

Protected Areas of the Republic of Moldova

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David Rodríguez Rodríguez

Centro de Ciencias Humanas y Sociales
Spanish National Research Council (CSIC).

[C/Albasanz, 26-28 28037 Madrid](http://C/Albasanz,26-28.28037.Madrid)

david.rodriguez@cchs.csic.es

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I. Introduction

1.1 Introduction to the study

This study on the protected areas (PAs) of the Republic of Moldova was awarded one of the three 2008 Alfred Toepfer Scholarships for young European conservationists at the Annual Conference of the EUROPARC Federation held in Brasov, Romania, in September 2008. The objective of these grants is to develop an environmental study in a European country different from the author's.

David Rodríguez Rodríguez is a conservation biologist. Currently, he is developing his PhD Thesis on the Evaluation of the Protected Areas of the Region of Madrid (Spain) at the Institute of Economics, Geography and Demography of the Spanish National Research Council (IEGD-CSIC).

1.2 Aims

The main aims of this study are:

- To help managers and conservationists to have a simple, updated evaluation on the situation of the country's protected areas, whereby they can identify main targets and deficiencies to improve conservation.
- To give interested people outside Moldova (scientists, students and the general public) a broad perspective on the current state of the protected areas of the Republic of Moldova.
- To gather and diffuse knowledge about Moldova and its protected areas internationally.

1.3 Methodology

To compile the necessary data to do this report, three different methodologies have been applied:

a) Bibliographic review.

All available documents providing information on Moldovan PAs at the library of the Ministry of Ecology and Natural Resources were consulted.

b) Interviews.

Several interviews with different PAs' managers, experts and decision-makers took place. Interviewed persons included staff from the Natural Resources and Biodiversity Department of the Ministry of Ecology and Natural Resources, from the United Nations Development Programme and from the Academy of Sciences of Moldova.

A meeting with Mr. Ion Apostol, Vice minister of Ecology and Natural Resources, was also held.

c) Visits.

Nine field trips were done to different categories of PAs all over the country, always accompanied by a member of the Moldovan Academy of Sciences and other professional staff: Moldovan managers, technicians, researchers, etc. Seven PAs were visited in total (see Annex 1).

1.4 The Republic of Moldova at a glance

1.4.1 Location:

The Republic of Moldova is situated in South-East of Europe, on latitude 48° and 45° N and longitude 26° and 30° E. It is an inland country bordered by Romania to the west and by the Ukraine to the north, east and south.



Figure 1. Location of the Republic of Moldova

1.4.2 Geographic features:

The territory of the country is hilly, slightly inclined from the northwest to the southwest, laying on an altitude from 400 to 150m.

There is a wide range of soils in Moldova, the most prevalent being chernozems, which occupy 75% of the territory.

The hydrographical network is part of the Black Sea basin, and consists of 3,260 rivers and rivulets with a total length of 16,000 km. The main rivers are Nistru and Prut. There are also 3,532 lakes and water reservoirs.

The climate is temperate. The average January temperature is -3,5° C and 21,4° C in July. The warm period lasts about 175 days on average. The quantity of rainfall reduces from the north-west to the south-east, from 604 mm down to 568 mm, respectively.

1.4.3 Surface:

The country's surface is 33,843.5 square km¹.

1.4.4 Population:

The population of the Republic on 2009 was 3,570,100 residents, with a population density of 111,2 person/km², which makes the country one of the most densely populated in Europe.

Urban population represents 45%. The main city is Chisinau, the capital, with over 755,000 inhabitants. The rest of cities are small, slightly over 100,000 inhabitants each: Balti, Cahul, Hincesti, Orhey, Ungheni, and UTA Gagauzia.

Main ethnic groups are: Moldavians (64,5%), Ukrainians (13,8%) and Russians (13%).

¹ Including Transnistria.

1.4.5 History of Moldova

After the evacuation of the Roman legions from these territories (in 271 A.C., in the reign of Aurelian), there began the invasions of the territory by “migrating nations” (Goths, Huns, Avars, Slavs), which ended up with the formation of the Moldovan feudal state in 1359. Bogdan I is considered to be its founder.

In the Middle Ages, most of the present territory of Moldova was part of the Principality of Moldavia. In 1812, as a result of the Russian-Turkish Peace Treaty, it was annexed by the Russian Empire, and became known as Bessarabia. Between 1856 and 1878, the southern part was returned to Moldavia. In 1859 it united with Walachia to form modern Romania.

Upon the dissolution of the Russian Empire in 1917, an autonomous, then-independent Moldavian Democratic Republic was formed, which decided to unite with Romania in 1918.

This unity lasted till 1940, the year when the country was annexed by the Soviet Union as a consequence of the Ribbentrop-Molotov Pact of 1939.

The modern Republic of Moldova is the successor state of the Moldovan SSR, one of the 15 soviet socialist republics annexed by the former USSR. Moldovan SSR survived till the 27th of August 1991, when the Republic of Moldova became an independent and sovereign State. It is a rightful UN member since 1992.

On August 31, 1989, the Supreme Soviet of the Moldavian SSR adopted Moldovan as the only official language, with Russian retained only for secondary purposes, returned Moldovan to the Latin alphabet, and declared a shared Moldova-Romanian linguistic identity. As plans for major cultural changes in Moldova were made public, tensions rose further. Ethnic minorities felt threatened by the prospects of removing Russian as the *de facto* official language, the possible future reunification of Moldova and Romania and the ethnocentric rhetoric of the pro-Romanian Popular Front. The nationalist Popular Front won the first free parliamentary elections in the Moldavian SSR in the spring of 1990, and its agenda started to be implemented.

On September 2, 1990, the eastern part of the country, on the left bank of the river Dniester, named Transnistria and inhabited mainly by Russian population, was proclaimed as a Soviet independent republic by an *ad hoc* assembly, the Second Congress of the Peoples' Representatives of Transnistria.



Figure 2. State flag of the Republic of Moldova

The modern Republic of Moldova did not recognize secession of the Pridnestrovian Moldavian Soviet Socialist Republic, thus leading to a war that started in March 1992 and was concluded by the ceasefire of July 1992. Although the ceasefire has held, the territory's political status remains unresolved: *De jure* part of Moldova, Transnistria is a *de facto* independent state. It is organised as a presidential republic, with its own government, parliament, army, police, postal system and currency. Its authorities have adopted a constitution, flag, national anthem, and a coat of arms



Figure 3: State flag of the Pridnestrovian Moldovan Republic

II. The protected areas of Moldova².

2.1 Biodiversity

2.1.1 Biogeographic zones and landscape diversity.

The territory of the Republic overlaps three biogeographic zones: Central-European zone (represented by the central plateau of Codrii, which stands for 54,13% of the territory); Euro-Asiatic zone (represented by the areas of forest steppe and steppe; 30,28% of the territory); and Mediterranean zone (fragments of xerophyte forest steppe in the southern part of the Republic; 15,59% of the territory).

Five distinct landscapes are recognized within the two main natural zones: forest-steppe zone, and steppe zone.

A) Forest steppe zone.

The forest steppe zone of northern and central Moldova includes different forests (e.g., oak, beech, etc.), steppe and riverine meadow biotopes within a landscape dominated by plains and plateaus. Three landscape regions are found in the forest-steppe zone:

A.1 Plateaus and forest-steppe:

Plateaus of forest-steppe cover about 23,8% of the country, in the north-eastern part. The landscape is characterized by plateaus and hillocks dominated by oak (*Quercus*) forests, valleys with willow (*Salix*) and poplar (*Populus*), steppe and meadow formations.

A.2 Plateaus and plains with meadows of Balti steppe:

They cover 20,6% of the country, in the north of Moldova. The landscapes are represented by natural territorial complexes of hillocks as well as by slopes from river valleys; the forest vegetation is represented by *Quercus sp.* formations with *Prunus cerasus*; the meadow vegetation is represented by steppe and river meadow communities (*Stipa*, *Festuca*, *Deschampsia*).

A.3 Plateaus with forests of Codrii:

The plateau of Codrii forests is in central Moldova and covers over 15% of the Republic. The landscape is predominantly natural, with rounded mountain-tops and ancient landslides. Forest comprise mainly beech (*Fagus sp.*) and oak (*Quercus petraea*, *Quercus robur*), with herbaceous understory dominated by species typical of Central and East-Europe (*Aegopodium*, *Dactylus*, *Carex*).

² Officially, the Republic of Moldova

B) Steppe zone:

The steppe zone in southern and south-eastern Moldova is characterized by low precipitation (450 mm/yr), dry winds and occasional drought. The dominant species are grasses with typical Mediterranean representatives (*Stipa sp.*, *Bothriocloa sp.* and *Festuca sp.*) although the native steppe historically included many *Artemisia* species. The steppe also contains forest elements such as oak (*Quercus pubescens* and *Q. robur*).

The steppe zone is divided into two landscape regions:

B.1 Steppe plains of the lower Nistru river terraces:

These plains cover 19% of the Republic's surface area. They are strongly impacted by human activities, but are still rich in species typical of steppe communities. The west steppe of the Nistru river also contains oak (*Quercus pubescens*) groves.

B.2 Fragmented plains of Bugeac steppe:

The Bugeac steppe plains of south-west Moldova cover 20% of the Republic, and contain grass species adapted to xeric conditions, as well as different oak species: *Quercus pubescens*, *Q. robur*, *Q. petraea*.

The main human impact on Moldovan landscape is through agriculture. Agricultural lands cover 75,6% of Moldova, of which 64,5% are intensively used. Lands with natural vegetation, mainly forests, lakes and rivers, cover about 15% of the territory.



Typical Moldovan landscape

2.1.2 Ecosystems.

The ecosystems of the Republic of Moldova are grouped into three main types: natural (forests, steppes, meadows, paludous and aquatic, petrophyte, cavernicolous), agricultural (cereal, fruit-growing, vineyards, vegetable-growing, etc.), and urban.

Under human impact, the most affected are steppe, meadow and paludous-aquatic ecosystems. Their area diminished by about 80% in the last 40 years.

a) Forests:

At present, there exist 325,400 ha of forests in Moldova, highly fragmented in 800 forest compartments ranging from 5 to 1,500 ha. They cover 9,6% of the Moldovan territory.

Moldova possesses diverse forest communities, but the most common dominant species are

Quercus robur and *Quercus petraea*. Oak forests cover an area of 140,600 ha. The introduced *Robinia pseudoacacia* is common and stands for an important surface of the total forest surface. Flora of forest ecosystems includes 859 species, whereas fauna comprises 172 species of terrestrial vertebrates and about 9,000 species of insects.

b) Steppes:

Moldova steppe communities belong to the Pontic steppe of the northern Black Sea region. 90% of these steppes have either been converted into arable lands or have been degraded by other agricultural land uses, such as grazing. The steppe vegetation is maintained in fragments (0,5-300 ha) in the northern (Balti) and southern (Bugeac steppe) zones of the Republic, and occupies about 65,000 ha, or 1,92% of the country's surface.

The steppe flora is rich, with over 600 species, most of them belonging to four families: *Asteraceae*, *Fabaceae*, *Poaceae*, and *Lamiaceae*.

Steppe ecosystems are characterized by xerophyte species, including perennial grasses (especially *Stipa sp.*), ephemeral (hemiephemeroïds, ephemeroïds and ephemers) species, and sub-srubs.

Fauna counts 109 species of vertebrate animals.

c) Meadows:

Over the last 40 years, an estimated 200,000 ha of natural meadow ecosystems were destroyed in Moldova, covering at present about 101,400 ha, 3% of the country. The remaining vegetation of primary meadow communities remains only along the Prut and Nistru rivers.

The flora consists of about 650 species, the greatest number of which includes the genera *Poa*, *Alopecurus*, *Glyceria*, *Carex*, *Medicago* and *Trifolium sp.*

About 88 terrestrial vertebrates are recorded in meadow ecosystems.

d) Petrophyte ecosystems:

Petrophyte ecosystems (those associated with natural rock formations) cover 23,000 ha, or 0,68% of the country.

In north Moldova, these occur in calcareous formations. Along the Nistru and Prut rivers and their tributaries, they occur in "toltres", which are ancient coral reefs, rich in fossils. These Sarmatian toltres are unique ecosystems in the north-western Black Sea Basin.

Main vegetation includes *Quercus* forests: *Q. robur*, *Q. petraea* and *Q. pubescens*, as well as petrophytes grass communities with *Festuca rupicola*, *Poa versicolor* and *Stipa capillata*.

Flora includes more than 250 species, 18 of which are included in the Red Book. Vertebrate fauna is poor, accounting for 38 species.

e) Aquatic and paludous ecosystems:

Rivers, lakes and other wetlands cover 95,000 ha, or 2,8% of the country. The aquatic vegetation is grouped into 3 sub-types: I) sub-merged vegetation; II) floating rooted vegetation; and III) floating unrooted vegetation.

There are 34 dominant species of aquatic vegetation, and 83 associations, of which 37 are endangered. Some endangered species include *Nymphaea alba*, *Salvinia natans* and *Stratides aloides*.

In most of the aquatic basins, the number of commercially important fish species has declined: *Huso huso*, *Anguilla anguilla*, *Acipenser guldenstadi*, etc.

Many of these ecosystems are degraded or threatened by deforestation, spills, channelling, etc. as a result of their exclusively utilitarian conception.

f) Agricultural ecosystems:

Moldova is mainly an agricultural country: agricultural habitats cover 75,6% of the territory. Moldovan farmers cultivate about 97 species (including 553 varieties, hybrids and forms), and foster 28 species of domestic animals.

About 109 wild animal species occur in these habitats (excluding insects).

Main crops are cereals (wheat, corn), fruits (apple, plum, sweet cherry, apricot, walnut), grapes, vegetables (tomato, sugar beet) and fodder (alfalfa).

Principal problems related to agriculture are conversion of natural habitats and soil erosion and salinization.



Sunflower crops

g) Urban ecosystems:

Ensuring an adequate “green frame” within urban ecosystems is an important part of the Republic’s strategy for environmental protection. Forested urban areas in main cities (Chisinau, Tiraspol, Balti) ranges from 3,3% to 5,9%.

The flora of Chisinau includes 275 species and varieties, of which 168 tree species, 97 bushes and 10 woody lianas. There are 88 secular trees in Chisinau, which are state protected.

2.1.3 Species: richness and conservation importance

Biodiversity in Moldova is currently under assessment to compile a full inventory of living forms (Victoria Covali *comm. pers.*).

Studies till today have identified 5,513 **plant species**. Higher plant species, including vascular plants and mosses (*Bryophyta*), account for 1,989 species, whereas inferior plants, including lichens and algae, represent 3,524 species.

Fungi (*Mycophyta*) accounts for another 1,200 different species.

Taxonomic group	Number of species
Vascular plants	1832
Mosses	157
Lichens	124
Algae	3400
Fungi	1200

Figure 4. Vegetal and fungal richness in Moldova

Endemic plant species have not been identified in the country. However, some very rare plants represent the sub-endemic element: *Genista tetragona*, *Centaurea thirkei*, *C. angelescui*, *Euonymus nana*, etc. Other species are at the border of their natural distribution area: *Fagus sylvatica*, *Quercus pubescens*, *Carpinus orientalis*, *Paeonia peregrina*.

With regard to **fauna**, up till now, over 14,800 species of animals have been identified, 461 of which are vertebrates and about 14,339 are invertebrates.

The vertebrate fauna includes 70 mammal species, 281 bird species, 14 reptile species, 14 amphibian species and 82 fish species.

Taxonomic group	Number of species
Mammals	70
Birds	281
Reptiles	14
Amphibians	14
Fishes	82

Figure 5. Vertebrate's richness in Moldova

The fauna of the Republic of Moldova includes 55 Ponto-Caspian relict (only aquatic) species, including: 2 *Polichaeta*, 1 *Oligochatea*, 1 *Hirudinea*, 4 shellfish, 1 *Copepoda*, 17 *Amphipoda*, 7 mysids, 5 *Cumaceae*, 1 *Isopoda*, 1 *Decapoda*, and 15 fish species. About 10% of them are endemic of the Black Sea basin.

2.2. History of nature protection in Moldova

Environmental protection and the establishment of natural protected areas have been given attention since the Middle Ages. The main objectives were protection of forests, hunting species, and curative springs (XIII-XV).

There are three main stages in the development of State protected areas in the Republic of Moldova: in 1958-1959, the first decision on including 19,500 ha of forest into natural protected areas was taken; 1969-1975, the fund of state protected areas and the first State scientific reserve (Codrii, 1971) were created; 1976 till present, actions of implementing the previous decisions and measures of permanent development of the protected areas were taken. In this last period, the number of PAs and protected territory covered by them has been slowly but steadily increasing.

PAs accounted a surface of 41,200 ha in 1990 or 1.2% of the country. In 2000, the number of PAs was 309, covering 66,467 ha (1.96% of the country's territory), whereas in 2009, the current number of PAs is 312, covering 161,173 ha, or 4.7% of the country.

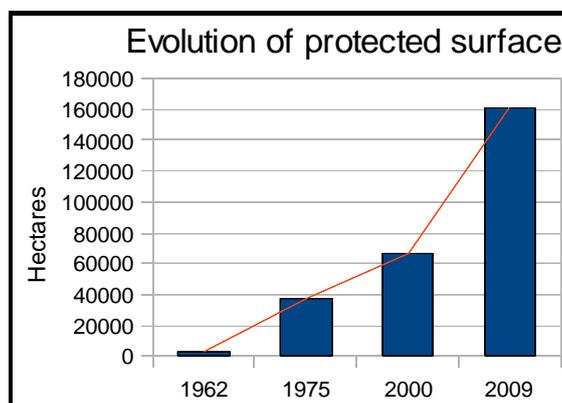


Figure 6. Evolution of protected surface in the country

The necessary prerequisites for the creation of a new legislative system and the extension of the fund of natural protected areas appeared in 1991, when the Republic of Moldova got its independence. The laws “On Environmental Protection” (1993) and “On the Natural State Protected Areas` Fund” (NSPAF, 1998) formed a new concept of environmental protection, based upon a territorial system of ecological stability, adjusted to national and international requirements.

At present, preference is given to *in situ* conservation of genetic diversity of organisms. A new classification of natural protected areas was adopted. It includes 12 categories (including 8 corresponding to IUCN criteria), stipulated on the “Law on natural areas protected by the State”.

In situ conservation of biodiversity is focused on expanding natural protected areas, improving their management, and developing an ecological network related to the European Ecological Network. The National Ecological Network (NEN, still a project) represents the overall natural habitats, linked physically and functionally. NEN also includes artificial habitats with a special value for the conservation of biodiversity and the maintenance of the geosystemic balance.

2.3 Protected areas of Moldova: an updated review

2.3.1 General figures

Currently³, there are 312 PAs in Moldova, distributed into 11 categories as follows:

Category	IUCN Category	Number	Surface (ha)
Scientific reserve	I	5	19378
Nature monument	III	131	2910
Natural reserve	IV	63	8009
Landscape reserve	V	41	34200
Resources reserve	VI	13	523
Area with multifunctional management	VII	32	103
Botanical garden		1	1030
Dendrological garden		2	104
Zoological garden		1	20
Landscape architecture monument		20	191
Wetland of international importance		3	94705
Total		312	161173

Figure 7. Current scheme of Moldovan Pas

Moldovan Law on Protected Areas comprises two other categories: *National park* and *Biosphere reserve*, but for the moment no PA has been declared under those. A project of National Park of about 20,000 ha. in Orhey is, however, under consideration by the management authorities and it is likely to become a reality in the near future.

Seven of the categories in the Law correspond to the IUCN classification:

Ia: Strict Nature Reserve: protected area managed mainly for science

Ib: Wilderness Area: protected area managed mainly for wilderness protection

II: National Park: protected area managed mainly for ecosystem protection and recreation

³ As of September 2009.

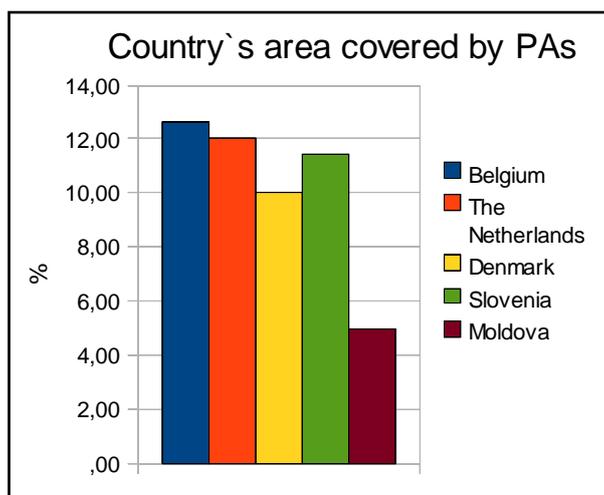
- III: Natural Monument: protected area managed mainly for conservation of specific natural features
- IV: Habitat/Species Management Area: protected area managed mainly for conservation through management intervention
- V: Protected Landscape: protected area managed mainly for landscape/seascape conservation and recreation
- VI: Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems

Dendrological Garden, Zoological Garden and Landscape Architecture Monuments, are as well considered as separate categories of the state protected areas.

At the moment (2009) the protected areas fund encounters 161,173 ha, which, however, constitutes only 4,7% of the total territory of Moldova. Moldova is still far away from the average EU protected surface (15%, in 2004). In figures 8 and 9 it is shown the percentage of territory covered by PAs in countries similar in size to Moldova (source: CBD).

Country	Country`s surface (km2)	PAs` coverage (%)
Belgium	30528	12,60
The Netherlands	41526	12,00
Denmark	43098	10,00
Slovenia	20273	11,41
Moldova	33843	4,96

Figures 8 & 9. PAs` coverage in different European countries

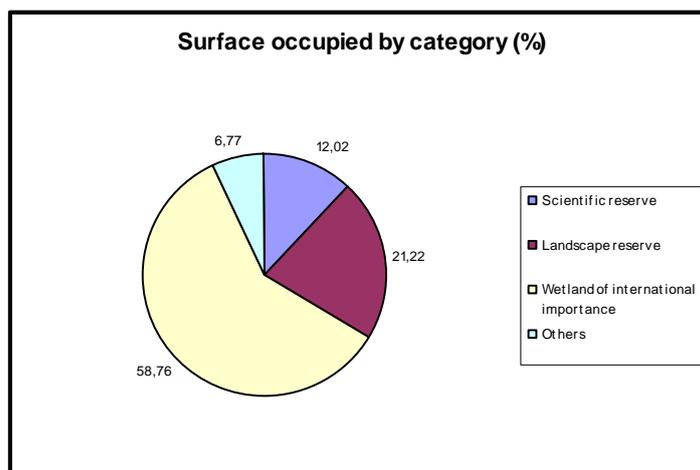


This protected territory is highly fragmented into a total 312 PAs in the country, which makes a ratio of only 516,6 ha/PA.

The largest PAs are the three recently designated (2006) Wetlands of International Importance (Ramsar sites), accounting for 94,705 ha, or 58,76% of all PAs` surface. Other categories which occupy the largest area are Landscape reserves (21,22%) and Scientific reserves (12,05%).

Category	Total surface (%)
Scientific reserve	12,02
Landscape reserve	21,22
Wetland of international importance	58,76
Others	6,77
Total	100

Figures 10 & 11. Percentage of PAs` surface covered by different categories



There is, however, a big number of landscape and scientific reserves. By dividing the number of the PAs of each category by the total surface occupied by that category (average surface), we obtained an average surface of 834 ha per each landscape reserve, and of 3,876 ha per scientific reserve (see figure 12). According to these data, the biggest scientific reserve, Padurea Domneasca, is only 6,032 ha.

Scientific reserve	Year of designation	Surface (ha)
Codrii	1971	5177
Iagorlac	1988	836
Prutul de Jos	1991	1691
Praiul Fagului	1992	5642
Padurea Domneasca	1993	6032

Figure 12. Scientific reserves` main statistics

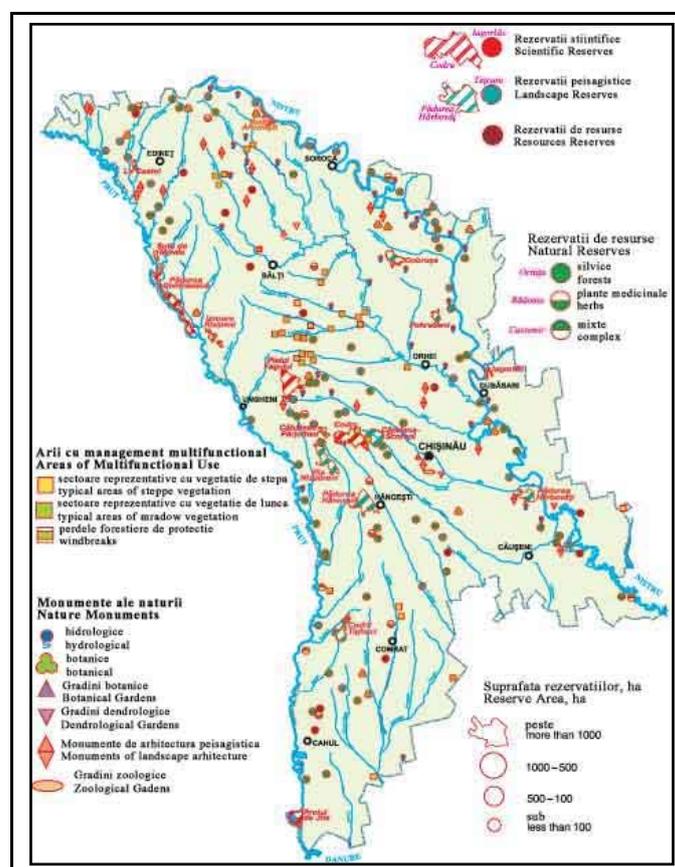


Figure 13. Map of the PAs of Moldova

2.3.2 Legislation

National legislation includes a number of laws, codes, decisions and decrees in the field of nature protection, biodiversity and forest management. The most important pieces of law are:

- **The 1993 Law on Environmental Protection**; and in particular Chapter 6, section 5, devoted to biodiversity and nature monument protection;
- The 1995 on the Law on Protection of the Animal Kingdom;
- The 1995 Law on Zones and Strips for Rivers and Water Basins Protection;
- **The 1998 Law on Protected Areas**;
- The 1993 Law on Cultural and Natural Monument Protection;
- The 2005 Law on the Red Book of the Republic of Moldova;
- **The 2007 Law on the National Ecological Network**;
- The 2007 Law on the zoological gardens.

However, the most relevant laws regarding PAs are: 1993 Law on Environmental Protection, 1998 Law on Protected Areas, and 2007 Law on the National Ecological Network.

a) The Law on Environmental Protection (1993) states the right to existence of all natural species as an essential element of the planetary cycle of matter, climate and renewal potential of natural resources. The Law calls for the drawing-up within a year from its adoption of a programme for biodiversity conservation aiming at protecting all species and habitats in the spirit of the Convention on Biological Diversity. In particular, the hunting, fishing or collecting of species listed in the Red Book should be forbidden, the introduction of new species strictly limited, the burning or destruction of protection belts forbidden, and a system of natural protected zones and natural monuments created.

b) The Law on Protected areas includes lists of protected species and protected areas (existing and new ones), as well as requirements for management plans. Protected areas are classified according to the IUCN classification. The law also includes the first list of soil protection areas and a list of protected wetlands. The identification of possible Ramsar sites (internationally important wetlands) and the establishment of biosphere reserves are foreseen. It establishes also the state ownership of protected areas.

c) The Law on the National Ecological Network establishes the creation of a national natural network according to international standards which includes and links PAs and other territories outside PAs of important value for the conservation of biodiversity. The actual configuration of the NEN, based on core areas -mainly current PAs-, corridors, restored territories and buffer zones, is currently under elaboration. A proposal for the establishment of the NEN is shown on Figure 14.

With regard to **international agreements and regulations** related to PAs, Moldova signed the *Convention on Biological Diversity* in 1992 and ratified it in May 1995. In June 1993, Moldova ratified the *Bern Convention on the Conservation of European Wildlife and Natural Habitats*. The requirements of those conventions are taken into account in the relevant policy and other documents.

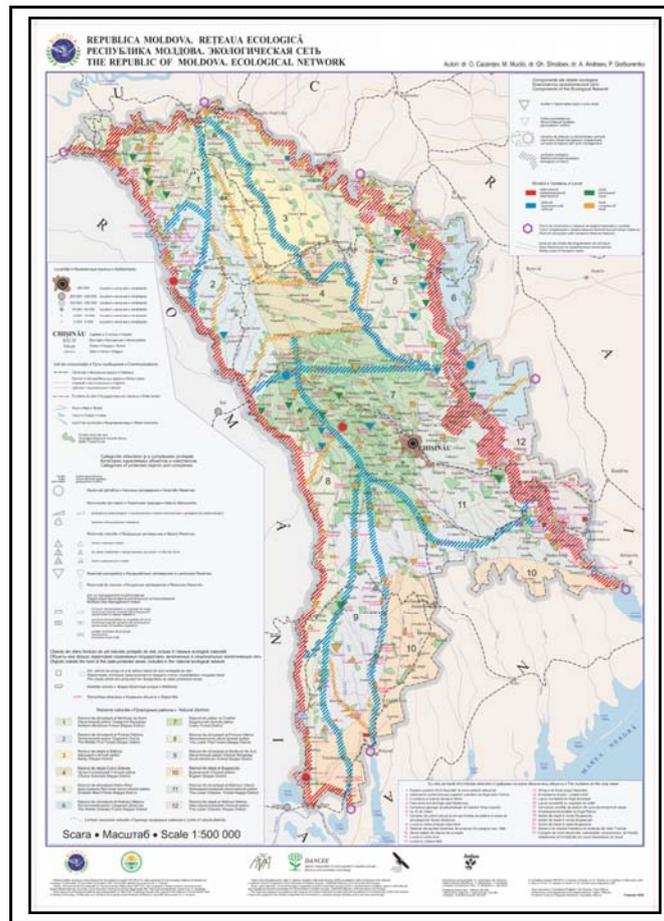


Figure 14. Proposal for the National Ecological Network

2.3.3 Ownership

The protected areas can be instituted either on public or private land.

The public territories declared as protected areas may not be privatized or transmitted to tenants. These areas should be demarcated. Their financing is the responsibility of the respective public authority. Starting from year 2000, the central and local authorities are asked (Art.6 of the Law on Protected Areas) to make proposals for the enlargement of the protected areas fund. The review of sites shall take place once per 3-5 years.

In case the protected areas such as Scientific Reserve, Biosphere Reserve or National Park are enlarged on basis of private land, the holder is recompensed, receiving either the money equivalent to the land or a similar land area.

The private protected areas can be instituted at the initiative of the landowner, remaining his/her property. A special regulation should be developed for describing the rights and obligations of all parties in such cases.

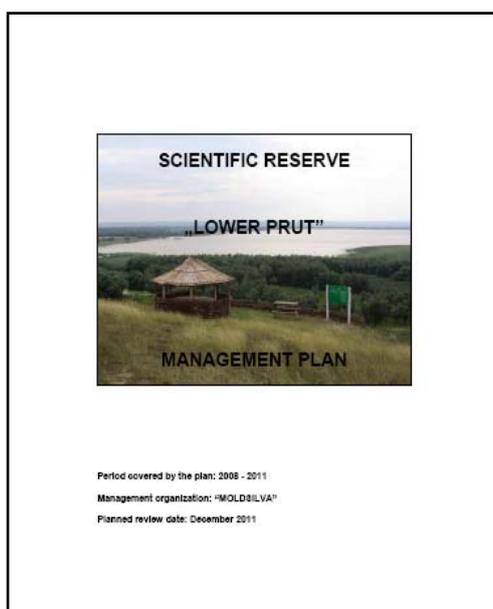
2.3.4 Management

The Law on Protected Areas (1998) designates, in addition to the Law on Environmental Protection, the Ministry of Environment⁴ as the responsible body for regulating nature protection. The Law includes an obligation for the Ministry of Environment to develop implementing legislation.

⁴ Currently, the Ministry of Ecology and Natural Resources.

Responsibilities in the field of management of nature and forest areas have been delegated to the State Forest Agency “Moldsilva”, including the management of the 4⁵ scientific reserves (SRs).

PAs managed by Moldsilva are generally subjected to multi-annual (usually 10 years) **management plans** detailing natural resources` conservation and exploitation. Their conservation status is acceptable. At least, the three Wetlands of international importance, the 4 scientific reserves and most of the 51 forest reserves (Nature reserve category), have multi-annual management plans (Alexandru Rotaru, Victoria Covali, *comm. pers.*).



“Lower Prut” Scientific reserve’s management plan

Local authorities have also significant responsibilities in the field of nature protection, mainly for the management of natural monuments and other PAs not managed by Moldsilva. These PAs generally face severe degradation due to lack of effective management (Alexandru Rotaru, Victoria Covali, *comm. pers.*). Poor scientific and technical preparation of local managers, lack of law enforcement by the central authorities, insufficient resources allocated for conservation, and economic interests result in defective management and in the degradation of the Republic’s natural resources. These PAs do not have usually any management tool, plan or staff.

Only scientific reserves have specific **staff** devoted to their management and conservation. All 4 of them have a Director and from one to four scientific specialists (Ala Rotaru, *comm. pers.*). Scientific reserves are also the only PAs in the country which are divided into different **management zones**: integral protection zone, reserve zone and buffer zone, typically. SRs have also a **public participation body**, whereby different stakeholders discuss on the SRs` management.

Some **public use facilities** (to be found only in scientific reserves) are: recreation areas, dust-beans, signs and camping sites.

No Moldovan PA does have **visitors` centres** to inform and channel visitors. None does it have statistics on **visitors** either.

Entry is free to all PAs, except to scientific reserves, where an entrance fee is charged and enables visitors to use the available public use facilities.

5 The four Scientific Reserves in the territory effectively controlled by the Government of the Republic of Moldova. The 5th Scientific Reserve, Iagorlac, is in Transnistrian territory and information about it cannot be found.

Some activities in SRs (scientific research, resources exploitation, potentially impacting leisure activities, etc.) are subjected to permission by the Ministry of Ecology and Natural Resources.

Resources allocated to Ps are scarce, both **financial** and **human**. Currently, the Ministry of Ecology's Division in charge of PAs, the Division of Natural Resources and Biodiversity, accounts for 5 employees. Their responsibilities are wide, and include not only the development and implementation of normative acts and management instruments for PAs, but also for other natural resources, such as flora, fauna, water and geological resources, hunting and fishing. Other tasks assigned to them include: biodiversity monitoring; the implementation of the provisions of international treaties on biodiversity; the creation of the national ecological network, the Emerald Network, and transboundary PAs; the regulation of import-export activities of wild flora and fauna and of genetically modified organisms; and the protection of the ozone layer, among other duties.

2.3.5 Conservation state. An overview

Despite measures taken in order to conserve and extend natural protected areas, their present state is poor. The NSPAF Law is not properly enforced and its requirements are often violated. Following the land reform, many PAs are now managed by economic entities, local councils, schools, etc, which neither show interest nor have the capacity for maintaining them in good condition.

The cases when the status of PAs is not observed are many. Just in the protection zone of a natural monument of European importance, the karst cave "Emil Racovita" and the adjacent karst area located in the north of the country, the Moldovan-German joint venture "Knauf" is extracting gypsum using the explosion method. Limestone is extracted in the proximity of the landscape reserve "La Castel" and on the territory of the nature monument "Trinca Canion". Such activities are leading to deterioration of PAs, soil, groundwater and air quality.

Part of the *geologic and paleontologic monuments* is currently used as rubbish dumps; their territory is not delineated, no warning or indicating signs exist (e.g. Brinzeni Reefs, Burlanesti Canion, Varatic Canion, Duruitoarea Canion, Procureni Reef, etc.).

The regime of the integrally protected zones of *scientific reserves* is generally observed, but some of them do not comply with all statutory requirements (e.g. the required minimum area). Another need is to re-evaluate the scientific reserves' boundaries. The scientific reserve "Prutul de Jos" is affected by illegal tree cuts and livestock grazing. Oil wells are located in the territory of the reserve, and the foreign concessionary does not entirely comply with environmental requirements.

The state of *natural reserves* is generally good, protection zones are marked and warning signs are installed. In some forest natural reserves the protection regime is only partially observed, and grazing, fishing and waste dumping occasionally occur.

The state of *landscape reserves* is pretty bad and they practically do not correspond to the IUCN criteria. Lack of finance does not allow meeting the most elementary requirements of the NSAPF Law and international conventions. The intensively visited areas are under severe impact. This concerns the landscape reserves Saharna, Tipova, Trebujeni, Ivancea, Capriana, Suta de Movile, etc. The management of most of these areas is deficient: there are not fitted stopovers for visitors, tourist routes are not marked, rules for visitors are not visualized, etc. Authorities' supervision is practically missing. Consequently, legal requirements are not enforced. A serious impediment to observing the protection regime is the tenure problem since areas within several landscape reserves have been privatised and economically used.

The protection regime of the *multifunctional management areas* is only partially observed. The natural zones subject to a special protection regime are not delineated, no landmarks, no warning signs.

During the last decades, *landscape architecture monuments* (old parks) and architecture monuments (mansions, family tombs and other buildings) have most suffered. During last years, the conditions of many of them have deteriorated. In 2006, works to rehabilitate some of these PAs started.

2.3.5 Threats to conservation

Biodiversity is currently under threat in Moldova, not only outside PAs, but also inside them. Protected areas and forest territory have increased over the last 20-30 years. However, the quality of forest ecosystems is declining, most wetlands have been drained, river ecosystems are degraded and threatened, and an increasing number of species are endangered.

Degradation has recently been compounded by a lack of enforcement capacity as well as reduced afforestation and management capacity due to the economic situation and budget constraints.

More specifically, threats to PAs -including scientific reserves- result from a multiplicity of reasons:

1. *Injudicious actions in bordering areas (current threat)*: In Moldova, an exclusively high proportion of territories are included in agricultural production. Currently 76% of the country's surface is agricultural (compared with 86% in the 1980s). The removal of perennial plant cover (including shelter belts) and inadequate soil management and cultivation techniques have resulted in serious deforestation and soil erosion which threatens biodiversity. The excessive crop specialisation and the over-use of chemicals in the recent past have put considerable stress on biodiversity, expelling flora and fauna from their usual habitats, drastically reducing their natural population in most cases. Bushes, fences and riparian vegetation were largely eliminated. The present landscape, especially in the northern and southern parts of the country, is characterised by the alternation of insulated forest patches and huge cultivated mono-crop areas.

2. *Insufficient surface occupied by protected areas and inadequate spatial planning (current threat)*: The total protected area is considered too small and fragmented to ensure long-term ecological balance with regard to land use (i.e. slope stabilization, watershed viability, ecosystem viability, wildlife habitats, recreational uses).

3. *Illegal logging (current threat)*: Poor vigilance and a full reliance on imported and increasingly expensive fossil fuels have caused a dramatic increase in the requirement for firewood in village areas. For many people the only source of firewood for heating and cooking appears to be woody protected areas.

4. *Illegal hunting (current threat)*: Illegal hunting is also increasing due to funding problems in relation to forest protection and has led to a decline of game populations over the past years.

5. *Trans-boundary impact in regional context (current threat)*: The construction of the Costesti Stanca dam had a substantial impact on the hydrological regime in the Prut river wetlands and flood plains. It led to the secondary salinization of soils and degradation of vegetation. A large hydroelectric station on the Dniester river near Novodnestrovsk (Ukraine) started operating in 1987. It altered the natural flow and temperature of water, and completely changed the initial aquatic habitats. The nominated transboundary courses (Prut and Dniester rivers) are also polluted by industries located upstream in either in Romania or Ukraine.

6. Non-effective management of protected areas (current threat): Protected areas management is becoming less effective due to the reduced availability of state funds. Additional constraints include vagueness and confusions in legislation, imperfection of institutional setting, inappropriate staffing, and lack of knowledge within the service in the following domains:

- Use of protected area buffer zones for generating revenue to be used for protected areas management support;
- Use of protected area buffer zones for reducing pressures on biodiversity through improved community relations and joint management initiatives;
- Extension of protected areas through GIS assisted analysis in the context of environmentally sound land use planning, energy use and forest management;
- International informational (know-how) and financial support for management, planning and monitoring of protected areas; and
- Simplified appropriate legal and fiscal measures within current economic constraints.

7. Legal framework and cooperation (current threat): During the past decade efforts have been made to update the legal framework for the protection of biological diversity. However, many legal instruments, some of them newly issued, are often contradictory and poorly enforced. Whilst the umbrella legislation governing protected areas management exists, this is not yet transposed into specific regulations for each reserve. The unclear division of responsibilities between different authorities and inadequate staffing complicates the sustainable management of biodiversity. It is recognised that the existing protected territories are insufficient to ensure a long term ecological balance, and during last years new areas were declared to be under state protection. In this regard, concerns were raised about the efficiency of the actual legal basis for the management of strictly protected areas (scientific reserves) and the acceptance of new protected areas at the local level, especially taking into account the present economic circumstances. Consultations with institutions, which will actually apply and enforce the Law, are indispensable, but previously omitted. Quite questionable is the position and statute of scientific reserves as part of Forestry Agency "Moldsilva", according to which they are administrated as production entities, with certain financial targets to be achieved as result of business affairs. Therefore, the responsibility of co-ordinating scientific reserves should be attributed to a special body (or bodies) possessing the required scientific and planning competencies and the will to fulfil the goals defined. In general, interaction among various institutions in charge of management of biological resources, in special, of PAs, is poor and needs to be strengthened.

8. Lack of long-term program for the development of protected areas (current threat): Such a program should define (justify) what natural habitats will need future protection, under what regime and in what specific geographic zones. At the reserve level, well prepared and tailor-made Management and Operation Plans are absent in some cases. The scope of planning process is reduced to the budget definition, with almost no specification of monitoring/research activities to be performed. These are required for ensuring an optimal use of financial, human and other resources. The spatial planning of reserve territory is also controversial: the most strictly protected core areas being placed in the centre of each reserve as convenient location from the guarding point of view, but do not contour the most precious sites. Despite the fact that the legislation stipulates multiple-use zoning, this has not happened, leading to conflicts amongst protected area administration and the population of surrounding settlements.

9. Poor stakeholders' involvement (current threat): The benefits of protected areas have never been explained to local communities. At the same time people perceive PAs as a lost opportunity for getting incomes. Traditionally, the public participation in planning and conservation process is very low. The prerogative of decision-making belongs to the high officials in the Ministry of Environment and Natural Resources, Forestry Agency "Moldsilva" and to reserve directors. Occasional consultations are hold with local stakeholders, but these occur mostly for solving

conflict situations.

10. Monitoring, research and information management efforts are inadequate (current threat): Flora and fauna inventories are not performed at regular basis. PAs have neither equipment nor standardised monitoring protocols/indicators.

11. Poor environmental education (current threat): There is still little environmental consciousness among Moldovan population, as a result of insufficient environmental education campaigns. This often leads residents and visitors to underestimating their PAs, as well as to inappropriate and dangerous behaviour: rubbish-dumping, fire-lighting, etc.

12. Alien invasive species (current threat): Alien invasive species pose a great threat to biodiversity conservation. Some of the best known plant alien species, such as *Acer negundo* (Victoria Covali, *comm. pers.*) and *Ailanthus altissima*, thrive in the wild out of control. Other internationally recognised alien invasive species, such as *Robinia pseudoacacia*, occupy vast surfaces as a result of intentional cultivation for wood and forest products (forage, honey, *etc.*).

13. Over-harvesting of non-wood forest resources (current threat): People residing in villages in buffer zones harvest a range of non-wood products such as lime flowers, mushrooms, kernel, and rosehips. Extraction techniques may well harm or even destroy regeneration of some natural resources.

14. Uncontrolled tourism and recreation (potential threat): Intensifying recreational use may harm natural resources if it is not well planned and implemented. For example, there are numerous caves in Padurea Domneasca Reserve and in Saharna protected areas which have not yet been sufficiently investigated. Some degradation has already been noted in the major caves. Uncontrolled use is still going on. The degradation will become even more severe, unless a suitable visitor management system is established.

3. Study of cases: the best and the worst.

3.1 The best: Plaiul Fagului Scientific Reserve.



Name	Plaiul Fagului
Category	Scientific reserve
Surface (ha)	5642
Year of designation	1992
Manager	Moldsilva
Conservation state	Good

Scientific reserves⁶ in Moldova reach the highest management standards in the country, comparable to the majority of Western Europe's PAs (e.g., natural parks).

Plaiul Faigului is managed *in situ* by a Director, a scientific assistant, a guard and a team of 30 forest workers who do both, conservation and forest exploitation tasks. All of them work for the State enterprise Moldsilva.

Reserve's office and wood-processing workshops are inside the reserve.

Environmental education programs are carried out regularly, aimed at different targets, from children to adults.

Visitors' access is restricted. An entrance fee of 20 lei (1,30 €) is charged to children and students, and of 40 lei (2,6 €) to the rest. This fee allows visitors to stay in the reserve for the whole day, and also the use of all public use installations. Among these, there are 10 recreation sites, two artificial lakes and a camping site. There is also a hotel (separate tariff).



Campers enjoying the reserve

⁶ Exception made for Iagorlac SR, for which no information is available.

The reserve is fully surrounded by a wire fence which clearly demarcates reserve's boundaries and prevents illegal access and occupation. It poses however, the problem of isolating animal populations inside.

There exists a regular monitoring program on the sanitary state of vegetation in part of the reserve. Biodiversity inventories and physical studies have been made. Some publications have been edited. Currently, restoration of the original vegetation composition and the substitution of alien species (*Acer negundo*, *Robinia pseudoacacia*, etc.) are being undertaken.

Main conservation problems at Plaiul Fagului are similar to those in many Western Europe's PAs: financial constraints, which hampers effective management, and herbivores' overpopulation, which hinders vegetation recovery.

3.2 The worst: Stinca Mare Nature Monument.



Name	Stinca Mare
Category	Nature monument
Surface (ha)	105
Year of designation	1989
Manager	Local Council of Cobani
Conservation state	Severely degraded

Stinca Mare Nature Monument faces different serious conservation problems which compromise its short-term existence as a PA of some value. The most important of them is illegal mining, which takes place inside the protected area and which is currently extracting rock out of this nature monument declared because of its significant geomorphology, thus destroying the PA.



Destructive mining and grazing in the PA

Other relevant conservation issues which occur inside and in the immediate surroundings of the nature monument are: illegal grazing, which threatens protected plant populations; and illegal rubbish dumping, which leads both to the visual degradation of the landscape and to the potential pollution of waters and soils.

Stinca Mare has neither defined boundaries nor information signs, which makes even more difficult to enforce law. This “invisibility” also leads to the lack of knowledge and appreciation by local communities.

Many other PAs in Moldova suffer from similar attacks to their natural resources. Stinca Mare Nature Monument was chosen, however, as a paradigmatic example of the consequences of the lack of effective management to a PA.

4. Conclusions-recommendations.

- The surface covered by PAs in the country is small and should be widened. The completion of the national PAs` network by the designation of biodiversity valuable sites not yet protected and by the effective implementation of the National Ecological Network should be a priority.
- PAs in the country are numerous but small. For many of them, substantial surface extension -and/or fusion with neighbouring PAs- is needed to ensure resources` conservation.
- Natural and cultural resources` exhaustive inventories should be completed for all the country as soon as possible. They are the first step to identify and demarcate new PAs or to redefine exiting ones.
- The general conservation state of the country`s PAs is deficient. Moldovan PAs face a great number of threats.
- River and riparian ecosystems` present state is poor, inside and outside PAs. They are intensely deforested and channelled in their most parts. Water is often over extracted leading to more severe droughts and pollutant spills often occur. Much effort should be implemented towards the ecological and functional restoration of small and medium-sized rivers as valuable biodiversity corridors at landscape scale, mainly for aquatic organisms.
- The general state of management is inadequate. Most PAs do not count on any sort of management resources, such as plans, financing or staff. There are, however, exceptions. These are mainly represented by the scientific reserves. Much effort should be done to ensure management effectiveness in PAs. Special attention should be paid to the redaction and application of simple, effective, and individual management plans or guidelines for every PA. In them, public use management should be considered.
- There is an almost total lack of management among locally managed PAs. Management competences should be withdrawn from local entities with no power or interest in PAs conservation, and given to effective management bodies, such as the Ministry of Ecology, Moldsilva or other specific management body.
- There exists a general lack of resources devoted to conservation and PAs. Efforts in funding, acquisition of material tools -including sound management software- and in recruiting professional, scientific and technical staff should be done.
- Legal framework is in general adequate, though greater coordination and simplification would help management effectiveness. There exists, nevertheless, a general lack of law enforcement which leads to a multitude of conservation and management problems. Law enforcement should be a priority.
- The number of PAs` categories is excessive, leading to confusion and management difficulties. It should be revised, reduced and simplified. Many PAs should be reassessed according to this simplified system.
- Stakeholders` involvement in PAs` management and conservation is currently poor or inexistent. It should be strengthened. Opportunities for sustainable development of local communities linked to PAs should be explained and supported.

- Environmental knowledge and consciousness is deficient or lacks at all among Moldovan population. Massive environmental education campaigns aimed at all population sectors should be launched.
- Natural resources` state and evolution is not being currently assessed. Simple and sound monitoring systems should be developed and broadly implemented.

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Annex 1. List of visited protected areas

Protected area	Category	Visit
Padurea Hirbovat	Natural reserve	13/08/09
Gradina Turcesca	Natural reserve	13/08/09
Cheile Butesti	Nature monument	19/08/09
Stinca Mare	Nature monument	19/08/09
Suta de Movile	Landscape reserve	20/08/09
Padurea Domneasca	Scientific reserve	20/08/09
Plaiul Fagului	Scientific reserve	24/08/09
Saharna	Landscape reserve	07/09/09
Tipova	Landscape reserve	07/09/09