

# MOLDOVA

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## Summary of climate change dimensions

The Republic of Moldova signed the UNFCCC on 12 June 1992 and the Parliament ratified it on 16 March 1995, thus officially recognizing the significance of the climate change-related problems for humanity. The Kyoto Protocol was ratified by Moldova on 13 February 2003 (the official date of accession was 22 April 2003).

## Climate conditions and their dynamics

Moldova's climate is moderately continental, characterized by relatively mild winters with little snow, long warm summers and low humidity. The country is located in an area where the air masses coming from the Atlantic Ocean via Western Europe interact and mix with the air from the extreme continental northeastern regions and the Mediterranean air from the southwest. Two distinctive patterns are observed with regard to territorial distribution of the climatic features in Moldova: a distinct zoning of annual rainfall, showing a decreasing trend from north to south; and an increase of approximately 100 mm/yr in the multi-annual rainfall averages in the upland regions, depending on the neighbouring flatland areas. The average annual air temperatures vary between 6.5°C (1987) in the north and 12.3°C (2007) in the south (Table 1).

The observation records of the past 20 years show the average monthly air temperatures varying between -8.5°C in January (1996) and +26.0°C in August (1992). The warm period of the year is approximately 190 days long. The annual precipitation intensity decreases from the northwest to southeast. During 1985–2007 the annual rainfall averages varied between 451 mm (2000) and 891 mm (1998) in the northern part of Moldova and 307 mm (2003) and 813 mm (1997) in the south of the country. The annual total number of rainy days (with >0.1 mm of rainfall) varied between 121 (1986) and 174 (1987) in the northern regions and between 91 (2003) and 152 days (1991) in the southern regions.

Historical data indicate that Moldova has a highly variable climate that has already experienced an increase in mean temperature, moisture deficits and extreme events, like drought, floods and frosts. Moldova copes with climate change risks through adaptation measures including development of policies and investments to enhance natural resource management and increase research, development and extension activities (e.g. appropriate land use, conservation agriculture, improved water use efficiency and sustainable forest and pasture management).

As of 1 January 2008, forestry ecosystems were represented 456 200 ha of forestland and other forestry vegetation, or 13.5% of the national land resources. The forestry resources comprise the forestry fund and forest vegetation on lands not belonging to the forestry fund (84.1%) but owned by the state, the rest belonging to the local public authorities (15.7%) and private owners (0.2%).

**Table 1. Average annual air temperature and precipitation reported at the stations of Briceni (north), Chisinau (centre) and Cahul (south) in Moldova, 1985–2007.**

Period	Average annual air temperature (°C)			Average annual precipitation (mm)		
	Briceni	Chisinau	Cahul	Chisinau	Briceni	Cahul
1985–1989	7.5	9.1	9.3	629.4	539.6	495.6
1990–1994	8.7	10.3	10.3	531.4	477.2	461.8
1995–1999	8.1	10.0	9.8	697.2	634.0	615.0
2000–2004	9.1	10.5	10.8	574.6	541.8	457.4
2005–2007	9.1	10.9	11.3	700.3	560.7	465.7

Forests play an extremely important role in catchment protection, and provide a number of direct and indirect economic and environmental benefits to rural communities in terms of fuelwood, non-wood products, ravine stabilization, landscape beautification and other benefits. A long-term, one-hundred-year trend of deforestation has been reversed in the past 50 years, and Moldova's current forest policy calls for a further increase in forest cover through forestation and improved community management of forests for direct uses and catchment protection.

Fuelwood is particularly important for rural households, who are unable to afford gas or electricity for heating and cooking. These benefits belie the fact that the forestry sector contributed just 0.3–0.4% of GDP during the last decade. The total value of forestry products and services, as estimated by the Forestry Research Institute for 2007, was MDL 57.7 million. Despite afforestation activities conducted from 2002 to 2008, the country still has a very low level of forest cover, which explains in part the frequency and severity of soil erosion, flood and landslide events.

### **Forestry Sector general policy**

The forestry policy of the Republic of Moldova focuses on biodiversity conservation at all levels, training of staff in the forestry sector, harmonization of the legislative framework, and international cooperation. The legislative framework underlying the state policy in the forestry sector comprises: Law No. 1515-XII of 16.06.1993 on Environment Protection (1993); Forest Code (Parliament Resolution No. 887-XII of 26.06.1996); the Law on Reclamation of Degraded Land via Planting of new Forests (Parliament Resolution No. 1041-XIV of 15.06.2000); Sustainable Development Strategy for the Forestry Sector (Parliament Resolution No. 350-XV of 12.07.2001); National Strategy and Action Plan on Biodiversity Conservation (Parliament Resolution No. 112-XV of 27.04.2001); Government Resolution No. 636 of 26.05.2003 on Approval of the Programme for Land Use and Soil Fertility Improvement (2003); Government Resolution No. 737 of 17.06.2003 on Approval of the State Programme for Reclamation and Planting of new Forests on the Land Available for Forestry for 2003–2020; Government Resolution No. 739 of 17.06.2003 on Implementation of the Sustainable Development Strategy for the National Forestry Sector; together with other Laws and Government Resolutions applicable directly or indirectly to the sector. The successful implementation of this legislation will contribute to the achievement of new qualitative and quantitative targets in the forestry sector, thus increasing its input in the solution of the ecological and socio-economic problems.

## **Current situation in the forest sector**

### **Consolidation of the bio-productivity and eco-productivity capacities of the existing forests**

The consolidation of the eco-protective and bio-productive potential in existing forests requires the prevention of their further degradation, as well as conservation, regeneration and reconstruction of the forest ecosystems by switching from a grove mode to a *Codru* (forest) mode, with broader application of mass regeneration treatments and prompt replacement of low productivity plantations. In 1997–2005, such work was performed on an area of about 33 000 ha (Table 2).

### **Forest conservation**

The contribution of the forestry sector to the national economy takes the form of forest products (wood and non-wood) supplied as finished or semi-finished products, or raw material, as well as services. Around 300 000 to 400 000 m<sup>3</sup> of fuelwood are gathered annually on average as result of forest maintenance and work to ensure plantation continuity in the forest resources managed by the Forestry Agency "Moldsilva", including fuelwood, which accounts for about 85%. Raw wood is harvested in the forests managed by Moldsilva during the cutting of secondary products (evolution treatments; cleaning; thinning; cleaning cuttings, including selective sanitation treatments), cutting of principal products (regeneration, conservation, clean sanitation cuttings) and ecological reconstruction.

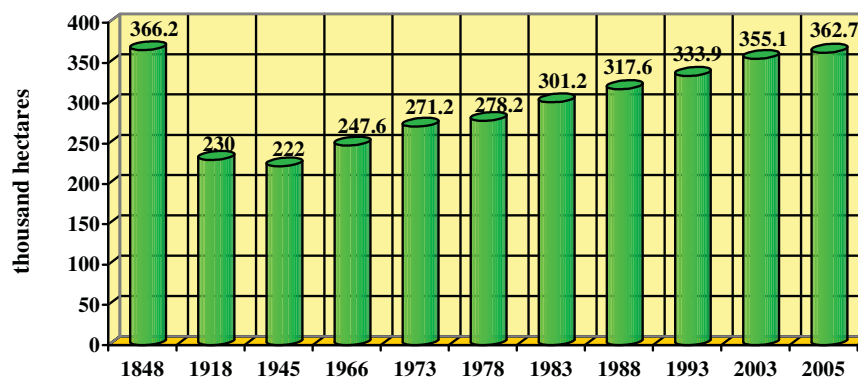
**Table 2. Forest areas (ha) covered by ecological regeneration and reconstruction activities**

Years	Forest regeneration			
	Total	Forest Plantation	Support to natural regeneration	Ecological reconstruction
1997	5040	1011	4029	0
1998	3989	1152	2837	0
1999	3065	1030	2035	169
2000	3309	816	2493	74
2001	2809	953	1856	77
2002	3643	1219	2424	455
2003	3050	998	2052	375
2004	3171	977	2194	393
2005	2944	981	1963	381

The worst situation is in the forests and other forest-type plantations managed by the local authorities, where, due to the needs of the local residents for fuelwood for heating and cooking, and for construction timber, illegal logging totalled about 104 000 m<sup>3</sup> in 1997–2005. In that period, the average illegal felling per 1000 ha of forests and forest-type plantations managed by Moldsilva were about 12 m<sup>3</sup>, whereas it was about 30 m<sup>3</sup> (2.4-fold) in the forests managed by the local authorities. It should be noted, furthermore, that a part of illegal logging, in particular in the forests managed by the local authorities, remains undetected and therefore is not recorded. Starting in 1999, the situation has been returning to normal, showing a definite decrease in the extent of illegal logging, including in the forests of the local authorities.

### Expansion of the forest area

In the context of implementing the national programmes and strategies in the sector within the 1999–2005 period, efforts were made in Moldova to expand the area under forests, by adding 30 119 ha of degraded agricultural land to the national forest reserve. To ensure forest restoration and expansion of the areas under forest-type plantations in the 1999–2005 period, the forestry facilities produced about 280 million seedlings. From 2005 to 2009, the area covered by forest changed little. To ensure constant ecological balance and more pronounced impact on the local climate and hydrology, to establish ecological corridors connecting forest areas and to improve the productivity of agricultural land, it is expected to plant forests on about 128 000 ha by 2020, with about 5 000 ha of plantations with quick-growing species and about 5 000 ha of green zones in urban and rural settlements.

**Figure 1. Evolution of forested areas in Moldova, 1848–2005.**

### **Risk factors conditioning forest vulnerability**

The ecosystems within the limits of the forestry fund are characterized by a wide diversity, comprising 28 distinct ecosystems and a series of biogeocenotic sub-types (by productivity). The ecosystems include major forests of oak (*Quercus* spp.), durmast (*Quercus petraea*) and beech; water meadows; and mixed species woods. The forestry ecosystems have 123 associations, of which over 25 phytocenotic taxons are regarded as standard phytocenoses. Currently almost all forestry ecosystems are affected by human impact, expressed as destroyed biotopes, unregulated harvesting of biological resources or inappropriate ecosystem management. The ecosystems of small and relatively small forest vegetation bodies are affected structurally and functionally to a larger extent, as their biotopes are usually degraded and to a large extent occupied by arborescent (*Acer negundo*), scrubby (*Sambucus* spp.) and herbaceous (Urticaceae, Lamiaceae, Apiaceae, Brassicaceae) invasive species. The national forestry fund also includes rare types of ecosystems, such as beech woods and petrophyte ecosystems of oak and durmast woods, unique in terms of biodiversity.

The woods are predominantly composed of deciduous species (97.8%), including oaks (*Quercus* spp.) (143 800 ha; 39.6%), ash (*Fraxinus* spp.) (16 600 ha; 4.6%), hornbeams (*Carpinus* spp.) (9 400 ha; 2.6%), acacias (*Robinia* spp.) (131 000 ha; 36.1%), and poplars (*Populus* spp.) (5 700 ha; 1.6%). Resinous species (mainly *Pinus* spp.) are present in small proportion, as little as 2.1%.

The standing stock of oak species is the most valuable wood in the national forestry fund. The woods originate 27% from seeds and 73% from offshoots. The big share of oak species originating from offshoots is one of the consequences of a grove mode management of these species over centuries. Such a distribution has an impact on oak productivity, with 43% of high productivity and 57% of low productivity. Almost one-third of the standing stock creating the forestry fund represents artificially introduced species not well adjusted to the natural ecosystems of the country.

In recent years the area occupied by woods grew, with considerable growth in the share of acacias and resinous species. The total surface occupied by oak species increased by circa 20 000 ha, although their share in the total structure of woods fell by 14.3%. The forestry ecosystems consist of circa 860 species, which account for 43% of the total spontaneous floral biodiversity of the Republic of Moldova.

In the forest ecological communities, almost 60% of the vertebrate and invertebrate species are common. It is significant that more than half of all the vegetative and animal species included in the Red Book of the Republic of Moldova are in forest biotopes. Given the overall characteristics of the forest vegetation, it is necessary to mention the big share of acacia and other introduced species (38.7%). The existing five thousand woodland areas, with areal extents ranging from 5 ha to 15 000 ha) are dispersed and in effect isolated. There are none of the interconnecting forest corridors that are of major importance both for the viability of the forestry fund and for maintaining biological diversity, conserving soils and providing hydrologic protection. Development of forestry ecosystems and associations depend on climate, geomorphology, pedology and other conditions. Most vegetal associations include durmast standing stock (52 associations), English oak (*Quercus robur*) (26 associations), and pubescent oak (*Quercus pubescens*) (6 flora associations).

**Table 3. Features and impacts of the major risk factors determining the vulnerability of forest ecosystems.**

<b>Risk Factor</b>	<b>Nature of Damage</b>
Low level of forestation on the country's territory.	Low potential to maintain constant ecological balance.
High dispersion and uneven distribution of forest bodies.	Reduced interconnection capacity between forestry cenoses determined by insufficient communication networks. Spatial isolation and reduced spectrum of ecosystem component variability.
Use of second to fourth generation shoots in vegetative propagation of 60% of trees in the forests (in durmast, this share reaches circa 90%).	Impact with more serious consequences for biotic and abiotic factors.
Low level of fruiting that does not assure sexual regeneration of oak species.	Reduced genetic variability of forest populations which in their turn determine the low resistance of the latter to unfavourable biotic and abiotic factors.
Highly degraded standing stock of natural and introduced species, which also compete with indigenous species.	Acute competition between indigenous and introduced species with gradual elimination of indigenous species and invasion of the introduced species.
Extended areas with accelerated and high rate of drying. High risk of diseases and pests.	Degradation determined by damage caused by diseases and pests.

#### **Monitoring of forest phytosanitary condition**

In 1992, the Republic of Moldova launched a number of monitoring activities related to the health status of the forests, establishing 12 constant surveys within the European system "IST Forest" for forest monitoring, and 680 surveys within the national system. The objectives of health monitoring is to collect information regarding vegetation health and forestry soils, the effects of forest pollution, the size and structure of the production fund in relation to establishment and development of managerial measures, and mitigation and prevention of negative situations in Moldova.

Moldova's forests are characterized as highly vulnerable to pests and diseases. Pest problems include damage caused by defoliating pest, including *Tortrix viridana* L., *Limantria dispar* L., *Erannis defoliaria* Cl., *Operophtera brumata* L., *Stereonychus fraxini* Deg., *Neurotoma nemoralis* L. and *Diprion pini* L.

There is also a detrimental impact on forest structure due to xylophagus pests, including *Agilus biguttatus* F., *Cerambyx cerdo* L., *Plagionotus detritus* L., *P. arcuatus* L., *Scolitus intricatus* Rat., *Xiphydria longicollis* Geoffr., *Hylesinus fraxini* Panz. and *H. crenatus* F. The effect of climate changes on forest yield, vitality decline, mortality and plant physiological response to climate change factors will be the subject of future investigations, as currently we lack the data.

#### **Potential impact of climate change on forest ecosystems**

Natural forests in the Republic of Moldova are a well preserved component of the landscape, which however greatly depends on climate factors. Current dominant mesophilic beech, durmast and oak forests reflect two climatic factors: temperature and precipitation. The climate change impact on forest ecosystems was assessed using several models (CSIRO-Mk2, HadCM2 and ECHAM4) and some trends identified.

- Evolution in time of the phytosanitary condition of forests according to CSIRO-Mk2 and HadCM2 models. This forest characteristic will change dramatically, highly affecting forests in the northern part of the country, as they will dry out extensively. The same may occur

with the forest species in the southern and central parts of the country, in particular in the eastern part of the central zone, because the stands mostly originate from the shoots of multiple generations and will be subjected to the serious phenomenon of mass drying out by 2099. According to the ECHAM4 model climate scenario, the current ecosystem drying phenomenon will be much stronger; by the end of this century climate aridization in the northern part of the country will result in particularly serious drying effects, with possible gradual disappearance of forests.

- Case study based on evolution in time of introduced species, acacia groves and ash tree monoculture. According to the climate scenarios in CSIRO-Mk2 and HadCM2, by the end of this century, while the ECHAM4 scenario predicts the middle of this century, these species may find themselves in adverse growth conditions, which may lead to substantial decrease in volume growth, the occurrence of disease and pest hotspots, and mass drying of soils. Such a situation can be prevented only through complex and costly works of ecological reconstruction aimed at introducing sub-level species to prevent the situation.
- Mathematical simulation of forest ecosystem evolution based on climate change. To assess impact on forests, the JABOWA III dynamic model describing the evolution of species composition and productivity depending on local conditions, species features and climate elements, was used, and established that the difference between biomass accumulation scenarios increases with the age of the trees. In the mix of species, the hornbeam and ash may be the most vulnerable species in the new climatic conditions determined by climate change. In the first half of the production cycle, starting 2010, the ash tree may display 20–40% decrease in biomass growth, while in the second half both species may feature much less growth than under the baseline scenario, which does not account for climate change.

National efforts to build up national capacity to address climate change issues have been widely supported by the international community through a series of international projects, summarized below.

**Moldova Soil Conservation Project** ([www.icas.com.md/index.files/PDSFC.htm](http://www.icas.com.md/index.files/PDSFC.htm)), 2002–2022.

*Project brief description:* The afforestation and reforestation activities of the CDM project cover all districts of the Republic of Moldova (over 20 289.91 ha of degraded land), excluding the eastern territories of Transnistria.

*Project output:* The total GHG emission reduction is estimated as 3 215 296 t CO<sub>2</sub>-eq., and the reduction costs as USD 13.340 million compared with the baseline.

**Moldova Community Forestry Development Project** ([www.icas.com.md/index.files/PDPC.htm](http://www.icas.com.md/index.files/PDPC.htm)) 2006–2035

*Partners:* World Bank BioCarbon Fund, Forestry Research and Management Institute, State Forest Agency.

*Project description:* The project's development objective is to restore degraded land to economic and environmental use for the benefit of rural communities. In addition to community benefits, the project's forestation activities should support, through restored productivity and conservation of soil, the global objectives of carbon sequestration and reduction of atmospheric GHG concentrations.

**Community Forest Development Project** (2004–2007)

*Partners:* Japanese Government, Policy and Human Resource Development Grant (PHRD), Moldsilva, State Forest Agency of Moldova, ICAS.

*Project brief description:* The project was oriented to development of forests and pastures. The project contributed toward building capacity and improving the enabling environment for community forest management by providing technical assistance for the development of community forest management capacity; and direct technical support to communities for creating new forests and protective forest belts.

*Project output:* New community forests and protective forest belts were established on an area of 8157 ha.

#### **Feasibility Study of Biomass Fuelled DH Pilot Plant in RM (2005–2006)**

*Partners:* Swedish International Development Cooperation Agency

*Project brief description:* The main objective of the feasibility study was to elaborate a more detailed analysis of the biomass-fuelled DH Pilot Project proposed in a previous pre-study and to confirm the opportunity to introduce wood fuels as a complement to other fuels in the Moldovan district heating sector.

*Project output:* Feasibility Study Report

#### **National Strategy of Natural Hazards Mitigation and Climate Change**

*Partners:* The World Bank, NGO-Business Consulting Institute

*Project output:* Documented in final report.

#### **National Human Development Report 2009**

UNDP supported the Socio-Economic Impact of Climate Change in Moldova and Policy Options to Adapt. ([www.undp.md/publications/2009NHDR/NHDR\\_eng\\_full.pdf](http://www.undp.md/publications/2009NHDR/NHDR_eng_full.pdf))

#### **Technology and information transfer: improving capability to fight defoliating insects in the Republic of Moldova**

In 1999, the Republic of Moldova faced an extensive outbreak of several species of defoliating moth infesting the country's sparse forest resources. With FAO TCP support, entomologists from the Forest Service of the United States Department of Agriculture provided in-country technical assistance in the design and implementation of aerial application projects. The project was part of a series of similar projects covering Bulgaria, Mongolia, Romania and the Former Yugoslav Republic of Macedonia. ([www.fao.org/docrep/007/y5507e/y5507e07.htm](http://www.fao.org/docrep/007/y5507e/y5507e07.htm))

### **Status of assessment and research on climate change**

With reference to forest ecosystems, the most relevant adaptation measures to new climate conditions are associated with:

#### **Revision of Sector Policies**

- Revision of the Forestry Sector Sustainable Development Strategy and of the Action Plan in the context of adjustment to new socio-economic realities.
- Development of local programmes on the use, conservation and development of natural resources (forests, other types of forest vegetation, grasslands), establishing community-level ecological networks taking into account the geographical, pedoecological features, the relief, etc., including the prevention or mitigation of natural hazards.
- Development of plans on planting forest vegetation on lands managed by other entities than the Moldsilva (70 000 ha).
- Development and implementation of projects aimed at planting protective forestry strips on 12 100 ha for agricultural land protection, on 28 000 ha for erosion control, and on 14 900 ha for water conservation.

#### **Applying a single forestry regime in managing forestry resources and forest vegetation, regardless of ownership**

- Implementing forestry landscaping on the entire territory covered by forestry resources and forest vegetation managed by local public administrations, accounting for all forestry resources.
- Development of a National Landscaping System, taking into account the concrete conditions of the Republic of Moldova.

- Strengthening of community forests to improve their condition, guarding, protection, regeneration and use, as well as to assure their wider specific poly-functionality.

### **Conservation and quantitative and qualitative development of forests and other types of vegetation**

- Expanding the area covered by forests by 7 500 ha annually (potentially to up to 20% of the national territory) on degraded land, privately owned land, etc.
- Expansion of the grassland area by 3 900 ha annually (potentially to up to 22% of the national territory) on agricultural land affected by erosion or on slopes greater than 70%.
- Development and implementation of a national programme of ecological reconstruction of the standing stock that does not correspond to current conditions, providing for reconstruction of circa 1 900 ha annually.
- Planting 20 000 ha of energy forests to satisfy the needs of the population for fuelwood.
- Carrying out surveys to assess the real consumption of wood products, including from illegal logging, developing and submitting periodic reports (2009 and 2013) on consumption of wood products.

### **Revision of the legal framework**

- Development of the new version of the Forestry Code (to include some new chapters such as the communal and private sector in forestry; forestry taxes, including taxes for activities leading to fragmentation of the forestry fund through road construction, electric power lines or gas pipelines crossing forests).
- Development of a new version of the Environment Protection Law.
- Strengthening the provisions of the Code of Administrative Contraventions and Penal Code regarding protection of forests against destructive actions.

### **Revision of the regulatory framework**

- Revision and development of new, important components of forestry regulation to be integral parts of the forestry regime, focusing on maintenance and conservation of forest areas; conservation of forest genetic resources; ecological reconstruction of forests; and certification of forests, forest products and management systems.
- Development of a new version of the regulation on the manner of maintaining the state record of forestry resources and the state forestry cadastre.
- Development of a new version of the regulation on classification of forests by groups, sub-groups and functional categories.
- Revision of the regulatory framework pertaining to development of an appropriate financial mechanism in conservation and development of forestry resources, by imposing mandatory allocations from some extra-budgetary funds (ecology, roads, etc.) and taxes (ecological tax on imported oil products, for landscaping, etc.) needed for expansion of forested lands.
- Development and approval of the regulation on the principles and way of funding priority forestry activities, on the state's contribution to priority forestry activities (landscaping, research, regeneration and expansion, guarding and protection of forests).
- Development and approval of regulations on environmental values and payment for their beneficiaries (agricultural land owners, treatment facilities, etc.), as well as establishing an economic infrastructure and a wood products market.
- Development and approval of regulations on implementation and assuring functionality of the principles of participatory management of public forest resources.
- Development and approval of a regulation on a wide promotion of pastoral forestry and agroforestry practices, to unify the efforts of the forestry, livestock husbandry and pastoral sectors, mitigating social conflicts.



- Approval and implementation by mayors of local regulations pertaining to forest vegetation and grassland management, including signing agreements between the livestock sector and mayors of contracts for grazing of animals on communal grasslands, specifying the obligations of the parties in terms of grassland maintenance.

#### **Improvement of the institutional framework**

- Adequate adjustment of the new conditions of the central forestry authority structure, with effects on the capacities to collaborate and cooperate with other central authorities, local public administrations at all levels, and local communities.
- Establishment by the Forest Research and Management Institute of an agency vested with functions to provide advisory and accounting services to public and private owners of forests and woody areas.
- Establishment of regional and local structures (initially self-financing) responsible for organization and management of forests and woody areas owned by local public authorities and private individuals (communal and inter-communal wood farms), as well as provision of primary technical and logistical support.
- Primary equipping of the Forestry Agency Moldsilva and its territorial structures with modern information technology;
- Procurement of licensed software for developing mapping materials, databases for the forestry sector, accounting and economic reports.

#### **Intensification of international cooperation and investment climate improvement**

- Signing and assuring implementation of international collaboration and technical-scientific and production cooperation agreements in the forestry sector.
- Launching technical assistance projects in the forestry sector, including with external donor support, including from international bodies such as GEF, World Bank and EU.

#### **Organization of training, education and professional development activities**

- Modernization of the forestry educational institutions, including equipping them with modern equipment and technical facilities.
- Organization of training and re-training programmes for forestry professionals in information technologies.
- Development and implementation of training programmes for owners (initially the staff involved in management, guarding and protection) of communal and private forests and other types of woody vegetation;
- Publication of training and information materials for the forestry sector.
- Strengthening the communication capacity of the state forestry bodies in view of setting up a sustainable social partnership with local communities through local public authorities.

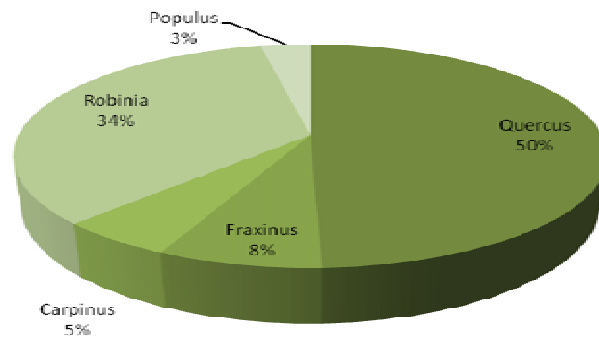
#### **Mobilization of scientific potential and encouraging implementation of innovation in practice**

- Development of methodologies and technologies for assuring adaptability of forest ecosystems to climate change.
- Description of natural forest ecosystems in view of adequate execution of forestry works and assessing degrees of vulnerability.
- Development of a general information system for the forestry sector of the Republic of Moldova.
- Development of software for forest inventory and forest cadastre purposes.

### Mitigation actions

The forestry sector is considered one of the most efficient in terms of GHG sequestration, accounting for 69% of the total. Due to their biological and productivity peculiarities and areas occupied, forestry species in the national forestry fund make variable contributions to GHG sequestration. Figure 2 indicates the relative importance of the main species, the major one being *Quercus* spp. The significance of the forestry sector in GHG sequestration is constantly increasing through expanding forest area, along with increased productivity from reconstruction and replacement of poor productivity species with more efficient ones.

**Figure 2. Forest species contribution to GHG sequestration in the Republic of Moldova.**



Measures to increase CO<sub>2</sub> sequestration capacities in the forestry sector include:

- Speeding up expansion of areas covered by forests and other types of woody vegetation on public and private lands.
- Implementing a new phase of expanding forested areas to eroded lands, and planting energy forests, etc.).
- Maintaining wood mass harvesting from silvicultural treatments at the current level, respecting the provisions of effective legislation.
- Decreasing offtake from illegal activities.
- Ecological rehabilitation of forest stands.
- Based on some models of climate evolution in the first half of the 21st century, a slight increase in forest productivity is possible (up to 10%), which will also result in an increased CO<sub>2</sub> sequestration.
- Significant expansion of forested areas in the context of more active promotion of agro-forestry and pastoral forestry practices, improving grasslands by planting groups of trees and shrubs, and delimitation of external boundaries and internal plots of the grasslands by planting forest belts.
- Implementing grassland improvement and revitalization activities, increasing the current capacity of 0.6–1.2 t of constant mass per hectare up to 4–5 t/ha.
- Expansion of grasslands onto agricultural lands affected by erosion.

### Research

Scientific research plays an important role in the sustainable development of the national forestry sector. Fundamental and applied research is needed to solve urgent problems faced by the forestry-oriented researchers. Applied research is focused on the development of clean and environmentally friendly forest management technologies allowing restoration of forest productivity, structure and functions in compliance with their potential, ensuring improved forest resistance to external negative impacts. The Forestry Research and Management Institute have performed certain activities in that context, including:

- Research on the natural regeneration peculiarities of the plantations affected by natural calamities.
- Research into plantation conditions and their productivity depending on applied silviculture work.
- Research into biodiversity changes in state-protected natural reserves as part of the national system of protected wildlife areas.
- Selection and characterization the valuable pubescent oak plantations.
- Research to identification of appropriate ages for oak trees silvicultural interventions.
- Studying current seed production, with measures recommended to improve the situation.
- Development of recommendations and regulations on seed production and gene pool conservation, ecological rehabilitation of plantations, etc.

**Table 4. Status and work by the national Institute of Silviculture Research and Management on research for assessment of effects of climate change.**

<b>Project title</b>	<b>Research areas 2006–2010</b>	<b>Research supervisor</b>
Geobotanical research: studies of flora diversity in forest ecosystems in protected areas (joint research with Botanical Garden).	Identification of forestry zones, description of forest types and forest associations, evaluation of biological productivity of forests and their ecological peculiarities.	Acad. Andrei Negru
Forest monitoring.	During 1993–2005, a monitoring process regarding forest health conditions was performed and a database created.	Dionisie Boaghie
Forestry protection and studies of influence of chemical treatments in fighting forest plant pests (common research with Institute of Zoology).	Studies of defoliation pest distribution and their multiplication intensity depending on climatic conditions.	Dionisie Boaghie
Applied silviculture research	Application-oriented research toward improved forest management through justified scientific recommendations regarding maintenance cutting, progressive and consequent silvicultural treatments, developed planting techniques for tree plants and their maintenance, species combinations in forests belts, restoration of damaged wooded areas, management of <i>Acer</i> spp. forests, developing forestry techniques for eroded plots, developing techniques for planting of deep dormancy seeds, stimulation of natural regeneration of oak ( <i>Quercus</i> spp.), and use of chemical substances for fighting diseases and pests in forests and nurseries.	

## **Proposed areas for cooperation**

### **Threats due to climate change**

- Species behaviour and their adaptability capacity to new conditions.
- Changes in the distribution and composition of habitats due to changes in species composition.
- Increased number of exotic species in existing natural habitats, with the risk of becoming invasive and leading to extinction of native species.
- Change in wetland ecosystems due to increased aridization.
- Loss of flora and fauna due to species reduced adaptability capacities under new climate conditions, particularly drying effects.

### **Measures to be taken**

- Establishment of a national system for monitoring of threatened species.
- Development of a specific management plan to prevent the progressive degradation of habitats as a result of climate change effects.
- Conduct studies and assess the vulnerability of various ecosystems and species to climate change impact.
- Conduct scientific research on monitoring and forecasting changes in forest ecosystems.
- Review the regulatory framework for forestry regimes.
- Identify and plant species that will benefit from the new environmental conditions.
- Increase forest area through forestation of degraded lands.
- Promotion of efficient agriculture and creation of protective forest belts for agricultural fields and water courses.

### **Potential project**

*Conservation and development of forest biodiversity in Moldova.* The aim of the project is to improve forest biodiversity, contribute to land degradation recovery and carbon sequestration, that could be achieved through:

- Providing assistance for regeneration and increasing the productivity of native forest in Moldova (species composition and structure).
- Extension of land covered with forests and forest vegetation.
- Increase tree and shrub species diversity and establish a genebank.
- Development of special data regarding forest biodiversity and creation of new protected forest areas.
- Building institutional capacity and public awareness.

## **Annex 1. International projects addressing climate change issues in the Republic of Moldova**

### **Republic of Moldova: Enabling Activities for the Preparation of the First National Communication under the United Nations Framework Climate Change Convention: 1998-2000.**

*Partners:* Ministry of Environment and Territory Development, UNDP Moldova, GEF.

*Project brief description:* The Project outlined a number of measures in the most important areas while showing directions for future work and creating a basis for efficient partnership.

*Project output:* The First National Communication (FNC) of the Republic of Moldova under UNFCCC ([unfccc.int/resource/docs/natc/moldnc2.pdf](http://unfccc.int/resource/docs/natc/moldnc2.pdf))

### **Climate Change: Enabling Activities (Phase II): 2000-2002**

*Partners:* Ministry of Environment, Construction and Territory Development, UNDP Moldova, GEF.

*Project brief description:* The objectives were to identify and assess technology needs for the replacement of old energy-inefficient technologies used in the energy and agricultural processing industries; to assess the possibilities of using renewable energy resources; to build capacity for absorption, design, evaluation and hosting of projects; and to perform an awareness building campaign on climate change issues.

*Project output:* Enhancement of the general awareness and knowledge of UNFCCC in the country; building national capacity to take responsibility for climate change-related issues (including the technology transfer process); delivering a report on “Technology Needs and Development Priorities” and a “Renewable Energy” Feasibility Study. ([www.undp.md/publications/doc/Report\\_new\\_1.pdf](http://www.undp.md/publications/doc/Report_new_1.pdf))

### **“Moldova: National Capacity Needs Self Assessment for Global Environmental Management”: 2003–2005**

*Partners:* Ministry of Environment and Natural Resources of RM, UNDP Moldova, GEF.

*Project brief description:* The main goals were to connect the spheres of biodiversity, climate change and combating land degradation; identify and present capacity strengthening needs in each individual area, and for them all in aggregate; national-level approval of the capacity strengthening measures in those three areas in accordance with the national strategies for environment protection, conservation of natural resources and sustainable development.

*Project output:* Report “Environmental Management: Report on National Capacity Self-Assessment” ([ncsa.undp.org/docs/598.pdf](http://ncsa.undp.org/docs/598.pdf)); and “Action Plan for capacity building to implement the Rio de Janeiro Conventions for 2006-2010 period”.

### **”Capacity Building for Improving the Quality of Greenhouse Gas Inventories (Europe/CIS region)”: 2003–2006**

*Partners:* Ministry of Environment and Natural Resources of RM and National Authorities from other 11 countries from Central European and CIS region, UNDP Moldova, GEF.

*Project brief description:* The project initiated a regional programmatic approach developed to build capacity for improving the quality of data inputs to national GHG inventories, using the good practice guidance of the IPCC for cost-effectiveness.

*Project output:* Reduced uncertainties and improved quality of inventories for subsequent National Communications; and improved national strategies for reducing GHG emissions.

### **“Technical Assistance to Armenia, Azerbaijan, Georgia and Moldova in the fulfilment of their global climate change engagements” 2004–2006**

*Partners:* Ministry of Environment of Moldova, Azerbaijan, Georgia and EU TACIS.

*Project brief description:* The key objectives of the project included capacity building in the beneficiary countries for the implementation of CDM Projects under the Kyoto Protocol,

including assistance in building the institutional infrastructure to support CDM projects and development of the portfolio of possible CDM projects; raising awareness among key decision-makers, business community and broad public of the country's obligations under UNFCCC and the Kyoto Protocol.

*Project output:* Portfolio of CDM projects, developed capacity building to mitigate GHG emissions, trained public administration authorities and in key national economic sectors for CDM project development. Four CDM projects have been under implementation in Moldova, and about ten CDM project ideas were still in the pipeline at the development and promotion stage.

#### **“Financing Energy Efficiency Investments for Climate Change Mitigation” 2008–2012**

*Partners:* United Nations Economic Commission for Europe, Climate Change Office, Ministry of Environment of the RM and National Authorities from 11 other countries of the region.

*Project brief description:* it focuses on funding of investments in energy efficiency activities to mitigate climate change effects in twelve countries of southeastern and eastern Europe and Central Asia.

#### **“Moldova Biomass Heating in Rural Communities (Project Design Documents nos. 1 and 2) 2006–2016**

*Partners:* Carbon Finance Unit Moldova, International Bank for Reconstruction and Development (IBRD) as the Trustee of the Community Development Carbon Fund.

*Project brief description:* The goal is to generate added value to the Moldova Social Investment Fund (SIF) II Project, through gained GHG emission reduction benefits, directed towards SIF project participants, thus creating incentives for further implementation of GHG mitigation measures.

*Project output:* Two CDM projects bundle 134 project activities focused on fuel switching activities and energy efficiency in public buildings (schools, pre-schools, public offices, medical centres, etc.). Estimated GHG emission reduction is 357 768 t CO<sub>2</sub>-eq.

#### **“Moldova Energy Conservation and Greenhouse Gases Emission Reduction” 2006–2016**

*Partners:* Carbon Finance Unit Moldova, International Bank for Reconstruction and Development (IBRD) as the Trustee of the Community Development Carbon Fund.

*Project brief description:* The goal of the present project is to generate an added value to Moldova Energy II Project, through gained GHG emissions reduction benefits, directed towards energy project participants, thus creating incentives for further implementation of GHG mitigation measures.

*Project output:* The CDM project bundles 19 project activities focused on fuel switching activities in public buildings (schools, pre-schools, public offices, medical centres, etc.). Estimated emission reduction is 114 469 t CO<sub>2</sub>-eq.

#### **“Renewable Energy from Agricultural Wastes” 2005–2008**

*Partners:* Consolidated Agricultural Project Management Unit (CAPMU) under the Ministry of Environment and Natural Resources of Moldova, GEF.

*Project brief description:* The ultimate project goal was to lay down the foundations for large-scale efficient use of biomass (straw), which should replace imported fossil fuel and trigger the introduction and promotion of use of primary agricultural waste (biomass) for generation of heat based on efficient technologies.

*Project output:* 11 biomass boilers (80 kW to 600 kW) with a total capacity of 2720 kW were supplied and installed in public buildings (schools and kindergartens) in rural communities.

#### **“Republic of Moldova: Enabling Activities for the Preparation of the Second National Communication under the UNFCCC” 2005–2009**

*Partners:* Ministry of Environment and Natural Resources of Moldova, UNEP and GEF.

*Project brief description:* This project led to the preparation of the Second National Communication (SNC) including a national inventory of anthropogenic emissions by sources and removal by sinks of all GHGs not controlled by the Montreal Protocol for the period 1990–2005, and a general description of steps envisaged to implement the Convention, including the development of the National Action Plan on Adaptation to Climate Change and the National Climate Change Mitigation Strategy.

*Project output:* To be published soon.

## **Annex 2. Main publications related to climate change**

- Academy of Science of Moldova. 2008. Report on the Activity of the Supreme Council for Science and Technology Development and the Main Scientific Results Achieved in Science and Innovation in 2007. Chisinau, 2008.
- Andrieş, S. *et al.* 2004. Programul complex de valorificare a terenurilor degradate și sporirea fertilității solului. Chișinău, Pontos, 212 p.
- Averin, I. 1960. Some changes in composition of hunting fauna of Moldova during last centuries. Journal “Ohrana priodi”, Nr.1, Publisher “Cartea moldoveneasca”, Chisinau, pp. 125-134. (in Russian).
- Banaru, A. 2000. Methodological Guidelines to Calculate CO<sub>2</sub> Emissions from Arable Soils. Collection of articles “Climate Change, Research, Solutions”, Chisinau, 2000. (in Romanian)
- Banaru, A. 2001. Evolution of Humus Balance in the Soils of Moldova. National Complex Program on Enhancing Soil Fertility. Chisinau, p.83. (in Romanian)
- Boaghie, D. 2005. Reconstrucția ecologică a pădurilor. Chișinău, Centrul editorial al UASM, 275 Buletin de monitoring ecopedologic. 2000. Ediția VII, Chișinău.
- Capcelea, A. 1996. The Republic of Moldova on the way to the sustainable development. Carbon Fond. World Bank. – Ch. Centre Ed. Of UASM. (in Romanian).
- Daradur, M., Cazac, V., Mihailescu, C. & Boian, I. 2007. Climatic Monitoring and Droughts. State Hydrometeorological Service the Republic of Moldova, Institute of Ecology and Geography, Academy of Science of Moldova. - Chisinau, 2007 (Publishing House “Tanavius” SRL.) - 184 p.
- Doniță, N. 1998. Ecologie generală și forestieră. Ed. Ceres, București, 121 p.
- Forestry Agency “Moldsilva”. 1997. National Report with regard to the state of forestry fond of the Republic of Moldova. Chisinau. 48 p.
- Forestry Agency „Moldsilva”, Andrieş S. 1999. Humus and Nitrogen in Moldovan Soils, Optimization and Conservation Measures. Proceedings of the Scientific Conference “Soil Science in the Republic of Moldova at the end of the Second Millennium”. Chisinau, 1999, p. 62–77. (in Romanian)
- Forestry Agency “Moldsilva”. 2003. International Scientific Conference “Sustainable Development of forestry sector of the Republic of Moldova”. Chisinau. 328 p.
- Forestry Agency “Moldsilva”. Various dates. Statistical record reports for the period 1990–2005.
- Forestry Agency “Moldsilva”, Prototype “Epigraf”. Development of community forests, Chisinau. 272 pp.
- Galupa, D., Talmaci, I. & Spitoc, L. 2005. Guide for project management „Soil Conservation in Moldova”. Chisinau, ASUM Publishing Centre, 206 p.
- Galupa, D., Talmaci, I. & Spitoc, L. 2005. Study for the Republic of Moldova “Ensuring Forests and Livelihoods Sustainability by Improving Governance and Illegal Logging Control”. Chisinau, ASUM Publishing Centre, 116 p.

- Galupa, D., Talmaci, I. & Spitoc, L. 2006. Forestry Sector of the Republic of Moldova – Issues, Accomplishments, Perspectives. Chisinau, ASUM Publishing Centre, 27 p.
- Galupa, D., Talmaci, I. & Spitoc, L. 2008. Moldova Community Forestry Development Project Carbon Sequestration and Emission Reductions Study. Chişinău, ICAS.
- Galupa, D., Talmaci, I. & Spitoc, L. 2008. Moldova Community Forestry Development Project Baseline Study. Chişinău, ICAS.
- Galupa, D., Talmaci, I. & ŞSpitoc, L. 2008. Agro-forestry practices in Moldova and Climate Change. Chisinau, IEP Sttinta, 96 p.
- Galupa, D., Talmaci, I., Spitoc, L., Rotaru, P., Rusu, A. & Boaghie, D. 2006. Forests and Public Grasslands Development in the Republic of Moldova. Chisinau, ASUM Publishing Centre, 19 p.
- Gulca, V. & Herbst, P. 2005. Moldawien: Nachhaltige Waldbewirtschaftung schafft IPCC (1997), Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories Vol 1-3.
- Kapp, G., Horst, A., Galupa, D., Talmaci, I., Spitoc, L., Horn, L., von Velsen-Zerweck, M., Grigoriev, P. & Danii, T. 2003. Moldova Soil Conservation Project carbon Sequestration and Emission Reductions Study. GFA Terra Systems.
- Kapp, G., Horst, A., Galupa, D., Talmaci, I., Spitoc, L., Horn, L., von Velsen-Zerweck, M., Grigoriev, P. & Danii, T. 2003. Moldova Soil Conservation Baseline Study. GFA Terra Systems.
- Kravciuc, I. 1966. Carefully to behave with forests in Moldova. - Journal "Ohrana prirodi", Nr.4; Publisher: "Cartea moldoveneasca", Chisinau, pp. 58-68. (in Russian)..
- Ministry of Ecology and Territorial Development/UNDP Moldova. 2000. First National Communication of the Republic of Moldova, Submission to the UNFCCC COP-6 on 13th of November 2000.
- Ministry of Ecology, Construction and Territory Development/UNDP Moldova. 2002. Technological Needs and Development Priorities. Report developed under the UNFCCC. Chisinau: Cartdidact, 2002 ("Reclama" Printing House). 176 p.
- Ministry of Environment and Natural Resources/National Institute of Ecology of the Republic of Moldova State of the Environment Reports 2002, 2003, 2004, 2005, 2006 (National Reports). Chisinau, "Mediul Ambient" (Environment), 2003, 2004, 2005, 2006, 2007.
- Ministry of Environment and Natural Resources/UNDP Moldova. 2005. Environmental Management: Report on National Capacity Self-Assessment. Cartdidact, 2005 ("Reclama" Printing House). 152 p.
- Ministry of Environment and Natural Resources. 2007. Environment Protection in the Republic of Moldova, Chisinau. 64 p.
- National strategy and plan for actions in the field of conservation of biologic diversity. Nr.112-XV, April 27; Publisher: "Stiinta", Chisinau. 108 pp. (in Romanian).
- Official Monitor of the RM No. 10 as of 01.10.1993, Parliament of the Republic of Moldova, Law No. 1515 as of 16.06.1993 on Environment Protection.
- Official Monitor of the RM No. 23 as of 27.04.1995, Parliament of the Republic of Moldova, Resolution No. 404 as of 16.03.1995 on Ratification of the UNFCCC.
- Official Monitor of the RM No. 9 as of 15.01.2002, Parliament of the Republic of Moldova, Resolution No. 605 as of 02.11.2001 on Approval of the Concept of the Environmental Policy of the RM.
- Official Monitor of the RM No. 048 as of 18.03.2003, Parliament of the Republic of Moldova, Law No. 29 as of 13.02.2003 on Accession of the Republic of Moldova to the Kyoto Protocol of the UNFCCC.



Official Monitor of the RM No. 6 as of 01.01.2004, Resolution of the Government of the RM No. 1574 as of 26.12.2003 on Assigning National Commission for Implementation of Provisions of the UNFCCC, as well as Mechanisms and Provisions of Kyoto Protocol.

Official Monitor of the RM No. 019 as of 30.01.2004, Parliament of the Republic of Moldova, Resolution No. 566 as of 25.12.2003 on Approval of Research and Development Strategic Priorities for the period 2004-2010.

Official Monitor of the RM No. 43-46 as of 30.03.2007, Resolution of the Government of the RM No. 304 as of 17.03.2007 on Approval of the Ecological Security National Program for the period 2007-2015.

Official Monitor of the RM No. 127-130 as of 17.08.2007, Parliament of the Republic of Moldova, Law No. 160 as of 12.07.2007 on Renewable Energy.

Official Monitor of the RM No. 141-145 as of 07.09.2007, Resolution of the Government of the RM No. 958 as of 21.08.2007 on Energy Strategy of the Republic of Moldova until year 2020.

Official Monitor of the RM No. 65 as of 25.12.1991, the Parliament of the Republic of Moldova Law No. 828 as of 25.12.1991 the Land Code.

Official Monitor of the RM No. 6 as of 30.06.1993, Parliament of the Republic of Moldova, Resolution No.1546 as of 23.06.1993 on accession of the Republic of Moldova to some environmental conventions and ratification of the Convention on Biological Diversity.

Official Monitor of the RM No. 77 as of 28.11.1996, Parliament of the Republic of Moldova, Law No. 915 as of 11.07.1996 on Plant Varieties Protection.

Official Monitor of the RM No. 4 as of 16.01.1997, Parliament of the Republic of Moldova, Law No. 887 as of 21.06.1996 on Forestry Code.

Official Monitor of the RM No. 40 as of 19.06.1997, Parliament of the Republic of Moldova, Law No. 1102 as of 06.02.1997 on Natural Resources.

Official Monitor of the RM No. 92. . 66-68 as of 16.07.1998, Parliament of the Republic of Moldova, Law No.1538 as of 25.02.1998 on the Natural Areas Protected by the State.

Official Monitor of the RM No. 003 as of 14.01.1999, Parliament of the Republic of Moldova, Resolution No. 257 as of 24.12.1998 on Accession of the Republic of Moldova to Convention to Combat Desertification in Drought/Desertification Affected Countries.

Official Monitor of the RM No. 133-134 as of 02.12.1999, Parliament of the Republic of Moldova, Law No. 612 as of 01.10.1999 on Plant Protection.

Official Monitor of the RM No. 116 as of 09.11.2000, Parliament of the Republic of Moldova, Law No.1041 as of 15.06.2000 on Improving the Degraded Lands through Afforestation

Official Monitor of the RM No. 46-49 as of 27.04.2000, Resolution of the Government of the RM No. 367 as of 13.04.2000 on Approval of the National Program to Combat Desertification.

Official Monitor of the RM No. 090 as of 02.08.2001, Parliament of the Republic of Moldova, Resolution No.112 as of 27.04.2001 on Approval of the National Strategy and Action Plan on Biologic Diversity Conservation.

Official Monitor of the RM No. 133 as of 08.11.2001, Parliament of the Republic of Moldova, Resolution No. 350 as of 12.07.2001 on adopting the Strategy for Sustainable Development of the Forestry Sector of the Republic of Moldova.

Official Monitor of the RM No. 099 as of 06.06.2003, Resolution of the Government of the RM No. 636 as of 26.05.2003 on Approval of the Program on Use of New Lands and Enhancing Soil Fertility.

Official Monitor of the RM No. 126 as of 27.06.2003, Resolution of the Government of the RM No. 739 as of 17.06.2003 on Implementation of the National Strategy for Sustainable Development of the Forestry Sector.

- Official Monitor of the RM No. 132 as of 01.07.2003, Resolution of the Government of the RM No. 737 as of 17.06.2003 on Approval of the State Program on Regeneration and Afforestation of Forestland for the period 2003-2020.
- Official Monitor of the RM No. 142 as of 08.09.2006, Resolution of the Government of the RM No. 1007 as of 01.09.2006 on the Progress of the State Program of Regeneration and Afforestation of Forestlands for the Period 2003-2020, Approved by the Government Resolution No. 737 as of June 17, 2003.
- Popusoi, A. 2002. Report concerning to state of forestry sector from Moldova, in the reference period 1997–2002. Presented in the Conference “Sustainable development of forestry sector in the Republic of Moldova”, 23 November. (in Romanian).
- Postolache, G. 1995. Vegetation of Republic of Moldova. “Editura stiintifica”, Chisinau. (in Romanian)
- Proca V.E., și col. 1981. Prognoz vozmojnâh izmenenii v prirodnoi srede pod vlianiem hoziaistvennoi deiatelnosti na territorii Moldavskoi S. S. R., Ed. Știința, Chișinău.
- Șabanova, G. A., Bulat, A. & Tofan, E. 2005. Raport privind diversitatea floristică și fitocenotică a păturii erbacee pe sectoarele din cadrul proiectului „Conservarea solurilor în Moldova”. Chișinău, ICAS.
- Șabanova G.A., Izverscaia T. & Ghendov V. 2007, 2008. Raport privind diversitatea floristică și fitocenotică a păturii erbacee pe sectoarele din cadrul proiectului „Conservarea solurilor în Moldova”. Chișinău, ICAS.
- Talmaci, I., Țăranu, M. & Scorpan, V. 2008. Emisii/sechestrări de GES în cadrul sectorului „Utilizarea terenurilor, schimbări în utilizarea terenurilor și gospodăria silvică” în Republica Moldova în perioada 1990-2005. Chișinău, Revista „Mediul Ambient”, nr. 2 (38): 42–46.
- Tkacenco, A. 1961. From the past of the forest of Moldova. - Journal “Ohrana prirodi”, Nr.5;
- Țurcan, V. 2005, 2007. Raport privind diversitatea avifaunistică pe sectoarele din cadrul proiectului „Conservarea solurilor în Moldova”. Chișinău, ICAS.
- Țurcan, V. 2008. Raport privind diversitatea avifaunistică pe sectoarele din cadrul proiectului „Dezvoltarea sectorului forestier comunal în Moldova”. Chișinău, ICAS.
- Ursu, A. 2000. Degradation of Soils and Desertification. Chisinau. 307 p.
- Ungureanu, V.T. *et al.* 1997. Ways to Control and Create a Positive Humus Balance in Soils in Moldova, Chisinau, p. 47 (in Russian)
- Uspenskii, G. 1970. Ways to create the optimal complex of fauna in the cultural landscape of Moldova. Bulletin of Academy of Sciences of Moldova. Biological, chemical and agricultural sciences, Nr. 2, Publisher “Cartea moldoveneasca”, Chisinau, pp. 52-58.
- Vdovii, G. *et al.* 1997. Report on the forest fund’s status of the Republic of Moldova. - Chisinau. 48 pp.
- Zagorcea K.L. 1990. Optimization of Fertilization Systems in Crop Rotation. Chisinau, p.286 (in Russian)
- Украинское лесоустроительное предприятие, (1987), Сводный проект организации и развития лесного хозяйства, лесных предприятий Министерства лесного хозяйства Молдавской ССР. Том 1, Ирпень.
- Швиденко А.З., Савич Ю.Н. (1987), Нормативно-справочные материалы для таксации лесов Украины и Молдавии. Киев. «Урожай», стр. 162, 216, 232, 273, 320.

### **Annex 3. Forestry sector activities based on the Republic of Moldova Action Plan for 2009–2013**

#### **Sector Policies**

Revision of Sector Policies of the Forestry Sector Sustainable Development Strategy and of the Action Plan in the context of adjustment to new socio-economic realities	2009–2013
Development of Local Programmes on the Use, Conservation and Development of Natural Resources (forests, other types of forest vegetation, grasslands), establishing community-level ecological networks taking into account geographical, pedo-ecological features, topography, etc., including in the context of prevention or mitigation of natural hazards	2009–2013
Development of a National Landscaping System, taking into account the actual conditions of the Republic of Moldova	2009–2013
Strengthening of community forests to improve their condition, guarding, protection, regeneration and use, as well as to assure their wider specific poly-functionality	2009–2013
Development and implementation of the national programme of ecological rehabilitation of the standing stock which does not correspond to stationary conditions, providing for restoration of circa 1900 ha annually	2009–2013
Carrying out surveys to assess the real consumption of wood products, including from illegal logging, and developing and submitting periodic reports (2009 and 2013) on consumption of wood products	2009–2013

#### **Legal, Regulatory and Institutional Framework**

Development of a new version of the Forestry Code (to include some new chapters on communal and private sectors in forestry; forestry taxes, including taxes for activities leading to fragmentation of the forestry fund through road construction, marking out electric lines, gas pipelines crossing forests, etc.)	2009
Revision and development of new, important components of the forestry regulatory basis, as integral parts of the forestry regime, focusing on the following areas: maintenance and conservation of forestry stations; conservation of forestry genetic resources; ecological reconstruction of forests; certification of forests, forest products and management systems	2009–2010
Development of a new version of the Regulation on the manner of keeping the state record of the forestry resources and the state forestry cadastre	2009–2010
Development of a new version of the Regulation on classification of forests by groups, sub-groups and functional categories	2009–2010
Revision of the regulatory framework pertaining to development of an appropriate financial mechanism in conservation and development of forestry resources, by imposing mandatory allocations from some extra-budgetary funds (ecological, roads, etc.) and taxes (ecological tax on import of oil products, for landscaping, etc.) needed for expansion of lands covered with forestry vegetation, etc.	2009–2010
Development and approval of the Regulation on the principles and manner of funding priority forestry activities, on the state's contribution to priority forestry activities (landscaping, research, regeneration and expansion, guarding and protection of forests)	2009–2013
Development and approval of the Regulation on environmental values and payment for their beneficiaries (agricultural landowners, treatment facilities, etc.), as well as establishing an economic infrastructure and a wood products market	2009–2013
Development and approval of the Regulation on implementing and assuring functionality of the principles of participatory management of public forest resources	2009–2013
Development and approval of a Regulation on a wide promotion of forestry pastoral and agricultural-forestry practices, to unify the efforts of the forestry, animal breeding and pastoral sectors, mitigate social conflicts, etc.	2009–2013
Approval and implementation by mayors of local regulations pertaining to forest vegetation and grasslands management, including signing agreements between the livestock sector and mayors of contracts for grazing of animals on communal grasslands, which will specify the obligations of the parties in terms of grassland maintenance	2009–2011

#### **Education, Training, Research and Development**

Development and implementation of training programmes for owners (initially for staff involved in management, guarding and protection) of communal and private forests and other types of forest vegetation	2009–2013
Organization of training and re-training programmes of forestry professionals in information technologies	2009–2013
Development of methodologies and technologies on assuring adaptability of forest ecosystems to climate change	2009–2010
Description of the natural forest ecosystems in view of adequate execution of forestry works and assessing vulnerability	2009–2013
Development of a general information system for the national forestry sector	2009–2013
Development of software for forest inventory and forest cadastre development	2009–2013