database, Development of GIS and Preparation of Project Documents for the Countries of the Southern Caucasus 2003-2004, UNESCO Moscow office , JFIT, UNESCO Venice office - In the framework of Caucasian Initiative "Nature and Biodiversity Conservation Programme in the Caucasus Region/ Establishment of Protected Areas in Armenia's Javakheti Plateau" 2004 German Federal Ministry of Economic Cooperation and Development (BMZ)/KFW, AHT International -In 2005 with the support of FAO developed "Sustainable development strategy of mountainous and high mountainous" project, where in an individual section they presented "Strategy of effective use of the natural resources and conservation of environment". - Preparation of the third national report to the UN Convention on Biological Diversity, 2005-2006 / GEF/UNDP - "Armenia agriculture small and medium enterprises market development" project (USAID DAI) identification of the possible role of small fisheries in the fish export development. -Supporting Country Action on the CBD Programme of Work on Protected Areas (2007 to 2011 / under implementation /UNDP/BRC

			-2008 Annual Work Plans Conservation and sustainable use of natural resources /2005-2009/UNDP -"Adaptation to Climate Change Impacts in Mountain Forest Ecosystems of Armenia" Project (2008-2012/ UNDP/GEF) -Protecting endangered species by updating Armenia's Red Book/ 2006 /MNP, Armenia, American Universities of Armenia – ECRC/Field Studies Council – FSC (UK)
2. Degradation of wetlands due to industrial, agricultural, and energy development	- Inventory of Armenian Ramsar sites: in search of ways for restoration of the lost and rehabilitation of degraded wetlands, especially as a waterfowl habitat/*Department of Especially Protected Natural Areas,*1998-2000, RC SGF - Establishment of cross-border conservation zones in Armenia and Javakhk highland" (with the support of German development and reconstruction bank),within Caucasus initiatives according to Armenia-Germany inter-government agreement in October 2005 a contract was signed " Regional Seminar "Current Issues of Conservation and Wise Use of Wetlands	-Lake Gili Restoration Plan , Khazer NGO GEF/UNDP, RA Government, 01.06.2000 up to 2008 - Implementation of the Ramsar Strategic Plan in Management of Wetlands in Sevan National Park, 1999-2000 Swiss Development and Cooperation Agency, Professional and Entrepreneurial Orientation Union - Ecological-economical Valuation of Armenian Wetlands: a Step towards the Elaboration of the National Wetland Policy 2000-2002, Ramsar SGF, Professional and Entrepreneurial Orientation Union - Identification of Ecological and Economical Values and Threats of Armenia's Peatlands: a Framework for Conservation, Restoration and Wise, Global Peatland Initiative, Professional and Entrepreneurial Orientation Union	-Improving the legislation on environmental impact assessment. 2003-2004 / UK/Regional Development Center/ Transparency International Armenia - "Reduction of cross-border deterioration of Kur-Araks river basin" project began in 2004 (GEF/UNDP).

	and Wetland Biodiversity in the European New Independent States"/ Ministry of Nature Protection 2003 RC SGF		
3. Soil erosion from poor agricultural practices, over grazing, and deforestation	- The law of the RoA "On flora" 22.12.1999 - The law of the RoA "On concession of subsoil for surveying and mining in order to exploit useful underground resources" 05.11.2002 -National action programme to combat desertification in Armenia, 2002/Minisrty of Nature Protection RA/ UNEP/Secretariat of UNCCD -Project "Natural resources management and poverty reduction" in 9500 ha pastures of 59 communities applied the sustainable management methods(system of shift grazing). As a result of project 3300 ha of pastures and grasslands will be improved. -"ICARDA – regional program of agriculture of development of mountainous countries" has developed a range of new technologies to improve the pastures and fodder diversity. -"Strategy on Development of Agriculture in Armenia" pinpoints the need of natural rehabilitation	- Promoting the Sustainable Use of Medicinal Plants Resources in Caucasus Ecoregion, (Armenia, Azerbaijan and Georgia 2002-2004 WWF	-Recovery of Lands Subject to Desertification in Garni Community of Kotayk Marz, RA 01.07.2003, UNDP/UNCCD Secretariat

	of pastures and grasslands.		
4. Uncontrolled deforestation	"The Forest Code of the Republic of Armenia" was adopted by Armenian Government in 24.10.2005 In 2003-2005 the Armenian Government adopted "National Forest Policy and Strategy"; "National Program of Armenian Forests" and "Action plan for mitigating actions to help address the problems associated with illegal logging" developed within the framework of "Natural Resources Management and Poverty Reduction" program.	Armenia Tree Project Foundation -Community Tree Planting and Rural Reforestation - Community Development and Poverty Reduction - Environmental Education and Advocacy. Armenian Forests NGO worked on multiple fronts including implementing model local reforestation and protection projects. Project "Our forests are our national heritage" NGO "Verelk", 2001/REC-Caucasus	Evaluation and Implementation of Sustainable Forestry Models in Northern Armenia, 2006-2008, "Armenia Tree Project" Foundation" (CEPF) Conservation and Rational Use of Forest Genetic Resources in the Trans-Caucasus 2001 IPGRI
5. Low public awareness of biodiversity	- The law of the RoA "On environmental education and fostering of the public" 17.12.2001 Seminar environmental management and eco-education in Armenia Sevan, February 2007/ Ministry of Nature Protection of / UNESCO Armenian National Committee	Project "Environmental Status Report of Yerevan /2005 –2007 " Association for Sustainable Human Development" / UNEP/GRID Regional project "Increase of public awareness on GMO and GM-products issues, assistance to forming an institutional approach to this problem with the aim of minimizing the related risks" 2004/ Association for Sustainable Human Development / Greens Union of Georgia, Friends of Earth -NAKRES (Georgia) and "Environmental Survival" (Armenia) NGOs implemented a joint project "Conservation of South Caucasus arid and semi-arid eco-systems", which was aimed at the study of the relevant eco-systems and biodiversity.	Professional and Entrepreneurial Orientation Union implemented a large-scale project on wetland management trainings: -Second National Training Course on Wetland Management 2000, Swiss Development and Cooperation Agency, - Regional Training Course on Wetlands, 2001, RC SGF Management for Technical Staff of Wetland - Wetland Management and Poverty Reduction in Mountain Regions Difficult of Access: Lake Arpi and Mount Aragats. Mitigating Problems through Public Awareness and Training 2002 RC SGF -

		-Increasing the awareness and commitment of decision makers to biodiversity and ecosystem conservation in Armenia's part of East Lesser Caucasus Corridor, 2006-2008"Armenian Forests" CEPF -Environmental education and increased environmental awareness project in Shirak Marz through establishing a regional environmental NGO centre NGO "Khazer, " 2001/REC-Caucasus -Project Database for full environmental expertise /NGO "Social Ecological Association," 2001/REC-Caucasus Project Campaign to clean the Dzoraget River Gorge/NGO "Lore," 2001/REC-Caucasus	Wetland Management Training Course for the Staff of Sevan National Park (Armenia) and Kolkheti National Park (Georgia) 2006-2007"Professional and Entrepreneurial Orientation Union" NGO /CEPF - Environmental Information, Education and Public Awareness in the NIS 17.06.2002,(30 months), 17.12.2004,TACIS -Increase of public awareness on environmental issues in the frame of "Cooperation in the countries of Southern Caucasus" project (USAID / Eurasia foundation) - In 2004-2006

Annex O: Description of USAID Program

Some Mission activities will continue from the previous strategy until their completion date; others will continue but in scaled-down form; and additional activities will be implemented during the new CAS. The following is a description of the anticipated USAID/Armenia portfolio, 2009-2014.

Social Protection
(1) Social Protection Systems Strengthening, ends September 30, 2011: Strengthens Armenia's social protection system, GOAM institutional capacity, and social services NGOs. This program focuses on macro-level reforms.

(2) The Building and Rehabilitating Infrastructure for Development and Growth in Employment (BRIDGE) Program, ends March 2010: Trains the most vulnerable unemployed members of communities in targeted regions of Armenia in basic and skilled construction techniques and provides them with short-term employment in renovating community infrastructure. BRIDGE has three components: community mobilization and renovation; vocational training for the most vulnerable; and job opportunities for vulnerable unemployed to participate in community recommended projects.

It is unlikely that BRIDGE activities will continue beyond the completion date; however Global Development Alliances (GDA) with similar activities may be funded.

(3) Building DPO Outreach for Greater Disability Inclusiveness ends December 2009. Strengthens the capacity of Disabled Persons Organizations and NGOs.

Economic Growth
(1) Competitive Armenian Private Sector (CAPS) improves competitiveness of targeted industries and increases sales, exports, and employment in those sectors. Currently, CAPS works with the information technology, tourism, and pharmaceutical sectors. The project provides technical assistance and capacity building for companies, including marketing, management, and human resources; and policy advocacy work through associations to better represent industries.

CAPS ends August 2010 (with a possibility of an extension to 2011). It is currently uncertain which direction CAPS will take: it may choose to work in an additional cluster; and/or it may move away from the "cluster approach" to provide more general assistance to "grow the economy."

(2) Financial Sector (Taxation and Banking): Development Credit Authority (DCA): Uses partial guarantees extended to private banks and institutional investors, respectively, to (a) facilitate MSME access to credit, and (b) encourage private investment in the issuance of commercial paper (a new investment product) by a non-bank financial institution.

New activities for 2009-2014 include (1) a tax administration project that will support value-added tax refunds to improve the enabling environment for businesses; and (2) support for the tele-communications sector.

(3) Water Sector: Institutional and Regulatory Strengthening of Water Management ends March 2009. The goals of this four-year project are to improve management of the country's water resources and to institute reforms to support commercial operation of water utilities. The program focuses on developing and implementing water legislation and on improving the effectiveness and transparency of key water management and regulatory institutions. A new task order, more targeted than the current four-year project, will be implemented during the new CAS period. It will focus on long-term financing mechanisms in water, sanitary services, and wastewater; and will involve working with the Interagency Working Group on Water Quality Standards to move the country towards the EU water framework standards.

An additional water sector activity may be implemented which would focus on legislative reforms in the sector which could help develop sustainable funding mechanisms.

A GDA with Coca Cola and Dilijan municipality is being developed. This will support wastewater treatment for the municipality, which will use a constructed/artificial wetland for treatment.

(3) Energy Sector: The Mission is considering providing technical assistance to help Armenia manage non-radioactive waste from the nuclear power plant.

To support regional cooperation and energy security, the Mission will support regional integration of the energy network. This will help Armenia achieve energy security.

A DCA mechanism will support energy efficiency measures by providing bank credit guarantees for these measures.

One or more GDAs are expected to be funded in the energy sector. This will likely involve energy efficiency, energy provision for socially oriented institutions, and/or renewable energy. Construction and implementation of small hydropower projects is a possibility given the Mission's previous support of this sub-sector (the Mission has supported seven small hydropower pilot projects).

Democracy and Governance
(1) Local Government Sector: The Local Governance Program ends in approximately 1.5 years. This project recognizes the vital role of local government in people's lives. USAID is helping to increase public participation in local governance, build the capacity of local governments to deliver services and develop local economies, and strengthen fiscal and administrative decentralization. The project assesses and helps to develop regulations and works to improve services in cities, such as garbage pick-up.

During the CAS, the focus will shift to working with NGOs and policy makers to improve service delivery. Environmental NGOs will likely be beneficiaries. The project works with "watchdog," advocacy, and public policy organizations and builds synergies among CSOs.

(2) Civil Society Sector: the Civil Society Project ends April/May 2010. It provides grants to NGOs/CSOs, especially those that support youth and that are advocacy NGOs.

(3) Rule of Law Program seeks to promote the rule of law as part of the country's broader democratic development. The project supports the independence, accountability, and professionalism of the judiciary; raises the level of knowledge and professionalism among lawyers in Armenia; promotes reform within the legal education system to provide students with access to rigorous curricula and prepares them for the legal profession; and increases public awareness of human and civil rights. This program assists in court cases involving civil rights and environmental complaints.

Investing in People: Health
During the CAS, the health office will focus on: improving the quality of healthcare; improving financing of healthcare; and creating demand for quality healthcare. The following activities will be implemented:

(1) Primary Healthcare Reform Project ends September 2010. This project supports Government to introduce primary health care reforms. USAID will focus on promoting cost-effective and transparent primary health care, and on empowering patients. During the new CAS, only "light renovation" is planned, such as painting and rainwater harvesting.

(2) Innovations in Reproductive Health ends September 2009, and improves the quality of reproductive, maternal, and child health services. This project will be extended, and will work in similar areas as the current project, through the CAS timeframe.

(3) A GDA (to September 2011) provides improved ophthalmology services, is implemented nationwide, and provides eye care using mobile services.

(4) A WHO grant that funds technical assistance for tuberculosis services ends 2009. This grant provides technical assistance to develop TB policy documents and a TB control package. Additional funding is expected which will extend the grant completion date.

(5) Health GDAs are expected to be funded, although currently, designs of GDAs are unknown. They may include working with/in health clinics, and could involve medical waste management.

Nagorno Karabagh
(1) World Vision activity ends December 2009. It works with orphans and disabled NGOs to build capacity so they can work in schools and improve education; and works with the Ministry of Labor to build capacity so they can contract with local NGOs for assistance.

(2) Humanitarian assistance (Congressional earmark): de-mining will continue, with focus on de-mining land that has agricultural value.

Cross-Cutting Initiatives
(1) Human and Institutional Capacity Building: This program emphasizes performance improvement of individuals critical to the achievement of the Mission's Strategy. Without major improvements in individual and institutional performance, there is little likelihood of successful implementation of government reforms.

(2) Community Connections: This exchange program is designed to promote public diplomacy through the exchange of cultural ideas and values between participants, US families, and local community host organizations. The goals are to provide participants with professional training and exposure to day-to-day functioning of a free market system, encourage public-private partnerships in Armenia, and create links between the US and Armenia regions and communities.

(3) Eurasia Partnership Foundation: This program focuses on development and growth of the private sector, promotion of good governance and strengthened civil society, enhanced media and communications capacity, strengthened regional cooperation and promotion of social science research.

Education: USAID/Armenia is developing educational aspects with other objectives across the Mission's portfolio to ensure that critical programmatic gaps in formal education are being systematically addressed.

Annex P: Matrix: Current Threats (2008), Actions Needed, What is being done (including extent to which USAID is addressing the action needed), and Gaps

CURRENT THREATS / ACTIONS NEEDED	Actions taken by government	Actions taken by NGOs	Actions taken by donors including USAID	Gaps
Threat: Unsustainable collection of fuel wood Actions Needed: (1) Poverty reduction activities, with a focus on areas of high biodiversity importance: buffer zones of PAs, IBAs, important wetlands and watercourses, and in key watersheds (2) Provide alternative fuel (gas, electric, etc.) especially in rural areas. (3) Implement community forest activities. (4) Improve protection of PA resources, and as appropriate, sustainable fuel	The Strategy on Developing Specially Protected Areas and National Action Plan (2002)/(UNDP/GEF) RA government budget: providing oil/gas heat in rural areas Micro-enterprise fund to support access to heating fuel	Project Biodiversity Conservation in Caucasus Ecoregion 1999-2000, WWF Creating an Ecoregion-wide Strategy for a Long Term Conservation and Sustainable Use of Biological Resources in the Caucasus (Armenia, Azerbaijan, Georgia) 2002-2004 (3 years) WWF Armenia Tree Project Foundation: -Community Tree Planting and Rural Reforestation (includes capacity strengthening for community forest management) - Community Development and Poverty Reduction - Environmental Education and	"Natural Resource Management and Poverty Reduction Project" WB Donors with poverty reduction focus: EU, GTZ, JICA, OSCE **USAID energy activities, including possible alternative energy GDAs could reduce need for unsustainable collection of fuel wood.** **USAID CAPS: addresses poverty reduction, income generation in areas adjacent to PAs (tourism component of CAPS). See recommendations to continue this.**	Sustainable fuel wood Initiatives, including Wood lots, community Enterprises **(not within USAID Program Areas/not USAID comparative advantage)**

wood collection by communities. (5) Encourage use of wood lots for fuel wood.		Advocacy Armenian Forests NGO works on multiple fronts including implementing model local reforestation and protection projects Project "Our forests are our national heritage", NGO "Verelk", 2001/REC-Caucasus		
Threat: Unsustainable commercial timber harvesting Actions needed: (1) Put in place new category, industrial forests; require a sustainable forest management plan; and ensure compliance with the FMP (2) Ensure transparent process for appropriating industrial forest to commercial interests (3) Consider community benefit component in industrial forests (4) Create a GIS including application of environmental monitoring criteria (NEAP-2) (5) Provide training to target environmental NGOs that have potential to serve as advocates for community interests	-The Forest Code of the Republic of Armenia (2005) RA Government implementing new categorization of forests including industrial forests In 2003-2005 the Armenian Government adopted "National Forest Policy and Strategy," "National Program of Armenian Forests," and "Action plan for mitigating actions to help address the problems associated with illegal logging" developed within the framework of "Natural Resources Management and Poverty Reduction" program.	ATP, FMP preparation/framework for community FMPs Project "Our forests are our national heritage", NGO "Verelk", 2001/REC-Caucasus	Evaluation and Implementation of Sustainable Forestry Models in Northern Armenia ,2006-2008, "Armenia Tree Project" Foundation" (CEPF) Conservation and Rational Use of Forest Genetic Resources in Transcaucasus 2001 IPGRI With support from USAID NDI a forum of ecological NGOs and RA political parties was established in 2005, where the priority environmental issues were discussed, particularly conservation of forests and other green areas, and desertification control issues. **USAID civil society strengthening: strengthens local NGOs to increase effectiveness (financial capacity, technical, and management capacity) See**	FMP implementation Community FMP preparation and implementation Concession process GIS: open access Most of these are outside the program areas of USAID **Open access GIS, could contribute to D &G and Economic Growth: see Recommendations**

(unsustainable commercial timber harvesting).			**recommendations to continue this.**	
Threat: Inappropriate grazing practices Actions needed: (1) Reduce and prevent land degradation with anti-erosion, anti-landslide activities. (2) Implement restoration measures (re-cultivation) of degraded lands (3) Define principles for privatized agricultural land consolidation (4) Create an open access GIS including application of environmental monitoring criteria. (5) Through land use planning exercises, strengthen and train local government authorities who will make decisions about land use.	-National action programme to combat desertification in Armenia, 2002/Minisrty of Nature Protection RA/ UNEP/Secretariat of UNCCD -Action Programme of the Government of the Republic of Armenia for the Period of 2003-2007" adopted on June 17, 2003 -Project "Natural resources management and poverty reduction" in 9500 ha pastures of 59 communities applied the sustainable management methods (system of shift grazing). As a result of project implementation, 3300 ha of pastures and grasslands will be improved. -"Strategy on Development of Agriculture in Armenia" pinpoints the need of natural rehabilitation of pastures and grasslands- -Measures for Development of Agricultural Reclamation in RA for the Period of 2002-2005; project was adopted by Government Decree № 1115-P, dated	-"Local Environment Protection Action Plan" developed for city Ararat in the framework of REC Caucasus programme, with active participation of "Greens of Ararat Marz"	Recovery of Lands Subject to Desertification in Garni Community of Kotayk Marz, RA 01.07.2003,UNDP/UNCCD Secretariat - "ICARDA – regional program of agriculture of mountainous countries" have developed a range of new technologies to improve the pastures in the fodder diversity and extremely burdened state. Among many projects the Armenian branch of Regional Environmental Center-Caucasus has implemented "Pilot projects of Caucasus mountainous regions sustainable development – Agenda 21", "Development of Local Environmental Action Plan" for Ararat, Kajaran and Vardenis towns. (2005) FAO: "Sustainable Development Strategy of Mountainous and High Mountainous." Produced "Strategy of effective use of the natural resources and conservation of environment". - "Armenia agriculture small and	**GIS: open access, for NR monitoring: See recommendations**

	2002 - A concept paper on «Development of Animal Husbandry in Armenia» was adopted by RA Government Protocol Decree in 2002		medium enterprises market development" project (USAID DAI) identification the possible role of small fisheries in the fish export development.	
Threat: Mining and other industrial and commercial developments that impact biodiversity Actions needed: (1) Increase environmental fees to encourage use of clean technology to minimize waste and water, land, and air pollution. (2) Ensure a transparent EIA process is implemented that takes into account community (3) Strengthen environmental compliance by developing environmental compliance legislation for tiered environmental review and third party environmental audits. (4) Implement insurance mechanism. (5) Strengthen capacity of State Environmental Inspectorate (6) Strengthen legislation and implement pollution	RA EIA Law, 1995 Signatory to the Aarhus Convention (2002) - The law of the RoA "On environmental education and fostering of the public" (2001) Seminar Environmental management and eco-education in Armenia Sevan, February 2007/ Ministry of Nature Protection of / UNESCO Armenian National Committee	Awareness projects implemented by NGOs (Khazer, Armenian Botanical Association Professional and Entrepreneurial Orientation Union, Sustainable Human Development) are in effect designed around different conventions - CBD, CCD, FCCC, Ramsar, Aarhus, etc.). NGOs Ecolur, Eco-News, Environmental Journalists Union	Improving the legislation on environmental impact assessment. 2003-2004 / UK/Regional Development Center/ Transparency International Armenia OSCE supported Aarhus Centers Regional Environmental Centers-Caucasus PA/Water project conducted environmental audit of Akhtala processing operations MCA-Armenia support irrigation and road rehabilitation, in conjunction with these activities, conducted SEA and will conduct site-specific EAs, using participatory approach—a model for future SEAs and EAs. **USAID support for Transparency International Anti-corruption, Advocacy, and Assistance Centers: provides**	**Strengthen EIA Process/See Recommendations** **Land Use Planning/ See Recommendations** **Strengthen Water Discharge Legislation/See Recommendations**

prevention measures that include water discharge legislation and a water monitoring program. (7) Target environmental NGOs that have potential to serve as advocates for community interests. (8) Raise awareness of importance of biodiversity and trade-offs between industrial development and other development (tourism, niche agriculture, etc.) (9) Implement land use planning and integrate environmental considerations.			**assistance for environmentally-oriented court cases; promotes transparency in government decision making/EIA**	
Threat: Poaching of fish and wildlife Actions needed: (1) A holistic approach to recover the fish stock: artificial propagation; control of invasives; protection of the fish stocks; regularize/ minimize water withdrawals from Lake Sevan, especially at time periods critical to the ecosystem; and a program to provide livelihood options for those living near the lake. It is important to treat the entire	-- The law of the RoA "On fauna" 03.05.2000 - The law of the RoA "on Lake Sevan"14.06.2001 -The law of the RoA "On the annual programme for restoration, preservation, reproduction and use of Lake Sevan ecosystem"27.12.2001 - The law of the RoA "On the complex programme for restoration, preservation, reproduction and use of Lake Sevan	-Lake Gili Restoration Plan , Khazer NGO GEF/UNDP, RA Government, 01.06.2000 up to 2008 - Implementation of the Ramsar Strategic Plan in Management of Wetlands in Sevan National Park,1999-2000 Swiss Development and Cooperation Agency, Professional and Entrepreneurial Orientation Union - Ecological-economical Valuation of Armenian Wetlands: a Step towards the Elaboration of the	.	CBNRM-community hunting areas **(not within USAID Program Areas/not USAID comparative Advantage)**

ecosystem. (2) Implementation of a program of community-based natural resources management (CBNRM) that would allow local populations to benefit from hunting.	ecosystem" 27.12.2001 - The law of the RoA "On environmental supervision" 11.04.2005 - The law of the RoA "On tariffs for compensation of damages caused to fauna and flora as a result of environmental violations" 03.05.2005 - "Interim State Expenditures Programme of RA for 2005-2007" approved by the Government Decree of RA, N: 985-P, dated 17.06.2004, according to which budgeted allocation of the environmental sector should be targeted to settlement of the following priority issues: • Rehabilitation of ecological balance of Lake Sevan; • Conservation of biological and landscape diversity; • Desertification control process; • Ecologically sound disposal of hazardous waste.	National Wetland Policy 2000-2002, Ramsar SGF, Professional and Entrepreneurial Orientation Union - Identification of Ecological and Economical Values and Threats of Armenia's Peatlands: a Framework for Conservation, Restoration and Wise, Global Peatland Initiative, Professional and Entrepreneurial Orientation Union		
Threat: climate change Actions needed:	-The Strategy on Developing Specially Protected Areas	- Project Biodiversity conservation in Caucasus Ecoregion 1999-2000, WWF (also see Annex K)	WB Poverty Reduction and NRM project: sustainable forest management component (ends	Protection of forests from increased pest/disease/

(1) Develop alternative livelihood options for communities in areas that are particularly vulnerable to climate change and who rely on vulnerable biodiversity resources. (2) Develop alternative sources of clean energy for use by Armenia's population. (3) Establish corridors between PAs to allow migration of wide-ranging species and ensure the resilience of plants and animals to climate change (4) Gradually increase forest cover with a goal of 266,500 hectares by the year 2050. (5) Application of an integrated system of forest protection from pests, diseases, and livestock grazing, and fire.	and National Action Plan was approved by the Government of RA on 29.12.2002/ (UNDP/GEF) Hyantar SNCO, reforestation/afforestation	Creating an Ecoregion-wide Strategy for a Long Term Conservation and Sustainable Use of Biological Resources in the Caucasus (Armenia, Azerbaijan, Georgia) 2002-2004 (3 years) WWF GEF Trust Fund: Developing the Protected Area System of Armenia Armenia Tree Project - 2006, UNCG-UNDP-OSCE-EcoLur project "Desertification Hot Spots in Armenia"	Jan 2009). MNP carried out projects with support of the GEF and UNDP on capacity building for implementing the UNCCD. In-situ Conservation of Crop Wild Relatives through Enhanced Information Management and Field Application (FSP) (Armenia, Bolivia, Madagascar, Shri Lanka, Uzbekistan), 03. 2004- 02. 2009(5 years). GEF/UNDP, IPRGI,BMZ, IUCN "Adaptation to Climate Change Impacts in Mountain Forest Ecosystems of Armenia" Project (2008-2012/ UNDP/GEF)	fire **(not within USAID Program Areas/not USAID comparative advantage)** **Alternative livelihood options with focus on vulnerable communities and biodiversity/See Recommendations** **Alternative sources of clean energy/See Recommendations**
Threat: invasive species are affecting biodiversity Actions needed: (1) Improve State Quarantine inspections and train customs officers. (2) Implement relevant articles of the "Law on Flora" (1999); "Law on Fauna" (2000) and "Law on	"Law on Flora" (1999); "Law on Fauna" (2000) and "Law on the Lake Sevan" (2001), and individual articles are being implemented (Third CBD Report, 2006). - The law of the RoA "On tariffs for compensation of			State Quarantine Service capacity Strengthening And Management Plans for Vulnerable species **(not within USAID**

the Lake Sevan" (2001) (3) Develop and implement management plans for the control of alien invasive species.	damages caused to fauna and flora as a result of environmental violations" 03.05.2005			**Program Areas/not USAID comparative advantage)**
Threat: the PA system does not adequately protect biodiversity Actions needed: (1) Implement the MNP's National Strategy and Action Plan on Developing Specially Protected Areas. (2) Implement community PA model(s) to illustrate how communities can benefit from management and use of PA resources. (3) Implement improved biodiversity monitoring scheme, including regular data collection, systematically compiled, and publicly accessible. (4) Rationalize roles and responsibilities of central, regional, and local governments. (5) Biodiversity awareness raising campaign. As part of this campaign, prepare Environmental Action Plans. (6) Improve environmental education	-The Strategy on Developing Specially Protected Areas and National Action Plan, was approved by the Government of RA on 29.12.2002/ (UNDP/GEF) Government of Armenia/MNP (RA budget: for implementation of National Strategy) RA and MNP to implement law which requires revenue raised by SPNAs to go into the SPNA budget. Establishment of cross-border conservation zones in Armenia and Javakhk highland" (with the support of German development and reconstruction bank) within Caucasus initiatives. According to Armenia-Germany inter-government agreement in October 2005 a contract was signed	-Ararat Local Environmental Action Plan with Regional Environmental Center and Environmental Survival - Creating an Ecoregion-wide Strategy for a Long Term Conservation and Sustainable Use of Biological Resources in the Caucasus (Armenia, Azerbaijan, Georgia) 2002-2004 (3 years) WWF IUCN support for biodiversity monitoring scheme. -Conservation of the Leopard in the Caucasus Ecoregion , 2002-2004, WWF -Caucasus Ecoregion: Recovery of Bezoar Goat in its Natural Range 2004 (36 months) WWF - "Critical Ecosystems Partnership Fund" (CEPF), implemented a large-scale project on identifying the territories, eco- corridors and the most endangered species that need urgent conservation.	GEF Trust Fund: Developing the Protected Area System of Armenia WWF Armenia - "Natural Resource Management and Poverty Reduction Project" Preparation Advance, 2002, WB -In the framework of Caucasian Initiative "Nature and Biodiversity Conservation Program in the Caucasus Region" Elaboration of a Vision of an Ecoregional Conservation Plan August 2002-May 2003, German Federal Ministry of Economic Cooperation and Development (BMZ)/KFW. Includes biodiversity monitoring scheme for PAs. - Identifying Priority Territories for the Creation of Bioshere Reserves, Creation of a Database, Development of GIS and Preparation of Project Documents for the Countries of the Southern Caucasus 2003-2004, UNESCO Moscow office , JFIT, UNESCO Venice office - In the framework of Caucasian Initiative "Nature and Biodiversity	Rationalize government roles in biodiversity conservation. **Opportunity for USAID to leverage support from donors to encourage streamlined institutional framework for biodiversity conservation. See Recommendations** Entry fees not charged/ Revenue sharing (Government decision/ Action required) Teacher training in environmental education; provision of materials/equipment (**not within USAID Program Areas/Not USAID comparative advantage.)**

(7) Consider charging entry fees and allow this revenue to be used by the SPNA system (i.e., implement law RA law on the budget which is scheduled to be implemented by 2011).	"Regional Seminar Current Issues of Conservation and Wise Use of Wetlands and Wetland Biodiversity in the European New Independent States"/ Ministry of Nature Protection 2003 RC SGF	- Assistance to establishment of new Protected Area "Arevik" in Southern Armenia 2005-2009 "Ecotourism Association" NGO/(CEPF) - Assistance to establishment of new protected area "Zangezur" in Southern Armenia 2006-2009 "Khustup" NGO/ (CEPF) Promoting Sustainable Resource Use Among Local Communities Near Protected Areas in Southern Armenia, 2007-2008"Fund for Biodiversity Conservation of Armenian Highland/ (CEPF) - Feasibility study of establishing "Arpi" National Park, 2006-2007, "Biodiversity and Landscape Conservation Union" CEPF - The status of Armenian mouflon (*Ovis ammon gmelinii*) and bezoar goat (*Capra aegagrus*) in Armenia and its implications for cons-ervation of these ungulates, 2006-2007 "Fund for Biodiversity Conservation of Armenian Highland"/CEPF - Estimation of the conditions of Meriones Dahlii's world population and elaboration of recommendations for species conservation 2006-2008 "Nature Rights Protection" NGO/CEPF	Conservation Programme in the Caucasus Region - Establishment of Protected Areas in Armenia's Javakheti Plateau" 2004 German Federal Ministry of Economic Cooperation and Development (BMZ)/KFW,AHT International -New GEF project: Medium Sized Project, Developing the Protected Area System of Armenia/UNDP and MNP	**No other gaps noted** **Opportunity to work cross-border with Caucasus Initiative (Javakhk) or use as model for a separate site.**