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# Scoping study of economic significance of ecosystems and biodiversity (TEEB) of the forestry sector of Armenia

## *Framework level assessment of the forestry sector capacities*

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## Abbreviations

NC	Natural capital
SPNA	Specially protected nature area
SEM	Sustainable ecosystem management
TEEB	The economics of ecosystems and biodiversity
ES	Ecosystem service
CBD	UN Convention on Biological Diversity
COP	Conference of Parties
EIA	Environmental impact assessment
GEF	Global Environmental Facility
IUCN	International Union for Conservation of Nature
NBSAP	National biodiversity strategy and action plan
WB	World Bank
MDG	Millenium development goals
WWF	World Wide Fund for Nature
PA	Protected area
UN	United Nations
FMP	Forest management plan
PES	Payments for ecosystem services
RA	Republic of Armenia
SNCO	State Non-Commercial Organization
AMD	Armenian Dram
NWFP	Non wood forest products
BAU	Business as usual
SEM	Sustainable ecosystem management
NUPF	Nature use and nature protection fees

## Terminology

*Ecosystem* – a self-regulated system consisting of living organisms and the environment they live in, which supports their interaction to condition natural phenomena, a part of which is ecosystem services.

*Ecosystem services (ES)* – benefits provided by ecosystems (goods, resources, environment), which are used (or can be used) by human and ensure favorable biological conditions.

*Types of ecosystem services* – provisioning, regulating, supporting and cultural services.

*Sustainable ecosystem management (SEM)* – management aimed at long-term use, protection, safeguarding vitality and restoration of ecosystem components and ecosystem services.

*Payments for ecosystem services (PES)* – payment transaction conditioned by an agreement made between the provider of ecosystem services and their user (beneficiary).

*Natural capital (NC)* – the integrity of systems conditioning biological diversity, of renewable and non-renewable resources, biogeochemical cycles and energy flows in a definite geographical territory.

*Social capital* – a system of common material and spiritual values, which has been formed in the result of social interactions in human society and which includes technical-economic and human capital.

## Executive summary

The aim of this TEEB scoping study for the forestry sector of Armenia is to outline thematic and policy questions that a full TEEB for the forestry sector of Armenia would answer as well as to provide an implementation roadmap for undertaking the full TEEB study in the future and for introduction of economic mechanisms on ecosystem services (ES), including prioritization and the steps, which are necessary to implement.

In the frames of the assignment a comparative analysis of the current forest management practice (business as usual/BAU) and sustainable ecosystem management (SEM) has been implemented along with a preliminary study on possibilities for valuation of ecosystem services. Respective proposals have been developed on promotion of SEM in the current forest management system and formation of an economic system of ESs.

The scoping study report presents main characteristics of forestry sector in Armenia, main economic indicators and sectoral policies, which have direct links with ecosystem services. The current state, experience and possibilities of economic valuation of biological diversity and ecosystem services in the forestry sector of Armenia have been analyzed.

On the basis of analyses a road-map has been developed with respective proposals on revision of legislation, policies and management system as well as economic valuation of ecosystem services in future.

International methodological guidelines have been used for the analysis of the current state of TEEB in forestry sector of Armenia, in particular The Guidance Manual for “The Economics of Ecosystems and Biodiversity” (TEEB) Country Studies.

# Chapter 1. Background information

## 1.1 ENPI-FLEG 2 program

The European Union (EU) funded “*European Neighborhood and Partnership Instrument (ENPI) East Countries Forest Law Enforcement and Governance (FLEG) II Program*” (the Program) is aimed to support the participating countries strengthen forest governance through enhancing their forest policy, legislation and institutional arrangements, and implementing sustainable forest management models on a pilot basis. The Program will be carried out over a four-year period, with end on December 31, 2016. The Program is supported by the European Commission contributing to a single-donor trust fund administered by the World Bank (WB). Austrian Development Cooperation (ADC) provides additional funds supporting Program activities in Armenia and Georgia. Implementation of the Program is led by the WB, working in partnership with the International Union for Conservation of Nature (IUCN) and the World Wide Fund for Nature (WWF).

The Program has three Development Objectives (PDO):

- 1) To make progress implementing the 2005 St. Petersburg FLEG Ministerial Declaration in the participating countries and support the participating countries commit to a time-bound action plan to ensure its implementation and follow-up activities (regional level).
- 2) To review or revise (or establish a time-bound action plan to review or revise) forest sector policies and legal and administrative structures; improve knowledge of and support for sustainable forest management and good forest governance (including the impact of related EU regulations) in the participating countries (national level).
- 3) To test and demonstrate best practices for sustainable forest management and the feasibility of improved forest governance practices at the field-level on a pilot basis in all participating countries (sub-national level).

The Program in Armenia deals with a number of issues according to the objectives above. In particular, it will mainly be focused on the works supporting legal and institutional review and reforms, building human resource capacity to address FLEG issues, public awareness and public monitoring of the forests, strengthening sustainable forest management through activities with model forest units such as forest protected areas and activities on sustainable use of forest resources with involvement of adjacent communities as well as improving the FLEG planning and monitoring at the national, regional (local) and international levels.

## 1.2 TEEB in the frames of the program

The Economics of Ecosystems and Biodiversity (TEEB) is one of the important components of the Program. TEEB is an international initiative promoting sustainable economies in which the values of biodiversity and ecosystem services are fully reflected in decision-making. In 2007, the German Federal Ministry for the Environment and the European Commission initiated work on TEEB.

In the frames of the project the TEEB scoping study for forestry sector was initiated in Armenia. It clearly demonstrates the advantages of sustainable forest management and can serve as a basis for the subsequent full-fledged TEEB study for the forestry sector of the country.

Later on in the frames of the Program the country scoping study will be analyzed and consolidated in a regional study document and a regional workshop will be implemented.

### **1.3 Scope of the assignment**

The aim of this scoping study is to outline thematic and policy questions that a full TEEB for the forestry sector of Armenia would answer. It should also provide an implementation roadmap for undertaking the full TEEB study in the future. The specific objectives of the scoping study include:

- Understanding of the policy context within which forest sector operates in Armenia
- Identification of alternative policy scenarios and their potential impacts on natural ecosystems
- Identification of the key thematic and policy areas and key questions on which the full TEEB study would focus on
- A list of outputs which would be delivered by the full TEEB study.

This scoping study will contribute to the fulfilment of the FLEG II PDO 2.

Among others, the scoping study should include: (i) brief evaluation of the current state of the forestry sector, existing challenges and perspectives, and relevant policy context; (ii) assessment of governance – key stakeholders influencing the formulation and adoption of policies; (iii) analysis of the sector's impacts and dependencies on biodiversity and ecosystem services; (iv) description of alternative policies (i.e. Business as Usual versus Sustainable Ecosystem Management), including their impacts on biodiversity and ecosystem services; and (v) identification of the questions to be addressed by the full TEEB country study for the forestry sector, including a roadmap for such a study. The interdependence of the forestry and other relevant sectors (e.g. tourism, agriculture) should also be emphasized.

### **1.4 TEEB: background and introduction**

Ecosystems services result from the conversion of natural capital and assets into benefits to people. "Ecosystem services" means the benefits people obtain from ecosystems. These include provisioning services such as food, water, timber and fiber; regulating services that affect climate, floods, disease, wastes and water quality; cultural services that provide recreational, aesthetic and spiritual benefits; and supporting services such as soil formation, photosynthesis and nutrient cycling.

The initiative was launched in response to a proposal by the G8+5 Environment Ministers (Potsdam, Germany 2007) to develop a global study on the economic benefit of biological diversity and economics of biodiversity loss. TEEB makes the case for integrating the economics of biodiversity and ecosystem services in decision-making. The TEEB study evaluates the associated decline in ecosystem services worldwide, and compares them with the costs of effective conservation and sustainable use. It intends to raise awareness of the value of biodiversity and ecosystem services and to facilitate the development of cost-effective policy responses and better informed decisions.

TEEB aims to assess, communicate and mainstream the urgency of actions through its five deliverables - science and economic foundations, policy costs and costs of inaction, policy opportunities for national and international policy-makers, decision support for local administrators, business risks, opportunities and metrics and citizen and consumer ownership.

TEEB has been conducted in three phases. Preliminary findings from the first phase were presented at the High-Level Segment of the Ninth Conference of the Parties to the Convention on Biological Diversity (CBD COP-9) in Bonn, Germany, in May 2008, in the form of an interim

report. TEEB Phase II, currently underway, takes an economic approach that is spatially specific and builds on knowledge of how ecosystems function and deliver services. It examines how ecosystems and their associated services are likely to respond to particular policy actions.

A fundamental focus of TEEB is on developing an economic yardstick that is more effective than GDP for assessing the performance of an economy. TEEB recommends that national accounting systems need to be more inclusive in order to measure the significant human welfare benefits that ecosystems and biodiversity provide. Such systems can help policy makers adopt the right measures and design appropriate financing mechanisms for conservation.

## Chapter 2. National strategy context

### 2.1 Reflection of ecosystem services in strategic documents

The practice of economic valuation of biological diversity and ESs is a relatively new direction in Armenia, which recently has been considered as an important field of action in Armenia. Over recent period a number of international organizations have been implementing various projects on TEEBs and ESs (Appendix 1).

However, the legislative basis for evaluation and consideration of economic significance of ecosystems and biological diversity is still missing in Armenia along with the guidelines and methodological instructions as well as the mechanisms of their practical application and introduction of financial tools and formation of respective markets.

This problem refers to all fields related to nature use, however it is of higher importance especially for the forestry sector given the importance of maintenance, provision and use of ESs in the context of sustainable forest management.

Some strategic documents of the Republic of Armenia (RA) consider ESs as an important factor for rational use of natural capital in Armenia as well as for investments in nature protection and formation of additional financial flows. Their brief description is presented below.

### 2.2 National Biodiversity Strategy and Action Plan

The National Biodiversity Strategy and Action Plan (NBSAP) were developed in 1999. The process of NBSAP revision started in 2014 with identification of national biodiversity targets, principles and main priorities, which can be fit under the five strategic goals defined in Aichi. The Strategic Plan of the Convention on Biological Diversity (CBD), adopted at CBD Conference of Parties (COP) 10 in 2010 in Nagoya (Japan) envisages that each country should develop, by 2012, national biodiversity targets and indicators for 2020, and update its NBSAP by 2014 in line with the Aichi targets.

The current version of NBSAP is not sufficient to implement the CBD COP-10 decisions. Specifically, the revised NBSAP needs to be in line with the goals and targets of CBD Strategic Plan and Aichi Biodiversity Targets, such as:

Strategic Goal A: Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society.

Strategic Goal B: Reduce the direct pressures on biodiversity and promote sustainable use.

Strategic Goal C: To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity.

Strategic Goal D: Enhance the benefits to all from biodiversity and ecosystem services.

Strategic Goal E: Enhance implementation through participatory planning, knowledge management and capacity building.

### **2.3 CBD Program of Works on Protected Areas**

According to the Program of Works on Protected Areas (PoWPA) under the Convention on Biological Diversity it is envisaged to carry out a gap analysis of protected areas system at national and regional levels considering the requirement of having representative systems of protected areas, which respectively protect the biodiversity and ecosystems of terrestrial, marine and inner water systems. The gap analyses should take into consideration the criteria adopted by decisions made by the Conferences of Parties in the frame of the Convention on Biological Diversity; they include non-renewable target components of biodiversity, requirements on minimal effective size and vitality as well as migration of species, integrity of protected areas, ecological processes and ecosystem services.

By the targets of PoWPA it is envisaged to prevent and mitigate negative impacts of the main threats to protected areas, review and revise policies including use of social and economic evaluation and incentives to ensure enabling conditions for more effective establishment and management of protected areas and the systems of protected areas.

It is important to study the effectiveness of use of financial resources and assess financial needs of protected areas at national level with consideration of all respective financing tools and mobilization of all financial resources, which include public financing and “debt-for-nature swaps” mechanism, as well as eradication of negative incentives and subsidies, promotion of private financing and taxes and payments for ecological services.

The PoWPAs envisages also the promotion of economic possibilities and markets which relate to the goods and services provided by protected areas and/or depend upon ecosystem services provided by protected areas in accordance with the targets of protected areas, as well as the equitable benefit sharing.

In 2012 the RA Ministry of Nature Protection developed the Action Plan for Implementing the Programme of Work on Protected Areas of the Convention on Biological Diversity (15 June 2012), which prioritizes development of management plans for protected areas, activities on natural monuments, works on biodiversity monitoring and cadaster system as well as on establishment of a national ecological network of protected areas.

### **2.4 State Strategy and National Action Plan on Development of SPNAs of Armenia**

At present the revision of the State Strategy and National Action Plan on Development of SPNAs of Armenia is in the process. The time-frame of the previous State Strategy and National Action Plan on Development of SPNAs of Armenia (adopted by the RA Government on 26.12.2002) was over in 2010, in addition there is a need to make it in line with the Strategic Plan of the Convention on Biological Diversity, adopted at CBD COP 10 (Decision X/2) as well as Aichi Targets for 2010 – 2020.

In the existing draft strategy the current state of specially protected nature areas of Armenia is analyzed and the development strategy is presented along with the priorities and problems with respective national action plan for the period of 2014 – 2020. The main strategic directions of development of the system of SPNAs are defined with special emphasis on the circumstance that SPNAs are “the zones of stability as well as of maintenance and restoration of ecosystem services” and their functioning is not only aimed at protection of natural heritage, but also at improvement of well-being of local population. It is emphasized that ESs are of economic value and they need to be integrated in the national system of economy.

## ***2.5 National Action Programme to Combat Desertification in Armenia***

Since 2002 a number of projects and new studies on land management and combating desertification have been implemented in Armenia according to the National Action Programme to Combat Desertification in Armenia (2002). The National Action Programme highlights the need for effective coordination among the environmental institutions and the specification and enhancement of responsibilities of territorial and self-governance authorities in environmental management. It further calls for improved land use planning and improvement of economic mechanisms for natural resource management. At present the National Action Programme to Combat Desertification in Armenia is under revision.

Ecosystems and the benefits and services provided by them are present in the ten-year Strategic Plan of the UN Convention to Combat Desertification. In particular, the following strategic objectives are relevant:

Strategic objective 2. To improve the condition of affected ecosystems. Expected impact 2.1. Land productivity and other ecosystem goods and services in affected areas are enhanced in a sustainable manner contributing to improved livelihoods.

Strategic objective 3. To generate global benefits through effective implementation of the UN Convention to Combat Desertification. Expected impact 3.1. Sustainable land management and combating desertification/land degradation contributing to the conservation and sustainable use of biodiversity and the mitigation of climate change.

The mentioned strategic objectives should be taken into consideration during the revision of the National Action Programme of Armenia.

## ***2.6 Concept on establishment of innovative financial-economic mechanisms in the environmental sector***

The Concept was developed with the aim to solve the problems of underestimation of biodiversity and ecosystems in Armenia, mitigate negative impacts on environment and ensure rational (sustainable) use of natural resources as well as increase investments and financial resources in the environmental field. The Concept highlights the issues of awareness raising about ESs, establishment of market relations, economic valuations, decision-making as well as integration of ESs in the national economy. It was adopted by the protocol decision N16 of the RA Government on 25 April 2013.

The proposals of the Concept are aimed at regulation of legal relations connected with the ESs, economic valuation of natural capital and development of a methodology for economic or monetary valuation of ESs. The focus is on introduction of innovative principles and “green” economy as well as on “green” reforms of tax legislation.

In particular, it is proposed to introduce a system of payments for ecosystem services, which in practice will not replace the system of environmental and nature use fees, but will be applied in parallel with it.

In the frames of the Concept the payment for ecosystem services (PES) is defined as a contractual transaction between a buyer of ecosystem services and/or the land use/land management practice, which ensures such services, and a seller. The types of buyers (for example, state, public/private entities, companies and others) shall condition the types of PES and the types of financial regulations. The public, private (self-organized) and trade schemes are defined in the list of PES schemes.

Based on the Concept the Action Plan to implement the objectives of the Concept on establishment of innovative financial-economic mechanisms in the environmental sector was developed and approved by the RA Government according to the protocol decision N47 dated 14 November 2013. It includes 8 actions planned for implementation till 2018.

## Chapter 3. Characteristics of the forestry sector of Armenia

### 3.1 Biodiversity and forests of Armenia

Armenia is a part of the Caucasus Ecoregion. The country is a typical highland country – the lowest point is at 375 m above sea level, whereas the highest point is 4,095 m above sea level. The mentioned altitudes and peculiarities of the relief have important implications to the climate of Armenia, which is characterized by aridity. The precipitation ranges between 250 – 1,000 mm annually. Five landscape types can be distinguished in the country: semi-deserts, steppes, forests and sub-alpine and alpine meadows.

In spite of its small size (29,74 thousand sq.km.) about 3600 species of high vascular plants and 1200 species of macroscopic fungi have been identified on the territory of Armenia. Among them 123 are endemic species. The flora of Armenia includes 106 endemic species, which makes about 3% of the total species composition of the flora. In the terrestrial fauna there are 329 endemic species, including 316 invertebrates. About 2000 species of plants have various useful properties and can be used as food and fodder, as well as medicinal, dye, oil-bearing, honey plants, resin-bearing plants. A number of animal species can be used for wool, meat and other purposes.

In the RA Red Book of Plants (adopted by decision N 72-N of the RA Government on 26 January 2010) there are descriptions of 452 species of plants and 40 species of fungi. Out of them 61 have been registered in the previous Red Book of the Union of Soviet Socialist Republics (USSR). Thirty five valuable plant species have become extinct from the territory of Armenia, at present a number of plant species of great interest is under the threat of extinction.

In the RA Red Book of Animals there are 153 species of vertebrate animals. Among mammals the most threatened species include Caucasian leopard (*Panthera pardus saxicolor*), Armenian mouflon (*Ovis orientalis gmelinii*), Bezoar goat (*Capra aegagrus*), brown bear (*Ursus arctos*), European marbled polecat (*Vormela peregusna*), otter (*Lutra lutra*), manul (*Felis manul*), striped hyena (*Hyaena hyaena*) and others.

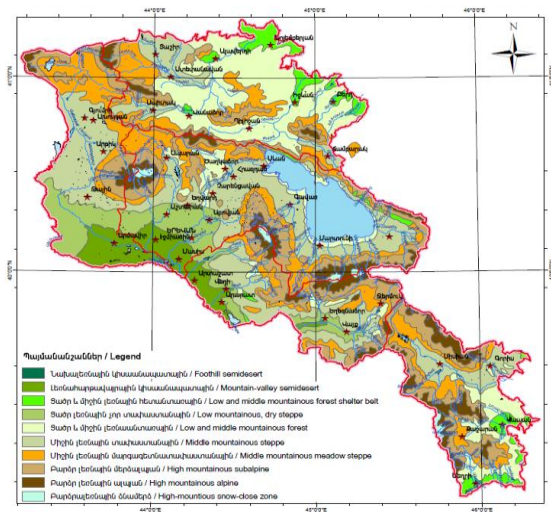
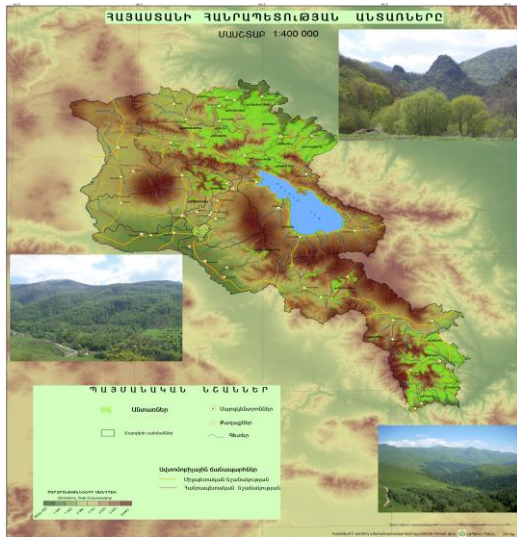
According to official data the forest lands of Armenia (without considering the forests in the structure of specially protected nature areas) make 334.3 thousand ha, out of which 277.3 thousand ha is covered by forests. The forests are mainly located on steep slopes at the altitudes ranging from 550 to 2400 m above sea level.

There are more than 200 types of forest communities, 274 species of trees and bushes occur in forest areas, out of which the main natural forest species include oriental beech (*Fagus orientalis*), Georgian oak (*Quercus iberica*), oriental oak (*Quercus macranthera*), Caucasian hornbeam (*Carpinus caucasica*) and pine (*Pinus Sosnovski*, *Pinus kochiana*).

The other tree species such as birch, elm, maple, ash, pear, apple, yew, hazel-nut, plane, walnut and others are presented as the mixture with the main forest species and occupy 8,4% of the forest covered territory.

The average bonitet of the forests of Armenia is 3.6, the average canopy cover is 0.55, the average standing stock is about 125 m<sup>3</sup>/ha, the average annual growth rate is about 1.3 m<sup>3</sup>/ha. The wood biomass per capita is about 12 m<sup>3</sup>.

## Forests and landscape zones



Source. "State Forest Monitoring Center" SNCO

### 3.2 Forest policy

Over the recent decade some key documents for the RA forest sector have been developed such as the National Forest Policy and Strategy (2004), National Forest Program (2005), Illegal Loggings Action Plan (2005), State Forest Monitoring Program (2006), a number of by-laws and other documents.

The RA National Forest Policy sets forth that forests are national wealth and should serve also to future generations through safeguarding sustainable management of forests and forest areas.

The main aim of the National Forest Program is to protect forest ecosystems, rehabilitate degraded forest ecosystems, continuous and effective use forest resources and implementation of the policy on sustainable forest management. Important objectives of the program include the activities on mitigation and prevention of illegal loggings, eradication of

economic and social causes of illegal loggings, improvement of environment, institutional improvement, scientific-educational development and capacity building.

### **3.3 Forest code**

In order to achieve the strategic objectives of the RA National Forest Policy the Forest Code was developed (2005), which regulates the legal relations in the field. According to the Code the forests of Armenia are state property (though it is possible to have community and private forests, Article 4) and they are managed by state structures.

According to the Forest code the forests in Armenia are classified by their purpose-oriented significance as protection forests, forests of special significance and production forests. The following forms of forest use can be applied in the forests: harvesting of wood and secondary forest products, use of non-wood forest products, activities on reproduction of fauna, implementation of scientific-research activities, forest use for health, sport, recreation and tourism purposes.

According to the Code the forest use in the forests in the structure of specially protected nature areas is regulated by the RA Law on specially protected nature areas.

### **3.4 Draft RA Law on SPNAs (2014)**

The aim of the Law on SPNAs is to ensure prevention or mitigation of negative anthropogenic impact on natural development of ecosystems and their components in the specially protected nature areas of the Republic of Armenia as well as their effective management.

In comparison with the acting Law (2006) the revised draft more clearly regulates the protection regimes and allowed forms of use in SPNAs, including ecotourism, the competences of their management as well as the provisions on buffer zones, ecological corridors, natural monuments, biosphere reserves and protected landscapes.

The draft Law envisages wider opportunities for local self-governing bodies in terms of participatory management especially for the categories of natural monuments and protected landscapes.

According to the draft Law (Article 7, provision 5) the SPNAs located in forest lands (except reserves and national parks) can be managed by the authorized body dealing with the management of forest sector.

### **3.5 Forest management**

The state forests of Armenia are mainly managed by the RA Ministry of Agriculture and the RA Ministry of Nature Protection (Table 1) including the system of SPNAs, which includes mainly forest landscapes and up to 60-70% of the flora and fauna of the country.

The RA Ministry of Agriculture is the state management body authorized by the RA Government in the fields of forest protection, guarding, reproduction and use. About 75% of forest areas including 13 sanctuaries (out of total 27, see Appendix 2) is managed by “Hayantar” State Non-Commercial Organization (SNCO) and its 19 branches (Forest Enterprises) – all under the Ministry of Agriculture.

State forest control is vested with the State Forest Inspection under the RA Ministry of Nature Protection. About 25% of forest areas in the structure of SPNAs (Dilijan and Sevan National Parks, Khosrov Forest State Reserve, Zangezur Biosphere Complex including Arevik National Park and Shiahogh State Reserve as well as 7 state forest sanctuaries) is managed by the Bioresources Management Agency and respective subordinate SNCOs – all under the RA Ministry of Nature Protection.

**Table 1. Main institutional structures of the RA forest management sector**

Structure	Functions
RA Ministry of Agriculture “Hayantar” SNCO with 19 branches (Forest Enterprizes)	Implementation of the state policy on forest protection, reproduction and use, safeguarding of protection, guarding, reproduction and effective use of the RA state forest lands.
RA Ministry of Agriculture “State Forest Monitoring Center” SNCO	Implementation of monitoring of illegal loggings and state forest monitoring.
RA Ministry of Agriculture Department of Forestry	Development of state policy on protection, reproduction and use of forests.
RA Ministry of Nature Protection Department of Environmental Protection	Development of state policy and strategy in the environmental field, definition of program principles and approaches of the tactics, development of the principles on selection of SPNAs, definition of their boundaries and protection regimes.
RA Ministry of Nature Protection State Environmental Inspection	Control over implementation of the instructions and requirements set forth by environmental legislation.
RA Ministry of Nature Protection Bioresources Management Agency	Coordination of activities on SPNA protection and sustainable use, support to development and implementation of the state policy. Provision of services for implementation of the forest management policy, in particular safeguarding implementation of works on state forest stock-taking, inventory and forest management planning.

The approval of the measures on protection, guarding, reproduction and use of forest resources is vested with the RA Ministry of Agriculture. The annual allowable cut volumes are planned and approved upon getting respective proposal from “Hayantar” SNCO. Forest management plans are developed according to the RA Forest Code and the Instruction on Development of Management Plans for Forest Enterprizes approved by the RA Government. The forest management plans define the planning and implementation of the locations, volumes and timeframes of complex measures on protection, guarding and use of forests for a 10-year period.

### **3.6 The problems of the forestry sector**

There are numerous problems in the forestry sector of Armenia conditioned by high demand for wood and poverty in forest adjacent communities, continued illegal loggings, non systematic forest use, slow dynamic of institutional reforms, inappropriate status and structure of “Hayantar” SNCO, insufficient financial and human resources and other causes, which results in uneffective management and reduction of qualitative and quantitative indicators of forests.

#### **Policy**

The state forest policy is not aimed at multi-functional forest use and ecosystem approaches in forest management. The services provided by ecosystems are not considered as alternative directions of forest management, respective programs on valuation and provision of ecosystem services as well as generation of financial flows have not been adopted and implemented. There are no provisions on ESs in the forestry sector policy and legislation documents as well as separate documents to regulate ESs.

The developments in the sector do not meet the requirements and guidelines of international conventions, in particular, in the fields of implementation of the criteria of sustainable forest management (SFM), revision of national legislation, land use and land zonation schemes to apply the tools on protection and spacial planning of natural habitats, appropriate engagement of local population in decision-making and others (Aichi Biodiversity Targets, CBD Stragetig Plan 2011-2020).

#### **Legislation**

According to the Forest Code the forests in Armenia are classified by their purpose-oriented significance as protection forests, forests of special significance and production forests. However, the category of production forests does not support sustainable forest management given the mountainous character of forests in Armenia and the presence of mainly forests of protection significance.

Regulations with clear environmental orientation are missing in the list of regulations of forest management sector, such as those aimed at mitigation of climate change and increase of resilience, high conservation value forests and forest protected areas.

The ecosystem approaches in forest management and the provisions on valuation of ESs provided by forests and forest SPNAs and enforcement of a related payment system are not defined in the RA Forest Code and the Draft Law on SPNAs, which are two key documents regulating forest management in Armenia.

#### **Management**

The functions of “Hayantar” SNCO and “State Forest Monitoring Center” SNCO under the RA Ministry of Agriculture, and Bioresources Management Agency and State Environmental Inspection under the RA Ministry of Nature Protection in the field of control and monitoring of forest biological diversity and illegal loggings still needs clarification.

The revision of the current status of “Hayantar” SNCO is the key for reforms of forestry sector management as the current status of SNCO limits the opportunities and competences of the main forest management entity of the country when it comes to decision making and their

implementation. It is suggested to restructure the SNCO as state forest service or state forest committee.

The structure of “Hayantar” SNCO does not meet its objectives, respective necessary structural units are missing (for example, departments on SPNA management, development of forest management plans, ecotourism, multi-functional forest use and others), the technical and human capacities are low (insufficiency of qualified specialists, technical means and equipment).

The cooperation is not sufficient in involvement of communities and local population in forest management and decision-making processes, more active measures on awareness raising are needed.

The lack of management plans in some forest enterprises results in forest use without appropriate justifications. The management plans do not define respective regimes of SPNA management and protection (13 forest sanctuaries), consequently at present no respective regimes are applied.

The scales of complex measures on forest reproduction and forest rehabilitation such as seed production, soil preparation, afforestation, irrigation, agrotechnical service, maintenance and others are still not sufficient. The pest and disease control without regular forest pathological surveys cannot be preventive and regulated. The technical means and equipment as well as the measures on public notification are not sufficient for prevention of forest fires.

## Planning

The planning of activities in forest enterprises is defined in respective management plans, however the forest management plans (FMP) have not been developed for all forest enterprises.

The FMPs are mainly not aimed at multi-functional forest use, the use of non-wood forest products by local population is not regulated, related clear estimates and planned activities are not sufficient (except secondary forest use).

In the FMPs developed so far the areas of forests having high conservation value have not been defined, no special measures have been developed for ecotourism and functional zonation of the areas. There are no planned programs on safeguarding migration of animals, stock-taking of biological resources and defining the quotas for their use, running of hunting enterprises as well as sustainable use of non-wood forest products.

In the FMP integrated measures on safeguarding integrity of ecosystems and ecological processes as well as ecosystem services are not defined, clear quotas of use of natural resources (non-wood resources) and biological diversity are absent. Forest stock-taking, forest cadaster, biodiversity monitoring and special scientific research on forests are not sufficient. There are no sufficient data on forest stock-taking, ongoing changes, diseases and pests, monitoring criteria, possible impacts of climate change and other surveys.

During the planning special-functional peculiarities are not taken into account, the activities are mainly planned according to the forest significance. However, in various forest areas within the same category of purpose-oriented significance different functional zones of active economic intervention, recreation, tourism development, strict protection, rehabilitation and others should be designated dependent upon the state of the given area in the given period.

### 3.7 Threats and risks

Due to various socio-economic circumstances and high demand for wood, the total logging volumes still exceed the volumes of legal cuts. The accessibility of wood, high price of energetic resources, needs of socially insecure population and their low solvency contribute to that.

Wood continues to be the main source of fuel for the population of forest adjacent communities. Collection of forest herbs and berries, hay-making and grazing are not clearly regulated.

The RA Governmental decision (1535-N, 27 October 2011) on free of charge provision of 8 m<sup>3</sup> of residual fuel-wood annually to forest adjacent communities has had certain positive impact on prevention of illegal loggings. However, it is necessary to revise the issues on provision of the means of transportation, distance of allocated cutting areas, wood transportation and other related technical issues.

Valuable forest areas are lost due to overexploitation of forests, non-regulated loggings, grazing, hay-making, land occupation and other causes, changes in species composition and structure occur in the forests, the stands lose their capacity of natural regeneration and their productivity is reduced.

In the result of various natural and anthropogenic impacts the natural regeneration of valuable forest species of oak, beech and Caucasian pine is not sufficient, the stands with domination of *Taxus baccata*, *Corylus colurna* and other rare tree species have been drastically reduced, at present they occur in the form on islands and individual trees.

Due to destruction of forest areas the ecological balance of environment is disturbed. In the logged areas and adjacent territories the processes of landslides, avalanches, mudflows, drying of springs and others are observed. The intensity of erosion and mudflows has increased; they cause damage to communities and areas of agricultural significance. In the result of overexploitation of forest ecosystems and grazing often the steppe-meadow vegetation types replace the high-value forest species.

The reduction of forest covered areas results in fragmentation of the areas of populations of plants and animals and loss of genetic diversity, increased carbon dioxide in atmosphere and the function of forest to absorb and accumulate carbon dioxide from atmosphere is reduced. Instability of forest ecosystems affects the productivity of agricultural crops as well as the diversity of plant composition in hay-making areas and pastures.

## Chapter 4. Forest economy and nature use

### 4.1 Gross domestic product and environmental protection

In Armenia in the period of 1998-2013 the volumes of nature protection and nature use fees increased more than 50 times. According to the data of 2013 the nature protection and nature use fees made 35.065 billion Armenian Dram (AMD), whereas the environmental expenditures were about 10 times less making just 3.9 billion AMD.

In various sectors a number of environmental funds have been established for implementation of environmental projects/programs, in particular:

- In 2004 by the RA Governmental decision N 891-N dated 10 June 2004 the Forest Rehabilitation and Development Fund was established (circulating amount 3,553.4 million AMD) with the main aim to support forest rehabilitation and create favorable conditions for development of forests in Armenia.
- In the period of 2005-2011 according to provision 65 of the Law on Concessions the Fund of Environmental Protection was functioning with the aim to accumulate respective safeguard amounts for recultivation of areas damaged due to underground resources exploitation as well as greening, tree planting and implementation of construction works on the mentioned areas.
- Since 2005 the Target Environmental Fund has been functioning as an extra-budgetary account. In the period of 2005-2012 a number of important environmental projects and activities were implemented thanks to the voluntary payments, contributions and donations by legal and physical persons of the Republic of Armenia.
- In 2011 by the RA Governmental decision N 517-N dated 28 April 2011 the Fund on Restoration, Protection and Development of Lake Sevan was established with the aim to support restoration of the strategic resource of freshwaters of Lake Sevan, its replenishment, protection, natural development and use as well as acquisition of necessary means to ensure clean water.

**Table 2. Annual reports on implementation of the RA state budget**

Budget indicator	2008	2009	201	2011	2012	2013
Allocations from the RA state budget for environmental protection (billion AMD)	3.0	2.6	2.3	4.4	3.8	3.9
Actual inputs to the state budget from nature protection and nature use fees (billion AMD)	6.12	9.97	9.10	12.17	26.13	35.065
The proportion of target-oriented use of fees (percentage)	49.0	39.1	53.8	54.5	N/A	N/A

Source: RA National Statistical Service

At the same time, by the indicator of expenditures aimed at environmental protection in comparison with the gross domestic product (GDP) Armenia is one of the last countries in the list of the Eastern Europe, Caucasus and Central Asia countries: in 2013 the incomes of the state budget made 3.3% and expenditures – just 0.4% of the budget.

## 4.2 Nature protection and nature use fees

According to the RA Law on Nature Protection and Nature Use Fees the nature protection fee is an obligatory payment to the state or community budget for implementation of nature protection measures, use and (or) sale of natural resources, which are considered state property.

According to the same law the nature use fee is a payment to the state budget for efficient, complex use of natural resources considered state property or a compensation payment for use and (or) sale of these natural resources.

There are the following types of nature protection fees:

- a) for emission of harmful substances to the environment (air and water basins);
- b) for placement of production and consumption wastes in the environment according to the established order;
- c) for the commodities causing damage to the environment.

There are the following types of nature use fees:

- a) for use of water;
- b) for solid underground resources except metallic underground resources, hydrated resources, underground freshwater and mineral water resources and other saline extracted resources;
- c) use of biological resources;
- d) royalty: for sale of extracted metallic underground resources and products resulting from their processing.

According to the RA National Statistical Service in 2012 the fees for use of biological resources made just 0.7% of total nature use fees, the fees for use of water – 1.2% and the fees for extraction of underground resources – 98.1%, which was mainly conditioned by introduction of royalties according to the RA Law on Underground Resources adopted in 2011. However, due to the circumstance that the Law on Concessions was abolished, the proportion of other taxes reduced.

**Table 3. Nature protection and nature use fees by types, 2007-2012, thousand AMD**

	2007	2008	2009	2010	2011	2012
<b>Nature protection fees</b>	572 726.6	569 582.2	591 105.6	735 145.5	803 481.9	546 467.3
including						
For emission of harmful substances to water basins	340 564.5	303 710.8	279 323.6	283 830.5	366 106.4	223 554.0
For emission of harmful substances to atmosphere from stationary sources	176 363.4	169 014.1	203 069.5	356 452.7	293 669.0	163 388.0
For wastes placed in waste accumulation sites	30 484.8	46 639.1	43 628.9	53 304.4	64 855.4	66 350.4
For commodities causing damage to the environment	25 313.9	50 218.2	65 083.6	41 557.9	78 851.1	93 174.9

	2007	2008	2009	2010	2011	2012
<b>Nature use fees</b>	3 533 230.0	3 309 455.3	2 788 349.9	4 073 450.3	4 792 661.9	16 767 117.1
For use of water	170 873.2	193 299.9	154 032.6	159 007.4	166 883.2	198 118.6
For solid underground resources, hydrated resources, underground freshwater and mineral water resources and extracted salt resources	3 299 659.8	3 051 837.0	2 558 761.5	3 831 084.6	4 538 053.8	16 444 535.1
For use of biological resources	62 697.0	64 318.4	75 555.8	83 358.3	87 724.9	124 463.4
<b>Total RA</b>	<b>4 105 956.6</b>	<b>3 879 037.5</b>	<b>3 379 455.5</b>	<b>4 808 595.8</b>	<b>5 596 143.8</b>	<b>17 313 584.4</b>

Source: RA National Statistical Service

**Table 4. Nature protection and nature use fees by years, million AMD**

Year	Absolute value	Comparison with the previous year (%)
2012	17313.6	309.4
2011	5596.1	116.4
2010	4808.6	142.3
2009	3379.5	87.1
2008	3879.0	94.5
2007	4105.9	99.7
2006	4117.2	120.1
2005	3428.3	198.3
2004	1728.6	152.6
2003	1132.6	99.4
2002	1139.1	133.4
2001	853.7	88.9
2000	960.5	81.6

Source: RA National Statistical Service

**Table 5. Fees for use of biological resources in 2012 by types, thousand AMD**

	Total	Including by types of biological resources						
		Fuelwood	Construction wood	Frogs	Other animals	Fish	Crawfish	Pastures
<b>Total RA</b>	<b>124 463.4</b>	<b>23 521.2</b>	<b>9 239.5</b>	<b>420.0</b>	<b>8 176.0</b>	<b>106.2</b>	<b>82 888.4</b>	<b>112.1</b>

Source: RA National Statistical Service

As it is seen from the definitions of the law as well as from the dynamics of nature use fees, the nature use and nature protection fees do not include amounts paid for any ecosystem service.

### 4.3 Forest economy activities

In 2012 the volume of forest economy activities implemented in the Republic of Armenia made 1, 187.5 million AMD, of which 98,7% was the economic activity.

The areas subject to complex cleaning made 986.7 ha and the area of not cleaned loggings areas - 97.8 ha.

**Table 6. Volumes of harvested wood by types of cuttings, 2012**

Loggings	Logged areas, ha	Spent amount, thousand AMD	Volume of harvested wood, solid m <sup>3</sup>		Out of which envisaed for use	Volume of wood harvested by other wood harvestors, solid m <sup>3</sup>
			Total	Out of which construction wood		
Thinning	79.2	32.6	948.9	433.6	948.9	-
Transitional	573.8	236.4	12 825.0	1 499.0	12 825.0	-
Sanitary	718.4	276.0	17 671.9	1 426.2	16 498.1	-
Other	46.1	-	8 096.6	228.1	7 222.7	6 633.0
<b>Total</b>	<b>1 417.5</b>	<b>545.0</b>	<b>39 542.4</b>	<b>3 586.9</b>	<b>37 494.7</b>	<b>6 633.0</b>

Source: RA National Statistical Service

The table above shows that the loggings (transitional and sanitary) made the main volume of forest economy activities. The volume of thinnings is small; at the same time the previously

logged areas are characterized by high volumes of natural forest regeneration and need thinnings. Implementation of more works on thinning will allow improving forests and provision of relatively cheap additional fuel-wood through increased volumes of legal annual loggings.

**Table 7. Use of non-wood raw materials and resources, 2012**

Type of use	Total, ha	Financial incomes, thousand AMD
Hay-making	68.5	643.5
Grazing	55.5	251.8
Collection of wild fruits	20.0	234.7
<b>Total</b>	<b>144.0</b>	<b>1 130.0</b>

Source: RA National Statistical Service

The data in the tables show that the incomes from the forestry sector do not include amounts for provision of ESs or their maintenance and the amounts coming from use of non wood forest products (NWFP) and multi-functional use of areas (ecotourism, recreation, green funds and others) are miserable.

## Chapter 5. Forest ecosystem services

### 5.1 Interrelation of environment and forest

Forest is formed in the result of the complex interrelations of biosphere components and in its turn it interrelates to these components. Forest is a part of the common natural wealth (also the national natural capital) and it is in direct interrelation with the socio-economic systems.

As the result of the complex interrelations with various components of natural complexes the forests have the functions of soil protection, water protection, climate regulation, safeguarding biological diversity, prevention of natural disasters and numerous other functions.

The interrelation of forest ecosystems with the main components of biosphere is expressed in the following forms:

- Atmosphere/climate: the function on climate regulation, absorption of carbon dioxide from atmosphere and accumulation of carbon, photosynthesis, regulation of humidity and temperature balance, reduction of forest vulnerability caused by climate change.
- Soil and water resources: soil formation, prevention of soil erosion, land-slides and desertification, regulation of surface and underground water flows, safeguarding qualitative and quantitative features of water, prevention of water loss.
- Biological diversity: safeguarding the balance of ecological processes and availability of genetic resources, safeguarding habitats for species and their interrelations, prevention of biodiversity vulnerability, provision of food and fodder.
- Underground resources: formation of hydro-geological conditions, relief, land cover and others.

### 5.2 Services provided by ecosystems

In general the services provided by ecosystems are of provisioning (food, clear water, clean air, fuel, raw materials), regulating (climate, prevention of natural disasters and outbreaks, shelters, habitats, prevention of soil erosion), cultural (aesthetic, religious, scientific, educational, social and spiritual values, formation of traditions, recreational resources) and supporting (soil formation, photosynthesis, circulation of nitrogen, carbon, oxygen and water) character.

The function of forest on biosafety is crucial also for the social system through support to formation of the social and economic capital:

- Health of population: clean environment, healthy psychological atmosphere, possibility for recreation and rehabilitation.
- Cultural and spiritual values: scientific, educational, emotional, historical and spiritual environment, traditions and others.

In terms of biosafety of population and improvement of the standards of living, the following ESs provided by forests are especially important in Armenia:

- Provision of fuel-wood: due to high prices of power-bearing substances at present fuel-wood is the main source of energy for the forest adjacent communities. In average, each household uses approximately 10 m<sup>3</sup> of fuel-wood annually. At present, according to the decision of the RA Government annually 8 m<sup>3</sup> of residual fuel-wood is provided to households free of charge; the population should ensure its collection and transportation at their own expenses.

- Provision of non-wood forest products: food (plants and animals), medicines, forest fruits and berries, edible plants. At present the majority of population uses fruits and berries mainly for personal needs. A part of the collected NWFPs is marketed in local markets, often they are not sold and get spoiled. Establishment of forest fruit-berries collection points and formation of market are among the ways to solve the problem.
- Provision of water: forests have direct influence on water balance, quantitative and qualitative features of drinking water resources. Watersheds covered by forests not only feed springs, but also regulate surface flows (rivers, streamlets) as well as provide water to be used for irrigation and energetic purposes. However, the protection of forest ecosystems in respect of their function to accumulate and distribute water resources, is not reflected anyhow in the economic system of fees and taxes.
- Tourism: development of eco-tourism has great perspectives in connection with forest ecosystems. In forest areas there are also numerous cultural monuments, traditional lifestyle and crafts are still maintained in communities, which can support to development of also cultural, agro and ethnotourism (or their combination) contributing to poverty reduction as well as development of infrastructures and services. Tourism can become the main source of income for the local population providing respective services as well as contribute to increased income to the state budget.
- Economic activity: agriculture, infrastructures, livestock breeding, bee-keeping and others.
- Mining: engagement of this sector in the system of payments for ESs is very risky in terms of compensation of real damages caused to forests and realistic assessment of irreversible changes of forest ecosystems.

### 5.3 Comparative assessment of forest ecosystem services

At present the complex significance of forest ESs and especially their role in safeguarding livelihoods has no actual economic reflection, which results in underestimation of ecosystems, their disturbance and reduction of biological diversity.

At the same time forest ecosystems are an important component of the national natural and social capital and ecological services provided by forest ecosystems should contribute to national economy and support further protection and rehabilitation of the environment and biological diversity.

The table below presents a comparative characteristic of main ecosystem services provided by forests for the cases of business as usual (BAU) and sustainable ecosystem management (SEM).

**Table 8. Comparative characteristic of forest ecosystem services in cases of BAU and SEM**

Types of ecosystem services	Gaps and risks: business as usual	Opportunities: sustainable ecosystem management
<b>I. Provisioning services: goods provided by ecosystems</b>		
Provision of food (fruits, berries, edible plants, fish, animals and others)	Non-regulated use, illegal hunting and collection, loggings, reduction of habitats, loss of biodiversity	Improvement of biodiversity habitats, increase in the quality and quantity of ESs, improved standards of living of local population

Water (drinking, irrigation; springs, streamlets, mineral waters)	Illegal loggings, erosion, avalanches, drying of springs, shortage of drinking and irrigation water, loss of water biological diversity	Regulation of water courses through afforestation, forest restoration and protection, improvement of qualitative and quantitative features of water, provision of water for drinking and irrigation to local population
Raw materials (fuel-wood, construction wood, fodder, others)	Reduction of forest cover, overgrazing, economic activities aimed at getting short-term benefits	Sustainable forest management, maintenance of forest features, long-term rational use of resources
Genetic resources	Illegal collection, non-regulated and illegal loggings, depletion of resources	Protection of forest covered areas and genetic resources, prevention and elimination of the risks of their reduction
<b>II. Regulating services: benefits obtained from regulation of ecosystem processes</b>		
Regulation of air quality (absorption of dust and emissions)	Reduction of the capacity to regulate the air quality and climate and to absorb carbon due to changes in forest cover, structure and composition of forests	Improvement of air quality, increased capacity and scales of climate regulation thanks to functioning of respective SPNA regimes, increased forest cover, reduced loggings and forest protection
Regulation of climate (regulation of temperature balance and humidity, absorption of carbon dioxide (CO <sub>2</sub> ))		
Regulation of surface and underground waters (intensity and seasonal distribution of flows, safeguarding of natural drainage, prevention of draughts)	Illegal loggings, drying of springs, shortage of irrigation water, frequent draughts	Regulation of water flows, improvement of qualitative and quantitative characteristics of waters, safeguarding water for irrigation, technical and energetic purposes, safeguarding vital needs of local population
Natural disasters (draughts, land-slides, mudflows, dust clouds, fires and others)	Increased frequency of draughts, mudflows, land-slides due to changes in forest cover, structure and composition of forests	Mitigation and prevention of consequences of natural disasters thanks to increased forest cover, forest protection and restoration
Erosion (removal of the upper soil layer, formation of gorges)	Soil erosion due to overexploitation of pastures and hay-making areas, non-regulated and illegal loggings	Prevention of natural erosion through afforestation, forest restoration and protection, retention of CO <sub>2</sub> in soil and safeguarding its increase

Safeguarding habitats (safeguarding biological cycles of populations, migration and others)	Reduction of biodiversity species and their quantities, reduction of forest cover, changes of the structure and composition of forests, increased fragmentation	Restoration of habitats, maintenance of migration routes of animals, functioning of special regimes of protection
Prevention of pests, diseases and outbreaks	Dissemination of pests and diseases and reduced quality of seeds due to non-regulated and illegal loggings	Planning of measures to control pests and diseases, improvement of their efficiency, improved state of stands and capacities of natural regeneration of forests
<b>III. Cultural services: intangible benefits provided by ecosystems such as spiritual enrichment, implementation of scientific-research activities, recreation, aesthetic values and others</b>		
Aesthetic values	Changes in forest landscapes and natural views due to loggings, erosion, mudflows and pests/diseases	Forest restoration, increase of forest covered areas, safeguarding the principles of participatory management and engagement
Spiritual and religious values	Degradation of cultural landscapes, changes of forest landscapes	Awareness raising, implementation of educational programs, restoration of cultural landscapes
Scientific and educational values		
Recreation and ecotourism	Non-regulated toursims, reduction of forest cover, changes of landscapes and pollution	Implementation of programs on tourism management, recreational zoning of areas, involvement of communities, strengthening local capacities, provision of services
<b>IV. Supporting services: the services needed for functioning of the other ecosystem services</b>		
Soil formation	Forest degradation, reduction of forest covered areas, erosion, disturbed soil formation	Restoration of degraded forests, increase of forest covered areas, prevention of soil degradation, improvement of conditions for the growth and restoration of forests
Circulation of nutrients	Disturbance of circulation of nutrients and reduced productivity of soils due to changes in forest cover, structure and composition of forests	Prevention of illegal loggings and grazing, non-regulated tourism and use of NWFP, safeguarding diversity of flora composition of hay-making areas and pastures
Water circulation	Non-regulated loggings, disturbance of water absorption and retention regimes of stands, drying of springs, erosion, floods	Increase of forest covered areas, prevention of illegal loggings, maintenance of stand capacities of natural regeneration, balancing water circulation



Photosynthesis	Reduction of forest cover, reduced absorption of carbon dioxide, disturbance of energy flow, reduced production of oxygen	Forest restoration, increase of forest covered areas, increased absorption of carbon dioxide, increased volumes of accumulated organic substances, regulation of the flows of energy and substances
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# Chapter 6. The road map and activities on full TEEB assessment of the forestry sector and integration of ES considerations

## 6.1 Policy and legislation

Taking into consideration the analysis of the current state of legislative and policy frameworks of the forestry sector of Armenia as well as available information the following steps should be taken to formulate a TEEB strategy and concept as well as financial mechanisms and markets for payments for ecosystem services:

- To ensure fulfilment of obligations and proposals derived from international conventions and treaties through their integration in the national strategic documents and programs on their implementation (the UN Convention on Biological Diversity, Aichi Biodiversity Targets, Strategic Plan for Biodiversity 2011-2020).
- To revise the RA State Forest Policy and Strategy (2004) and the National Forest Program (2005) to make them compliant with the SEM strategy and current approaches of international experience and to ensure a platform for sustainable management, monitoring and law enforcement in the field of forest use.
- To pay special attention at zonation of forest areas, expansion of specially protected nature areas and ecological corridors, development of green economy and infrastructures, economic valuation of ESs, formation of markets and poverty reduction in the processes of development of strategic documents and decision-making.
- To make necessary changes in the RA legislation, in particular to revise the RA Forest Code (2005) and develop a law on payments for ESs. The law should regulate the types of ESs, payments, mechanisms, rates, rights and obligations. At present the issue of developing a framework law on environment is under discussion. The provisions on ESs can be defined in the mentioned law under a separate chapter. Based on that respective by-laws can be adopted (for example, on methodology for economic valuation of ESs and others).
- To make changes in other respective laws based on the provisions regarding ESs stipulated in the law on ESs or the framework law. It is necessary to develop respective by-laws on the types of ESs, payments, mechanisms, rates, terms, calculation and other relevant provisions.
- To analyze the system of nature use and nature protection fees and revise the rates of payments for the damage caused to nature. For example, the rates (compensation) should be much higher if the economic activity causes irreversible changes to ecosystems (for example, open mining in a forest covered area) or if it is implemented in an area adjacent to certain ecosystem (forest area) and disturbs biodiversity due to the noise and other factors, pollutes waters and others. In the system of nature protection fees the fee for ecosystem degradation (and consequently reduction of provided ESs) should be clearly expressed; it can be rather high and in some cases put under question the expediency of a given economic activity.
- To implement priority activities of the Action Plan (with respective activities and timerame) developed and adopted on the basis of the Concept on Establishment of Innovative Financial-Economic Mechanisms in the Environmental Field (adopted by the RA Government on 25 april 2013, protocol decision N16).

## 6.2 Institutional problems and management

The sustainability of forest ecosystem management should be based on effective use of benefits and services provided by forests as well as a comprehensive assessment of flora and fauna diversity, soils, waters, landscapes, relief, atmosphere and others.

In order to improve the effectiveness of forest sector management it is necessary to take the following steps:

1. Revision of the status of “Hayantar” SNCO:
  - Establishment of a state forest service (or state forest committee).
  - Revision of the status of existing forest enterprises (branches of “Hayantar” SNCO) to give them the status of legal person in order to create favorable conditions for implementation of forest management plans.
2. Revision of the structure and management arrangements of “Hayantar” SNCO:
  - Establishment of a department on management of specially protected nature areas in the structure of “Hayantar” SNCO.
  - Establishment of a sub-division on forest management planning in the structure of “Hayantar” SNCO to deal with development of forest management plan, zoning of forest areas and updating respective information.
  - Establishment of a department on economic valuation of ecosystem services, coordination of programs on NWFP, secondary forest use and socio-economic programs; the main objectives should include safeguarding of integrated management of natural resources and application of international experience.
  - Development of human and technical capacities in “Hayantar” SNCO in terms of sustainable forest management.
3. Zoning of forest areas, monitoring of biological diversity, definition of various management regimes and multi-purpose forest use:
  - It is necessary to carry out a national inventory of forests in Armenia to get updated data not only on technical characteristics and wood resources of forests, but also on ecosystem services provided by forests. Such inventories should be carried out once in each ten years. Last time the inventories have been carried out for a number of forest enterprises, based on those respective forest management plans have been developed and approved; the implementation timeframes of many of them are expiring. It is expedient to carry out a total inventory of all forests of Armenia to get complete data: later on it will serve as a basis for forest cadaster maintenance. The inventory should include also biological diversity to serve as a basis for further monitoring of biological diversity.
  - It is necessary to do zoning of forest areas based on the inventory data. In the result the areas subject to use and the valuable areas subject to protection will be distinguished. The zoning can become a basis for further implementation of economic activities as well as to discuss the cases when the long-term benefits obtained from ecosystem services provided by ecosystems exceed the benefits obtained from economic use of the given area. Some principles of zoning of SPNAs are presented in Annex 3.
  - Multi-purpose forest use should be applied in forest enterprises (branches) to support biodiversity protection, ecotourism development, and use of forests for recreational and scientific-educational purposes.
  - Thanks to scientific justifications and zoning the natural monuments, separate valuable and pristine forest areas including high conservation value forests under the management of “Hayantar” SNCO should be managed according to respective regimes

through designation of specially protected nature areas or ecological corridors to expand the system of SPNAs in the country.

- Biodiversity management should be based on accurate scientific data and reliable monitoring of flora and fauna species, for which a system of biodiversity monitoring should be established.
- It is necessary to establish the mechanisms of involvement of communities, non-governmental organizations and private sector to serve to the benefits of various social groups and communities, at the same time to ensure participatory management and rational use and restoration of resources.

### ***6.3 Forest management planning***

Ecosystem approaches should be applied in forest management when the entire forest ecosystem with all biotic and abiotic components is considered the object of management, rather than a stand or wood production.

For that purpose the process and acting instruction on development of forest management plans should be revised. The management plans being currently developed should include the programs on protection, scientific research, biodiversity monitoring, ecotourism, organization of hunting grounds, use of non-wood forest products and secondary forest use by the forest adjacent communities.

In order to ensure effective protection of biological diversity it is necessary to make the forest management measures compliant with and integrate them in the other plans and programs of territorial management (community development, mining, tourism and watershed management, disaster management, energy management and other plans).

In the forest management plans the issues of forest productivity, restoration, improvement of forest composition should be emphasized along with the measures on maintenance of regulating ecosystem services provided by forests and forest genetic pool.

The management plans should have separate business plans (or economic justifications for implementation of the plans), which should define the economic policy of forest enterprises, their capacities, financial sources and tools including payments for ESs and other alternative sources of income.

### ***6.4 Socio-economic aspects of forest management***

The socio-economic measures of forest management should be clearly derived from nature protection priorities as further degradation of resources will result in loss of not only regulating services of forests, but also their economic and social significance.

Forest ESs have economic value and should be integrated in the general system of economy in the country. The compensation fees envisaged for provision of ESs or their maintenance encourage additional financial flows aimed at protection of landscapes and biological diversity.

In theory, the main sources of financing for ES maintenance include the state allocations in the field, financial means of organizations causing pollution (water resources, mining and others), donor organizations, nature use fees, land owners, sponsors and others.

The long-term economic strategy of ESs should be aimed at solution of problems in an ecologically rational, socially fair and economically profitable way. The payments for ESs in

future can form revolving ecological funds to support provision of financial means for nature protection as well as establishment of the bases for compensation funds and green economy.

In the process of formulation of a mechanism of payments for ESs it is necessary to clearly define the presence of respective ESs and their types, objectives of their valuation, the amounts to be paid by their consumers to the ESs providers as well as the legal and institutional frameworks with consideration of local peculiarities and socio-economic situation.

The analyses of the current socio-economic situation in Armenia show that in the near future the practice of introduction of payments for ESs in the forestry sector can have certain difficulties and be just of a partial character. At least, it will be difficult or impossible to apply the ES payment system in the communities, which use forest ESs. However, it is possible to consider application of the system for the subjects of economic activity (in particular, hydropower plants, mines and others) with use of collected means for maintenance and restoration of ESs.

The system of payments for ecosystem services is expedient to introduce only after revision of the system of nature use and nature protection fees (NUPF). Otherwise, the insufficient system of NUPF can cause obstacles to the system of payments for ecosystem services. For that purpose it is necessary to analyse the functioning NUPF system and discuss the possibilities of introduction of the system of payments for ESs, which should include payments for not using the ecosystems in contrary to the system of NUPF, which implies payments for use of resources or damage caused to the environment.

In general, it is necessary to increase state budget allocations to nature protection (in 2013 they made 0.4% of the budget), which are aimed at restoration and protection of ecosystems and consequently contribute to maintenance of ecosystem services provided also by forests.

### ***6.5 Transfer from the current forest management practice (BAU) to sustainable ecosystem management (SEM)***

In the forestry sector of Armenia the following actions are needed for the transfer from the current forest management practice (BAU) to sustainable forest management (SEM):

- Needs assessment in terms of methodology and awareness, awareness raising of state institutions and capacity building (institutional, human, technical).
- Activation of the dialogue and cooperation between forest stakeholders, private sector and decision-makers.
- Review of the expenditures and profits of BAU and SEM, clear calculation of the economic significance of forests in the national system of NUPF.
- Forest inventory to get updated data on wood and non-wood resources, biological diversity and ecosystem services.
- Accurate estimations of the economic profits of forest ecosystems and acquisition of reliable financial information on resources (wood, non-wood forest products, water resources, hay-making areas, pastures, biological resources).
- Allocation of required resources for respective studies.
- Improvement of legislative framework including methodological documents and guidelines.
- In some cases full economic assessment of forest ecosystems and biological diversity, which can justify not use of the given forest ecosystem for economic purposes or its alternative use to get more benefits in a longer term. Such assessments can be done also in forest SPNAs.

The above mentioned activities can contribute to identification of the needs and necessity of introduction of the system of payments for ESs at national level.

## ***6.6 Pilot projects on economic valuation of forest ecosystems and payment for ecosystem services***

Prior to implementation of large-scale activities at national level it is necessary to implement pilot projects on economic valuation of certain ESs (non-wood forest products, ecotourism, water supply and others) to overview the practice of the country in the field and test application of the system of payments for forest ecosystem services in a pilot area.

Implementation of the pilot projects can provide answers to the following main questions:

1. The types of benefits provided and expected from ecosystems, the objectives of their assessment.
2. The types of ESs, which can be considered in forest use and market economy.
3. Economic methods of valuation of ESs (for example, assessment of the values for use or not use, shadow prices, expenditure methods and others). The lack of respective data is the main problem for this.
4. Who provides/maintains ESs, who gets profits and who are the “losers”, the groups of beneficiaries who get significant benefits and from whom it is possible to get financial means via various mechanisms.
5. Economic valuation of ESs/estimation of their value: estimation of the total value of benefits provided by ecosystems, estimation of the profits coming from the activities (impacts) resulting in changes of the state of ecosystems, analysis of distribution of costs and benefits.
6. Potential sources of financing for protection of ecosystems.
7. Financial mechanisms and economic tools of payments as well as required legal bases such as agreements, contracts and others.
8. Pilot projects on assessment of ESs can be implemented also in forest sanctuaries; at present their majority is used as a part of forest enterprise without respective protection regimes and proper consideration of existing biological diversity and ecosystem values. The same is valid for the high conservation value forests: assessment of ESs can justify application of certain protection regimes in such areas.

## 6.7 Full TEEB study of the forestry sector

In general, the full TEEB study of the forestry sector in Armenia can be rather costly and therefore should be properly justified. Moreover, the data obtained for the full TEEB study later will require some update due to the changes occurring in forest areas in the result of ongoing activities in the forests (area covered by forests, resources, biodiversity indicators, socio-economic conditions and others).

At the same time, it is more expedient to implement pilot assessments for forest areas of various types (an area subject to economic activity, protected area, high conservation value forest area and others), in particular prior to commencing economic activity in the given area. They can result in justifications for not implementing such activities with the perspective of having more benefits in a longer term.

In general, the full TEEB study of the forestry sector of Armenia can answer the following questions and result in the following outcomes:

- Economic value of the ESs provided by forest ecosystems of Armenia.
- Expected long-term benefits from ecosystem protection/not use, including socio-economic benefits of communities.
- Contribution to promotion and justification of institutional reforms in the forest management sector as well as the practice of sustainable ecosystem management.
- Support to definition of the directions of economic activity in forest areas and improvement of their efficiency.
- Support to forest biodiversity protection, multi-purpose use of forests and restoration of valuable features of forests.
- Support to provision of alternative sources of income and poverty reduction.
- Support to sustainable management and development of related sectors (tourism, agriculture, energy production sector, water management, mining industry and others).

## Conclusions

In spite of the fact that some strategic documents of the Republic of Armenia mention about the importance of ESs, the comprehensive understanding of their economic value in practice is missing at national level along with the economic mechanisms of their consideration.

The forestry sector is not an exception, where the complex approaches of sustainable ecosystem management and the results of ESs valuation are not applied, the economic potential of ESs is not a component of economic policy of the country and the protection of forest biological diversity and habitats are not considered priority issues.

The analyses of the forestry sector (comparison of the current forest management practice and sustainable ecosystem management, Table 4) show that the sector management is not in line with the principles of multi-purpose forest use. Continuation of the current forest management practices does not contribute to provision of ecosystem services by forests and wood production continues to be the main source of income in the sector and the main tool of economic activity causing obstacles to sustainable forest use.

At the same time, application of the SEM principles and continuous provision of ESs can contribute not only to protection of biological diversity and habitats, but also provision of alternative sources of income, poverty reduction and multi-purpose use of forests as well as sustainable management of the related sectors (tourism, agriculture, energy production sector, water management, mining industry and others).

Establishment of mechanisms on economic valuation of forest biological diversity and ecosystems and application of respective tools are the safeguards of sustainable development of the sector and protection of forest ecosystems. They will contribute to socio-economic development, policy revision in related sector, definition of the most important ESs and rational use of the natural capital.

Implementation of the activities proposed in this report can later serve as the basis for assessment of ecosystem services provided by forests, their economic valuation and establishment of respective financial mechanisms. This process requires revision of the forests policy, legislation and management system, financial investments (including international sources) and implementation of long-term strategies on regulation of intersectoral problems and harmonization.

Prior to the full TEEB study of the forestry sector it is necessary to implement pilot projects on assessment of forest ecosystems and ecosystem service provided by them. The analyses of the outcomes of the pilot projects will justify the need for the full TEEB study, its feasibility and opportunities.

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## Appendices

### *Appendix 1. Ongoing projects on assessment of ESs in Armenia*

To fill in the gap in economic valuation of biological diversity and ESs and their integration in national economy, over the recent years pilot projects have been implemented by various international organizations, which are still ongoing. Consequently the outcomes of their implementation have not been made widely available so far.

1. Under the auspices of the global Poverty-Environment Initiative of the UN Environmental Programme and the UN Development Programme a Technical Support Programme has been implemented with the primary goal to introduce the concepts of economic valuation of ecosystem services and a pilot methodology with the emphasis on understanding the necessity of sustainable management of natural capital for economic development and human well-being. A project component on pilot valuation has been implemented with the focus on evaluating the impact of mining industry on ecosystem services in Lori Region (with use of the Qaraberd gold mine example). In parallel, support has been provided to the RA Ministry of Nature Protection to incorporate the approaches and respective provisions on ecosystem services in a new framework law on environmental protection.
2. Similar assessments are implemented by the Regional Environmental Center for the Caucasus (RECC) in the frames of the project “Support Development of Biodiversity Conservation Policies and Practices in Mountain Regions of the South Caucasus”. They include economic valuation of the flora, forests and fauna.
3. The USAID project report “Introduction of Payment for Ecosystem Services schemes in Upper Hrazdan Pilot River Basin of Armenia” (2011). It includes the piloting of the criteria of the ES payments guidelines developed by the UNECE with the aim of introduction and application of a system of payments for ecosystem services in the river basins of Armenia. For that purpose a pilot area has been selected, which includes the Upper Hrazdan river basin till Qakhsi settlement along with the right hand tributaries – the Rivers Marmarik and Tsaxhkadzor. A scheme of payment for ecosystem services has been proposed along with the further steps on its introduction.

## Appendix 2. Specially protected nature areas of Armenia

Specially protected nature areas in the structure of State Non Commercial Organizations under the RA Ministry of Nature Protection

SNCO	Specially protected nature areas
Khosrov Forest State Reserve	Khosrov Forest State Reserve Khor Virap State Sanctuary Goravan Sands State Sanctuary
Zangezur Biosphere Complex	Shikahogh State Reserve Arevik National Park Plane Grove State Sanctuary Zangezur State Sanctuary Sev Lich State Sanctuary Boghaqar State Sanctuary Khustup State Sanctuary
Dilijan National Park	Dilijan National Park Akhnabat Yew Grove State Sanctuary
Sevan National Park	Sevan National Park Juniper Open Woodland State Sanctuary
Reserve-Park Complex	Erebuni State Reserve Vordan Karmir State Sanctuary Jermuk Hydrological State Sanctuary Hanqavan Hydrological State Sanctuary
Arpi Lake National Park	Arpi Lake National Park
Zikatar Environmental Center	Zikatar State Sanctuary

Forest state sanctuaries in the structure of “Hayantar” SNCO under the RA Ministry of Agriculture

N	Name	Date of establishment	Protection object
1	Hazelnut	13.09.1958	Protection of relict hazelnut species <i>Corylus colurna</i> and yew groves ( <i>Taxus baccata</i> )
2	Gyulagarak	13.09.1958	Protection of the forests of relict pine
3	Her-her open woodland	13.09.1958	Protection of the relict open woodlands of juniper
4	Jermuk forest	13.09.1958	Protection of mountainous forests of oak ( <i>Quercus marcanthera</i> ) and their typical fauna
5	Bank's pine	29.01.1959	Protection of a unique artificial grove of Bank's pine
6	Caucasian rose-bay	29.01.1959	Protection of the relict species Caucasian rose-bay ( <i>Rhododendron caucasica</i> )
7	Arzakan-Meghradzor	09.04.1971	Protection of rare forest species (brown bear, Caucasian black grouse)
8	Gandzakar	09.04.1971	Protection of mountainous forests, rare and valuable animals (roe-deer, brown bear, Caucasian black grouse)

<b>9</b>	Getik	09.04.1971	Protection of mountainous forests, rare and valuable animals (roe-deer, brown bear, Caucasian black grouse)
<b>10</b>	Ijevan	09.04.1971	Protection of forest landscapes with their typical fauna
<b>11</b>	Margahovit	09.04.1971	Protection of forest landscapes with their typical fauna
<b>12</b>	Yeghegnadzor	16.11.1971	Protection of forest landscapes with their typical fauna
<b>13</b>	Goris	06.11.1972	Protection of forest landscapes with their typical fauna

The sanctuary under the RA Ministry of Education and Science

Aragats Alpine State Sanctuary was established on 29.01.1959, the protection object is the Lake Qari and adjacent alpine meadows

### Appendix 3. Guidelines on zoning of forest areas

Source: *Recommendatory Guidelines on Development of Management Plans for the RA Specially Protected Nature Areas, Transboundary Joint Secretariat (TJS) for the Southern Caucasus, 2009*

Zoning is the definition of a functioning significance for the areas and as a planning tool is not limited to simple description of the actual state of the areas, but it also defines the development directions for the areas. Zoning of protected areas is done with the purpose to regulate and facilitate management as well as to define main and allowable types of activities for the given areas.

According to the guidelines of International Union for Conservation of Nature (IUCN) zoning is a widely used flexible tool to ensure protection and use for various purposes via administrative-functional classification of the areas. There are no universal schemes for zoning, they are conditioned by the peculiarities of the areas and zoning in various countries is done according to the legislative requirements adopted in the country.

The functional zones of the area is defined on the basis of natural, social, cultural and administrative peculiarities as well as of main target-oriented purpose of the given forest area. The spacial distribution model of the zoning should ensure that the managers, visitors and local population can easily and clearly distinguish the zones as well as information on the rights and limitations derived from their management regimes.

For zoning it is necessary to implement general methods of comparison of the results of interdisciplinary studies, mapping and other data (comparison of the materials and thematic maps on land types, flora and fauna species, forest management planning, infrastructure, administrative arrangement, topography, historical-paleontological monuments and others).

The main ecological and economic characteristics and potential of the area, the impacts and peculiarities of land use should be analyzed and based on that the areas should be grouped within the limits of the same zone. The main tasks of the zoning are defined based on the management objectives; they are defined with consideration of the following factors:

- Protection of ecosystems and other exceptional values
- Protection of historical-cultural values
- Restoration of degraded areas and resources
- Policy and decisions of the management system
- Limitations conditioned by ecological factors
- Reduction or elimination of not desirable use or activities
- Promotion of the types of desirable use and area development
- Results of participatory consultations
- State of natural resources and land use
- Regulation of the types of activities and others

During zoning it is necessary to avoid fragmentation to ensure the integrity of habitats and ecological corridors. The zones of strict protection (reserve, core), recreation, economic activities, restoration or buffer zones can be defined on the territories according to the protection and use regimes, functional significance and ecological, scientific, recreational, economic, historical-cultural and aesthetic values.

The main objective of the reserve (core) zone is the protection of valuable, representative and vulnerable ecosystems (biodiversity). The main types of activities in this zone include prevention of human intervention to ensure natural condition of the area, scientific research, ecoeducation

and monitoring. The vulnerability criteria for designation of Key Biodiversity Areas according to the IUCN guidelines, critical thresholds defined for threatened species as well as the Red Book of Armenia and IUCN Red List of threatened species can be applied to define this zone. According to international approaches the zone of strict protection cannot border with the economic zone, a buffer zone should be in between.

Recreational zones are mainly formed near the natural-historical monuments and recreational areas adjacent to settlements, in the areas with beautiful landscape to ensure tourism development, recreational activities, sustainable use of areas and income generation. The environment in the zone should remain intact and anthropogenic impacts should be reduced as much as possible. The infrastructures should comply with the principles of landscape planning. The visits should be organized only to the allowed areas with the principle of minimal impact and implementation of continuous monitoring. The recreation zone in its turn should have a buffer function on reduction of pressures on the reserve zone. The programs on ecotourism and visits developed for protected areas should be mainly focused on this zone and adjacent areas.

Economic or support zone (areas of traditional use) are mainly adjacent to the community or private lands. The main objective of this zone is to ensure low-impact long-term sustainable use of natural resources and control it. In fact this zone is transitional and should have an intermediate functions of protection on one hand and intensive use on the other hand. The types of use should be defined with the purpose to satisfy the needs of local population having direct dependence on natural resources. The use of land, water and forest resources as well as of pastures and the types of use for other agricultural purposes should support the protection of ecosystems.

Buffer zone is also defined in order to reduce the negative anthropogenic impacts on ecosystems. It is a separate area, which surrounds the given area and where it is allowed to implement only those types of economic activity, which do not cause damage to ecosystems. In the buffer zone it is forbidden to implement an economic activity, which may be risky for the stability of the ecosystems and their natural development as well as the protection of the representatives of flora and fauna and of the objects having scientific or historical-cultural value. Buffer zones are of crucial importance, if possible they should be included in the administrative boundaries of the managing subjects and located in the neighbourhood of the reserve zones with the need of strict protection in order to prevent possible impacts.

Some areas can be temporarily included in the restoration zone with the aim to restore separate degraded areas. The activities implemented in this zone are mainly aimed at complete eradication of the negative impacts and restoration works. The forms of forest use, which can cause obstacles to the effectiveness of implemented works should be temporarily ceased. The activities mainly allowed in this zone include scientific research, biodiversity monitoring and use of forests for ecoeducational and other purposes having minimal impact on forests.

During the zoning the landscape planning approaches should be widely applied especially for establishment of infrastructures, resettlement and regulation of the types of land use. The landscape planning harmonises the issues of socio-economic development of the areas and environmental protection, the trends of land use and development of the areas as well as the ecological requirements and the directions of desirable use.

## About FLEG II (ENPI East) Program

The Forest Law Enforcement and Governance (FLEG) II European Neighbourhood and Partnership Instrument (ENPI) East Countries Program supports participating countries' forest governance. At the regional level, the Program aims to implement the 2005 St. Petersburg FLEG Ministerial Declaration and support countries to commit to a time-bound action plan; at the national level the Program will review or revise forest sector policies and legal and administrative structures; and improve knowledge of and support for sustainable forest management and good forest governance in the participating countries, and at the sub-national (local) level the Program will test and demonstrate best practices for sustainable forest management and the feasibility of improved forest governance practices at the field-level on a pilot basis. Participating countries include Armenia, Azerbaijan, Belarus, Georgia, Moldova, Russia, and Ukraine. The Program is funded by the European Union.

<http://www.enpi-fleg.org>

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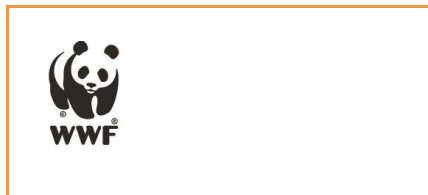
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### IUCN

IUCN, International Union for Conservation of Nature, helps the world find pragmatic solutions to our most pressing environment and development challenges. IUCN's work focuses on valuing and conserving nature, ensuring effective and equitable governance of its use, and deploying nature-based solutions to global challenges in climate, food and development. IUCN supports scientific research, manages field projects all over the world, and brings governments, NGOs, the UN and companies together to develop policy, laws and best practice. IUCN is the world's oldest and largest global environmental organisation, with more than 1,200 government and NGO members and almost 11,000 volunteer experts in some 160 countries. IUCN's work is supported by over 1,000 staff in 45 offices and hundreds of partners in public, NGO and private sectors around the world.

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