Biodiversity Assessment for Moldova

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

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ACRONYMS

BEO	Bureau Environmental Officer
BIOFOR	Biodiversity and Sustainable Forestry
BSAP	Biodiversity Strategy and Action Plan
CITES	Convention on International Trade and Endangered Species
DEP	Department of Environmental Protection
EIA	Environmental Impact Assessment
EMM	Ecological Movement of Moldova
EU	European Union
GEF	Global Environmental Facility
GIS	Geographic Information Systems
IQC	Indefinite Quantity Contract
IUCN	International Union for the Conservation of Nature
MoAF	Ministry of Agriculture and Forestry
MoE	Ministry of Environment and Territorial Development
NATO	North Atlantic Treaty Organization
NEAP	National Environmental Action Plan
NGO	Nongovernmental Organization
REC	Regional Environmental Center
SEI	State Ecological Inspectorate
SFS	State Forestry Service
SMEs	Small and Medium Enterprises
SO	Strategic Objective
TACIS	Technical Assistance to the CIS Program
WCMC	World Conservation Monitoring Centre
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme

Executive Summary

The Kiev Regional USAID Mission initiated an assessment of the Regional Program's adherence to legislative guidelines for the protection of natural resources and biological diversity as prescribed in the Foreign Assistance Act (22 CFR 216) and subsequent amendments (Sec. 117 and Sec. 119). The Regional Mission contracted Chemonics International through the Biodiversity and Sustainable Forestry IQC (BIOFOR) to undertake this assessment between April and July 2001. The project team included a local expert and two international specialists working in Moldova for two weeks. This report is based on review of available literature, discussions with USAID staff, interviews with government and non-government stakeholders, and the experience of the team members.

The scope of work required the team to synthesize and analyze existing information and prepare a report that: 1) describes major ecosystems and species diversity of Moldova; 2) identifies key landscape features for the conservation of biodiversity; 3) describes current and potential threats to biodiversity conservation; 4) analyzes policies, land use practices, and obstacles to biodiversity conservation; 5) assesses national conservation policies, strategies, commitments to international conventions, and management capacities; 6) assesses the USAID program's potential impact on biodiversity; and 7) identifies potential USAID opportunities to support biodiversity conservation.

Major findings of the assessment include:

1. Biodiversity of Moldova has been severely reduced over the past 100 years. Steppe and steppe-associated wetland ecosystems have been particularly hard hit. Forest cover in Moldova is the lowest for any country in Europe.
2. The protected areas system is inadequate in ecological coverage. Additional protection is most urgently needed for steppe and wetland ecosystems.
3. Laws and regulations or their implementation and enforcement are inadequate to protect biodiversity. The NGO community in Moldova is impressive, but remains too weak to effectively participate and lead in a broad range of biodiversity issues.

As the USAID program in Moldova focuses on economic and governance issues, it is not expected to have a tremendous impact on biological diversity. Indeed, the impact of USAID's program on biodiversity in Moldova have been mostly indirect with no significant negative consequences, with one exception: USAID's support to land titling under the government's rural land privatization program may have contributed to decline of biodiversity, a decline that continues today. However, insufficient data are available to determine the actual extent of the impact of the land privatization program on biodiversity and on the landscape, or to the Moldovian institutions charged with biodiversity conservation.

Current USAID programs have the potential to positively impact biodiversity in the future — or possibly mitigate past negative impact — particularly on the agricultural landscape. The small and medium enterprises program supports a private network of farm service centers/farm stores that provide farm inputs and technology. This program has significant potential to contribute to biodiversity conservation by providing products, technology and training for creation of shelterbelts, farm woodlots and streamside buffer zones. Governance programs that currently encourage and support decentralization in selected cities could have a direct and positive impact on biodiversity by expanding efforts to the village level. USAID's support to the NGO community is helping to build a private sector that can cooperate with government to advance biodiversity conservation.

Activities for USAID/Moldova to consider incorporating into existing and future programs include the following:

1. *Assess the impact of rural land privatization on biodiversity and forestry.* Use the information to design programs for improving biodiversity management and inform ongoing rural land privatization efforts in Ukraine and elsewhere.
2. *Encourage USAID-supported farm stores to include products and services that promote a more holistic approach to agricultural landscape management.* This could include provision of multi-purpose tree and shrub species and training on their use in agroforestry systems; and, training in organic farming, zero tillage or low tillage farming systems. Train microcredit officers to identify environmental issues.
3. *In two to three rural regions, establish pilot programs to improve natural resources management through integrated components of USAID's strategic objectives*. The components include privatization, decentralization, energy efficiency, small and medium enterprise, and public participation through civil societies. Crosscutting initiatives that incorporate components from two or more of the programs described above will have the most significant positive impact on natural resources and the environment in general.

This assessment provides general observations and recommendations for the government of Moldova and other biodiversity conservation stakeholders. These include: 1) consider developing physical land use plans at the village/rural community scale and provide local authorities with greater responsibility and fiscal authority to implement the plans; 2) protect and manage remaining dry and mesic steppe and expand existing steppe reserves through habitat restoration; 3) encourage the establishment of multipurpose shelterbelts and woodlots and the reclamation of gallery forests in the agriculture landscape; 4) urgently address the decline in forests related to the need for heating fuel; 5) support creation of a national biodiversity information clearinghouse to provide information about biodiversity to all stakeholders; and 6) strengthen NGO capacity to contribute to biodiversity conservation and educate the public on biodiversity issues.

SECTION I

Introduction

This biodiversity assessment for Moldova addresses legislative guidelines for the protection of natural resources and biological diversity as prescribed in the Foreign Assistance Act (22 CFR 216) and subsequent amendments (see Annex A, Sec. 117 and Sec. 119). The Regional Mission contracted Chemonics International Inc. through the Biodiversity and Sustainable Forestry IQC (BIOFOR) to undertake biodiversity assessments in Moldova.

The scope of work (see Annex B) required fielding a team to investigate, synthesize, and analyze existing information on the status of biodiversity. This information was made into a report that:

- Describes major ecosystems, species endemism, and key habitats
- Identifies key landscape features and areas for the conservation of biodiversity
- Collates information on endangered and threatened species
- Describes current and potential threats to biodiversity conservation
- Analyzes policies, land use practices, pest/contamination sources, and transboundary obstacles to biodiversity
- Assesses national conservation policies, strategies, conventions, and protected area management capacities
- Identifies bilateral, multilateral, and U.S. government efforts that support or significantly affect biodiversity conservation
- Assesses the USAID program's potential impact on biodiversity
- Identifies potential USAID opportunities to support biodiversity conservation

Biodiversity assessments were conducted in Moldova, Ukraine, and Belarus and included an in-country mission from April 17 to May 30, 2001; the team worked in Moldova from May 6 to 18. Local experts supported two international specialists in each of the study countries and a third international expert was fielded to support the team's development of conclusions and recommendations. The team working on the Moldova assessment included:

- Richard Warner — team leader/natural resources management specialist
- Aron Borok — natural resources and institutional development specialist
- David Gibson — natural resources management specialist/BIOFOR project manager
- Alexandru Teleuta, Ph.D. — Moldovan biodiversity specialist

The team conducted document reviews and held interviews with a wide range of government and NGO biodiversity experts (see Annex C for a list of people contacted). In addition to interviews with stakeholders in Chisinau, the team met with village leaders in Hincesti, Bugeac, and Lozova. The team also visited the protected areas of Codrii scientific reserve and the Bugeac

Steppe, thereby experiencing firsthand the major natural biomes in Moldova as well as the impact of agriculture on natural diversity.

Due to time constraints, no original research was conducted. Although the team sought to maximize the use of available and accurate quantitative data, the assessment depended largely on secondary research. The nearly complete translation of the recent Biodiversity Conservation National Strategy and Action Plan was a major source of information for this assessment.

The authors wish to thank those individuals interviewed in the course of the study and the many experts who provided information to the recent Biodiversity Conservation National Strategy and Action Plan and other reports that facilitated this assessment.

SECTION II

Status of Biodiversity

A. Overview

The Republic of Moldova is a landlocked country located in southeastern Europe between Ukraine and Romania (see map below). It has an area of 33,843 sq km (slightly larger than Maryland in the United States) and a population of 4,430,654 (2000 estimate). Moldova is situated at the intersection of three biogeographic zones: the Central-European zone, the Euro-Asiatic zone, and the Mediterranean zone. Many species typical for each of these zones are at the limit of their natural range in Moldova. The country has a rich biota relative to its size, especially considering that the highest elevation reaches only 430 m.

Today, natural ecosystems cover approximately 10 percent of Moldova. A significant proportion of this area is highly degraded. Agricultural lands cover 75 percent of the country. Native steppe and steppe-associated wet meadows have been systematically converted to cropland and pastures. The extent of loss of steppe is not thoroughly documented, but less than 1 percent remains of some types of grassland and wet meadow ecosystems that were once common in

Reprinted from the First National Report of Moldova. Ministry of Environment and Territorial Development and the World Bank. 2000.

Moldova. Forest covers about 9.6 percent of the country, although 86 percent are plantation forests (Economic Commission for Europe, 1998). Streams, rivers, and wetlands have been negatively impacted by sedimentation and chemical runoff associated with the new agriculture-dominated landscape, and industrial and urban influences. Draining of wetlands, elimination of native riparian vegetation, impoundment, and channeling of streams and rivers have all taken a serious toll on aquatic resources in Moldova, on downstream rivers, and on the Black Sea. These changes have contributed to the significant loss of commercial fish in recent years, although there is no data indicating the extent of the economic loss from this trend.

The precipitous decline of natural habitats over the past 100 years threatens many species and has caused others to vanish from the landscape in Moldova. Large mammals, such as the bear and wolf are gone, as is the steppe eagle. Information is insufficient to determine the status of insects and many other less obvious organisms, but some of these species are likely extirpated from Moldova and many others are certainly in jeopardy. Furthermore, many of the species and ecosystems threatened in Moldova are under siege throughout their range; some are threatened with extinction. Exotic species are a growing problem in the remaining natural systems and negatively impact agriculture, forests, and fisheries. However, there appears to be little work done in the country to determine the extent of invasive species or their impact on the economy of the country.

While virtually all the changes to the landscape and ecosystems in Moldova were made — and continue to be made — for local economic gain, their cumulative impact are disrupting major ecological and physical systems to an extent detrimental to the economy and well being of the people. Loss of soil fertility reduces harvests and requires use of expensive chemicals, which can further damage ecosystem health. Deforestation contributes to global and local climate change, which in turn is disruptive to forestry and agriculture. Fish production has declined as the wetlands are reduced, and the rivers engineered and more polluted. Illicit and uncontrolled harvesting of forests, plowing and grazing of remnant tracts of native steppe, and draining of wetlands and wet meadows is detrimental to wildlife and other wildland products that would otherwise have long-term benefits. The simplified landscapes limit the ability of the population to procure food, fiber, and fuel. There is a serious need to study the effects of these issues on the country's economy.

B. Major Landscapes, Ecosystems, and Natural Communities

The available information on the status and condition of biodiversity in Moldova is not organized according to a single system of landscape classification. Hence, much of this report presents information on forests and steppes in general, relating the information to particular regions where supported by the available data.

Postolache (1995) described the natural plant communities of Moldova, including the distinct ecological communities found within forest and steppe landscapes. Five landscape regions — three types of forest-steppe in the north and central parts and two types of steppe in the south (see map in Annex D) — characterize the original, natural vegetation of Moldova:

Forests of Codrii Scientific Reserve.
Photo by R. Warner.

- The northern and northwestern parts of the country are dominated by *plateaus of forest-steppe*. This region occupies 23.8 percent of the country. The hillocks and plateaus were predominately forested with oaks (*Quercus pedunculata* and other oaks), cherry (*Prunus cerasus*), and in some places birch (*Beluta sp.*). The native vegetation of the valleys included willows (*Salix sp*.) and poplar (*Populus sp*.), occasionally interspersed with patches of steppe and meadow vegetation. The native northern forests are dominated by oak (*Quercus*).
- Forest-steppe vegetation in the northeastern part of the country is characterized by *Balti-steppe*. This landscape region covers 20.6 percent of the country. The natural vegetation of this region is characterized by hillocks and river valleys covered with forests dominated by oaks (*Quercus sp.*) and cherry (*Prunus cerasus*). The steppe and meadow vegetation are characterized by grasses (including *Stipa spp., Festuca spp.,* and *Deschampsia sp.*).
- The plateau of the *Codrii forest* is in the central part of Moldova. It occupies approximately 15 percent of the country. The landscape is characterized by rounded hills carved by ancient landslides. The native forests are mainly dominated by beech (*Fagus sylvatica*) and oak (*Quercus petraea and Quercus rubra*) with components of ash (*Fraxinus excelsior*), hornbeam (*Carpinus betulus*), maple (*Acer plantanoides*), and basswood (*Tilia tomentosa*). The understory is dominated by species typical of Central and Eastern Europe.
- The steppes of the *Lower Nistru* terraces are situated in southeastern Moldova. They occupy about 19 percent of the country.
- The *Bugeac steppe* is found in southwestern Moldova, where it occupies about 20 percent of the territory.

Wildflowers of the Bugeac Steppe.
Photo by R. Warner.

Low precipitation (i.e., 450 mm/yr), dry winds, and occasional drought characterize both of the steppe landscape regions. The dominant species are grasses typical of the Mediterranean region (*Stipa spp., Bothriocloa sp.,* and *Festuca sp*.) and historically included many species of sage (Artemisia spp). Although dominated by grasslands, native steppe also includes forest groves, mostly dominated by oaks. The most common tree species in southern forest groves are oak (*Q. petraea, Q. pedunculata*), hornbeam (*Carpinus betulus*), and cherry (*Prunus spinosa*). Riparian forest along the Prut and Nistru Rivers and their main tributaries are composed of willows (*Salix triandra, S. purpurea, S. viminalis*), poplar (*Populus alba* and *P. nigra*), and oak (*Quercus robar*).

Two American tree species are common exotics in Moldova. Black locust (*Robinia pseudoacacia*), which was introduced to stabilize soils, is the dominant component in 38 percent of the forests and is invasive to the native forests and grasslands. The wood of black locust is an excellent fuel for heating and can be used for fence posts, construction, and furniture. It also contributes to wildlife habitat, but not efficiently as it is planted as a monoculture. Boxelder (*Acer negunda*) is an introduced species that has become an aggressive invasive along the Upper and Middle Prut River. The wood is low quality, though the species does provide valuable wildlife cover and food. However, native species can provide these same services to people and wildlife and with less disruption to the natural ecosystems.

There is considerable information available about the historical changes and current condition of forests in Moldova, at least for the major forest reserves. In the 19th century the area of forests declined from 450,000 ha to 160,000 ha. Through reforestation programs in the latter part of the 20th century, the area increased to its current level of 325,000 ha (9.6 percent of the country).

Moldova is substantially less forested than other European countries, which average 29 percent forest cover (Economic Commission for Europe, 1998).

The remaining northern forests are highly fragmented. The forests in central Moldova are less fragmented and include several larger tracts in protected areas. The few forests in southern Moldova are degraded and mostly represented by young plantations. Windrows and shelterbelts are a substantial component of the standing timber in Moldova.

In the past year or two the total area of forests in Moldova has declined, in part due to cutting of wood for home heating. Recent loss of forests may be considerably greater than indicated by available data, which may underestimate the losses of trees from windrows, shelterbelts, and riparian buffers.

There is little information available about the current condition of natural vegetation of the steppe landscape. The national report mentions 11 types of steppe vegetation, but the team did not find sufficient information to get a clear picture of the diversity of vegetation types represented, the distribution, condition, land ownership, or conservation status of each type or for steppe overall.

Steppe communities that once covered perhaps 1 million ha in the southern half of Moldova are now drastically reduced, having largely been converted to cropland. Some types of mesic to dry steppe have been reduced to less than 1 percent of their original extent. Today, there are perhaps as little as 1,000 ha of dry to mesic steppe remaining in the Lower Nistru Terrace and Bugeac Steppe landscape regions. These steppe ecosystems are critically endangered throughout their range, which extends across Ukraine into Russia. Loss of ecological processes and biological diversity is clearly evident throughout the steppe landscapes. Steppe vegetation in the northern forest-steppe landscapes is reported to be somewhat more abundant, though the status of mesic to dry steppe is difficult to determine because the available information aggregates these natural communities with more common wet meadows.

Although wet meadows are not as readily plowed and converted to croplands as are the steppe lands, it is evident that wet meadow ecosystems have largely been drained, “improved” as pasture lands, or converted to low-quality croplands. Remaining examples of these wetlands are under siege, heavily grazed, mowed for hay, or drained and converted to croplands, which are generally of low quality.

The Prut River on the western border and the Nistru River to the east drain most of Moldova. The former is a tributary of the Danube River. Moldova is entirely within the watershed of the Black Sea. Land conversion, hydrological engineering, pollution and other human activities have seriously and negatively impacted the rivers, streams, and associated marsh habitats in Moldova. These impacts extend downstream, substantially contributing to the already seriously degraded ecosystems of the Danube River and the Black Sea.

Other ecological types are found on particular geological formations and microhabitats. Most notable are the petrophyte habitats along the Dniester River.

C. Species Diversity

Moldova is rich in species diversity considering the absence of mountains and moderate variations in climate. There are no known endemic species in Moldova. Assessment of the status of species by ecosystems is not possible with the data currently available.

The status of information in Moldova makes estimates of conservation status difficult and the information reported somewhat unreliable. Some of the species currently reported as threatened or endangered may prove to be more common, while many other species will be added to the list as the knowledge base grows. See Annex E for lists of species of Moldova that are recorded in the threatened species databases of the International Union for the Conservation of Nature and the United Nations Environment Programme's World Conservation Monitoring Centre.

There are 1,832 species of vascular plants and nearly 5,000 species of lower plants and fungi reported for Moldova. Plant species diversity is particularly high in forests (more than 850 species) meadows (about 650 species) and steppe (more than 600 species).

There are about 14,800 species of animals reported for Moldova and undoubtedly many more yet to be found as inventories are expanded for invertebrates in microscopic organisms. Vertebrate fauna total 461 species. While the greatest diversity of vertebrates is recorded in forests (172 species), 153 (89 percent) of these species are recorded from forests associated with meadows. The highest diversity of vertebrates recorded in Moldova is found in the forests of Codrii. The river corridors and associated wetlands are particularly important for migratory birds.

Table 1. Number of Species and Number of Species of Conservation Concern in Moldova for Major Taxonomic Groups

Group	Number of estimated species in Moldova	Number of endangered and vulnerable species
Mammals	70	46
Birds	281	89
Reptiles	14	9
Amphibia	14	4
Fish	82	15
Invertebrates	14,800	34 + 9 families, 3 orders
Vascular plants	18,32	224
Mosses	157	10
Lichens	124	18

SOURCE: First National Report of Moldova, Ministry of Environment and Territorial Development and the World Bank, 2000. The endangered and vulnerable species data are based on the national Red Data Books; see the national report for details.

More than 12,000 invertebrate species are recorded for Moldova, though the total number of invertebrate species is likely close to 15,000. The current distribution and status of most of the insects is poorly documented. A review of the lists of species of conservation concern indicates the lack of information about invertebrates in Moldova. There may be invertebrates already extirpated from Moldova and certainly many more that are endangered than is indicated by the data. Similarly, while there is a list of plants found on the Bugeac Steppe Reserve, the reserve managers are not aware of any studies of the invertebrates found there.

Maintaining forests along stream banks would reduce erosion and provide wildlife habitat. *Photo by R. Warner.*

D. Threats to Biodiversity

Most loss of biodiversity and ecological processes in Moldova has resulted from land conversion for agriculture. This pattern continues today, including plowing of native steppe and draining of wet meadows. The apparent decline of sage (*Artemesia spp*.) and other species on the few remaining native tracts of steppe is perhaps the result of grazing, mowing, and "pasture improvement," such as seeding with nonnative species that are often preferred as forage.

Poor farming practices are taking a substantial toll on less obvious components of biodiversity in the agriculture landscape and aquatic ecosystems. For example, the team saw examples of vertical plowing (i.e., plowing up and down hills) where contour plowing would have helped retain soils and hold chemicals on the land. Instead, the furrows act like drainage troughs, carrying soil and chemicals down the hills and into the streams and to the Black Sea, thereby negatively affecting terrestrial and aquatic biodiversity, and the health and economic well-being of many people.

Excessive use of chemicals in the agriculture landscape has likely had negative impact on biodiversity, particularly during the soviet era. Pesticides have certainly reduced insect diversity in the short term. The long-term impact of persistent organic pesticides may not be known for decades. Industrial pollution likewise adversely impacts biodiversity, particularly in the streams and rivers. There has been a substantial reduction in use of agricultural chemicals in the past 10 years as a direct result of the regions economic decline. A World Bank report indicates that since the mid-1980s soil contamination from fertilizers has decreased significantly and currently is almost non-detectable. However, improper technologies and use of outdated chemicals remain problems.

Illegal cutting of timber is a growing problem. While the team was in Moldova there were news reports of 400 ha of mature trees having been illegally cut from a forest reserve for timber export to a furniture maker in Western Europe. Deforestation has been particularly intensive in the windbreaks and hedgerows. There were approximately 20,000 hectares of forest in windbreaks and hedgerows in 1970. By 1994 illegal harvest and poor management had reduced these to just over 5,000 hectares — a 75 percent decline, much of which occurred after the breakup of the Soviet Union. Loss of these woodlands continues today, largely to meet the demand for heating fuel. Orchards are also declining in coverage. This loss of woodlands in the agricultural landscape as a result of harvesting for heating purposes has contributed to a general decline of biodiversity, including more arid climate and increased soil erosion.

The team found little information on the historical loss of wetlands in Moldova, but the loss was undoubtedly substantial. Loss of ephemeral wetlands was likely most significant. As of 1994 wetlands totaled 5,500 hectares. Many wetlands are severely degraded, having been mowed and grazed intensively for decades. The loss of wetlands continues today to make way for farmland. The team was told of one village that was planning to drain 500 hectares of common lands for conversion to agriculture land.

Hydrological engineering has radically changed the ecology of aquatic ecosystems in Moldova. The combined impact of dams, channels, tilling of wetlands, the removal of riparian vegetation, sedimentation, and pollution from urban and rural runoff have devastated rivers and streams. Aquatic biodiversity has declined, thus harming local and commercial fisheries.

Exotic species are a growing problem for biodiversity in Moldova. However, few people seem aware of the threat and appallingly little information is available about the distribution and impact of exotic species.

SECTION III

Status of Biodiversity Conservation

A. Protected Areas

There are 308 protected areas in Moldova, covering approximately 1.96 percent (66,400 ha) of the country (see Table 2). Within Europe, only Greece has a lower share of protected areas. The 1998 Law on Natural Protected Areas formed a new concept of environmental protection in Moldova, based on ecological stability and founded on international requirements. A new classification of natural protected areas was adopted, which includes 12 types of protected areas (8 according to IUCN criteria and 4 according to national criteria). There are no national parks or biosphere reserves in the Republic of Moldova, though plans have been made to extend the Danube Delta Biosphere Reserve to include the lower Prut River in Moldova and Romania. There is also a project to create a new national park along the Raut River.

Table 2. State Protected Areas

Protected Areas	Number	Hectares
Scientific reservations	5	19,378
Monuments of nature	130	2,906
Natural reservations	63	8,009
Landscape reservations	41	34,200
Resource reserves	13	523
Multifunctional areas	32	1030
Botanical gardens	1	105
Zoological gardens	1	20
Dendrological gardens	1	104
Monuments of landscape architecture	20	192
Totals	275	66,467

The scientific reserves (five units with an area of 19,378 ha) are research institutions financed from the state budget (see Table 2). The scientific reserves Codrii and Plaiul Fagului each have a staff of 30 to 33 members. The staff of other scientific reserves consists of 6 to 15 members. As directed by the Law on Natural Areas Protected by State (1998), the scientific reserves are to be managed by separate administrative units set up by the national government and subordinated to the Ministry of Environment and Territorial Development (MoE). This has not yet been implemented and the scientific reserves are currently managed by State Forestry Service (SFS).

Table 3. Scientific Reserves

Unit	Year Established	Total Suface Area (ha)	Forest (ha)	Number of Plant Species	Number of Animal Species
Codrii	1971	5,177	5,006	1,012	200
Iagorlac	1988	1,044	563	649	161
Prut de Jos	1991	1,691	312	193	241
Plaiul Fagului	1992	5,642	5,336	903	197
Padurea Domneasca	1993	6,032	5,160	729	210

Two very different resreves were visited by the assessment team. These two examples illustrate some of the challenges facing biodviersity conservation in Moldova. Similar problems are likely faced by other protected ares in the country.

Codrii Scientific Reserve is a state-managed forested reserve located in the Codrii Forest landscape region of central Moldova. The reserve is divided into three management areas:

- A core area of 732 ha is strictly protected and ecological processes are permited to run their natural course.
- The vast majority of the reserve (4,445 ha) is identified as the reserve buffer zone. In this zone, timber is harvested to sell on the local market and old and sick trees are removed ("sanitary cutting"). The "sanitary cutting" in Codrii eliminates standing and fallen dead trees that would provide essential habitat for many species. Reserve managers do not attempt to control the boxelder and black locust in the reserve, although they do recognize them as invasive problematic species. While the reserve was 95 percent state funded in 1991, today only 5 percent of its revenue comes from the state. Consequently, timber harvest has increased and to generate income needed to manage the reserve.
- Private land around the reserve is identified as a transition zone where the reserve managers attempt to guide landowners to maintain natural diversity within the context of their farms. Hunting is not allowed on the reserve. Poaching is occasionally a problem.

By contrast, many of the smaller protected areas are under the authority of country or local public administration and if managed at all the support comes from local budgets. Most of these reserves are "paper parks" without any staff whatsoever. Lack of funding, even for basic transportation, make it impossible for local governments to monitor activities on these smaller reserves.

For example, the Bugeac Steppe Nature Reserve in the Bugeac Steppe landscape region is managed by the Village of Bugeac. The reserve is composed of two sections, one 4 ha and the other 56 ha — the largest tract of native dry to mesic steppe in southern Moldova. Despite its small size, this reserve is a significant contribution to the protection of the critically endangered steppe ecosystem. During the team's visit to the reserve, it was clear that village managers are proud of the reserve. However, the local staff are not trained in protected areas management and receive no guidance from the state or anyone else. Scientists from the Institute of Botany have

prepared a list of plants found on the reserve, but little is known of the status of these species. Species on the list may have vanished from the reserve. There are no inventories or even species list for other species groups — nothing on small mammals, insects, etc.

The smaller tract of the reserve is strictly protected, meaning that grazing, cutting of hay, and collection of medicinal or ornamental plants is prohibited. Local people are permitted to collect plants on the larger tract of the reserve. Unfortunately, there are no data about the types or quantity of plants collected or the impact this has on the reserve. Without such monitoring, it would be easy for the collectors to completely eliminate species from the reserve.

Although the team was told that the reserve was not grazed, there was substantial evidence of recent grazing. The grazing was apparently light relative to the robust spring growth. However, grazing in the dry summer months would likely be hard on the native biota. More problematic is annual mowing for hay, which may eventually eliminate some species, perennials in particular. The reserve managers and local scientists have little information about the impact on steppe vegetation of grazing, mowing, or burning, though all three are affecting this and other steppe reserves, intentionally or otherwise.

There are no signs marking the reserve and no markers at all to identify the boundaries for either tract of land. There is no buffer zone or other form of protection from chemical drift from the adjacent crops and orchards. Row crops and orchards are planted to the invisible limit of the reserve. In the past year virgin steppe was plowed and planted immediately adjacent to the reserve or, since the boundaries are not marked, it was impossible to determine for certain that the newly plowed land was not inside the reserve. Regardless of being in a reserve or not, Eurasian dry to mesic steppe is a critically endangered ecosystem on global scales. Virgin steppe, particularly adjacent to such a small and important reserve, should be given the highest possible degree of protection. That is not happening in Moldova.

The regulations on protection of state-protected areas are elaborated by the MoE and implemented by the SFS for forest-protected areas and local administration for most other reserves. At present, only scientific reserves host groups of tourists and conduct ecological tourism. There is a need to more actively develop ecological tourism to fund biodiversity protection in the reserves. However, the infrastructure of ecological tourism is not sufficiently developed in the Republic of Moldova. There are no professional guides for ecological tourists nor have nongovernmental organizations (NGOs) actively participated in the development of ecological tourism.

The National Strategy and Action Plan and long-standing plans for a National Ecological Network project extend the system of state protected areas to 80,000 ha (2.36 percent of the country) by 2015. The Moldovan Government has yet to allocate funds toward this expansion and the Biodiversity Strategy and Action Plan (BSAP) acknowledges the need for outside funding to meet all of its commitments.

B. Conservation Outside Protected Areas

Even a well-designed and integrated protected area system will be insufficient to ensure the conservation of all important species and habitats. Seasonally migratory animals (migratory fish,

birds, bats, etc.), or species that normally range over large distances (birds and most large mammals) will be among those insufficiently protected by parks. Many endemic species of plants and animals may also remain outside protected areas. Therefore, other conservation tools will be necessary to ensure the protection of biodiversity throughout the country.

Protection of the environment outside protected areas in Moldova is largely the responsibility of the MoE, including the State Ecological Inspectorate (SEI). Their authority comes from the Law on Environmental Protection (1993, 1997), the Law on Ecological Expertise and Environmental Impact Assessment (1996), and other state laws, including the forestry code, land code, and water code. The resources for evaluating and enforcing these laws are insufficient and the process too centralized to be effective. Coordination between MoE and government agencies promoting economic development is ineffective in enforcement of environmental laws.

Much of the native forests in Moldova are managed by the SFS. Only a small part of the forests is in preserves with strict protection status. From SFS lands there is limited legal harvest of timber for local use.

The process for physical planning in Moldova is outlined in the Law on Principles of Urban and Territorial Development (1997) and other laws and government documents. It is intended that land-use plans be directed at the local level. However, infrastructure and experience in planning are inadequate at the local level and these plans are not yet developed.

C. Potential Impact of Land Privatization

Surprisingly little data are available to evaluate the environmental impact of land privatization. The few studies found from other countries more often than not suggested that large-scale changes in land tenure leads to changes in land management practices and subsequent declines in environmental conditions, including loss of biodiversity. The team's observations in Moldova suggest that the land privatization program missed important opportunities to improve natural resources protection and management. Specific examples mentioned by those interviewed or observable by the team include:

- The shape and size of farms in some cases essentially precluded the option of contour plowing. Given a long, narrow field oriented up and down a hill, farmers have little choice but to plow against the contour to cultivate their land. This practice is deleterious to soil fertility and allows greater runoff of agrochemicals and soil, thus threatening aquatic ecosystems. In the Codrii area, the terraces constructed to reduce landslides are being plowed away. Soil erosion is a major problem in Moldova; annual loss of soil is estimated at 26 million tons, including 700,000 tons of humus.

Terraces constructed to reduce erosion are literally loosing ground where they are being plowed for crops.
Photo by R. Warner.

- Improper sizing and shaping of privatized parcels also seems to have been partly responsible for the continued decline of windrows and shelterbelts which have declined by 75 percent in the last 25 years and there is little evidence of replanting these important assets. The hydrological function of shelterbelts and windrows are even more important now that much irrigation capacity has been lost. Other diverse forest and non-timber products, habitat functions and associate biodiversity have simultaneously been lost.

- There was a missed opportunity to apply conservation easements on the land deeds. These might have been used to restrict cutting of streamside forests — as required by the water code and a priority identified in the National Environmental Action Plan (NEAP) — and to protect other forests, soils, wetlands and native steppe on private farms or that remained as communal property. Such easement restrictions would be most appropriate on lands reserved as community property because they are somehow degraded or inappropriate for agriculture. In the absence of such restrictions, these lands may be converted to the very uses that prevented them from being included in the private farms.

- Natural areas that are potential sites for expanding the systems of protected areas (as projected in the National Environment Network) were not given adequate consideration in the land privatization process. Whereas prior to privatization, negotiations with only a few land managers might have protected these areas, any effort now will require agreements with dozens or hundreds of individual landowners, vastly complicating the process.

- The impact of land privatization on existing protected areas was substantial. Before privatization the staff of existing protected areas had to conduct outreach with only a

> handful of people to establish and enforce management programs for buffer zones and transition zones. Since privatization they must deal with hundreds of individual farms. This additional burden came at a time when their budgets declined by as much as 90 percent. Hence, it has been impossible to maintain the same level of protection.

The international donor community and the government have acknowledged many of these impacts. For example, the Environmental Performance Review for Moldova, prepared by the Economic Commission for Europe (1998) reported:

> "…when the Moldgiprozem organized land privatization under MoAF (Ministry of Agriculture and Forestry), a land-use mapping scheme was established without consultation between MoAF and DEP (Department of Environmental Protection). No use restrictions were put on those plots that were privatized but affected by erosion. Farmers were not informed of the best agricultural practices that they should follow to preserve or improve the quality of the soil that they were receiving. No information was given on the setting-up of ecological corridors or the creation of ecological networks, which are amongst the objectives of DEP."

The Biodiversity Conservation National Strategy and Action Plan approved by the Government of Moldova earlier this year (2001) included the following within a list of factors with negative impact on biodiversity:

> " Unsatisfactory integration of biodiversity protection requirements into economical and sectoral policy, especially in the agricultural reform process."

It has been suggested that reduction of farm size and the introduction of modern economics into farming practices tends to cause investments in more sustainable land stewardship and reduce pressure on less productive and fragile lands. Other anecdotal evidence suggests that land privatization may encourage more rational pesticide use and crop diversification, to the benefit of biodiversity. However, there is inadequate information available within the region or elsewhere to state these benefits as facts.

D. Ex-Situ Conservation

Ex-situ conservation is the protection of biodiversity outside its natural environment. Monastery and estate parks, some established more than 100 years ago, provide a solid basis for ex-situ conservation of plants in Moldova. The Botanical Garden of the Academy of Sciences, the Dendrological Garden, and other public gardens manage a collection of more than 3,000 plant species. The Botanical Garden has an impressive, long-term project to assemble the major vegetation communities present in Moldova. More than 30 years ago, it planted trees and seeded grasses to restore forests and steppe ecosystems in the garden. Over the years understory species have been added to the forest and pieces of native sod added to the steppe.

The Zoological Garden and National Institute of Livestock and Veterinary Medicine maintain a collection of approximately 320 animal breeds.

SECTION IV

Strategic and Policy Framework

A. Policy Framework

Environmental and natural resource policy in Moldova reflects the national laws and international agreements described below. The National Environmental Action Plan and the Biodiversity Strategy and Action Plan provide an overview of policy and how it will be implemented. The NEAP was completed in 1995. Major themes of the NEAP related to biodiversity include:

- Water quality management
- Land use management
- Energy conservation and pollution reduction
- Transboundary pollution
- Biodiversity and protected areas

Short-term NEAP priorities include:

- Restructuring of agricultural extension services and introduction of soil conservation methods and environmentally friendly agricultural practices appropriate for Moldova.

- Development of a land resources strategy, considering land use, protected areas, and forest resources, and including the establishment of the first National Park in Moldova.

- Individual watershed management studies, considering related agricultural and forestry measures.

- Development of a water resources strategy and master plan, considering water resources and uses, and a systematic assessment of water quality and sources of pollution.

A section of the NEAP on agriculture addresses the land privatization process, including the need to increase conservation efficiency by considering the spatial distribution of private plots. The agriculture section also recommends the introduction of a set-aside program for lands that serve as buffer strips and buffer zones for protecting water sources, as well as a program for afforestation or permanent vegetative cover (for grazing or biomass production) for lands that are on steep slopes and would help protect watershed integrity. Finally, a section on forest, watershed, and soil protection addresses the need to increase monitoring and enforcement capacity for forest resource protection.

The BSAP provides details of policy and investment strategies for biodiversity conservation. The Moldova Parliament adopted the BSAP in April 2001. At the time this report was being

prepared, the English version of the BSAP was being revised for publication. The biodiversity assessment team was provided an advanced draft of the English translation, which served as the major source of information for this report. The BSAP is rich in data and provides fairly frank evaluations of strengths and weaknesses in the environmental sector.

General strategic objectives outlined in the BSAP are as follows:

- Establish biodiversity protection as a basic value of the Republic of Moldova.
- Assess and eliminate anthropogenic effects that threaten the integrity and maintenance of ecosystems and species.
- Identify optimal conditions for environmental rehabilitation through biological diversity conservation.
- Improve the legislative framework concerning use and conservation of biological resources.
- Establish sustainable use of biological resources as a socioeconomic benefit at local, national, and regional levels.
- Improve biodiversity management systems.
- Improve the public's access to information and participation in the decision-making process in the field of conservation and sustainable use of biodiversity.

Specific action plans are organized under the following categories:

- General action plan
- Creation of a national ecological network
- Protection of ecosystem biodiversity
  - Forests
  - Steppe
  - Meadow
  - Petrophyte
  - Aquatic
  - Agricultural
  - Urban
- Species protection
- *Ex situ* biodiversity conservation

The BSAP proposes more than 100 actions. Each action identifies an implementation period, the institutions responsible for implementation, and the financial sources needed. Several activities have been highlighted as priority actions. The BSAP also outlines several strategic components that are divided into three categories: 1) short-term plans that require less than 5 years for

implementation; 2) medium-term plans that require 5 to 10 years; and 3) long-term plans that require more than 10 years. Within these categories, priority components are also identified. The BSAP recognizes the need for further decentralization of biodiversity protection activities to county (Judet) and village governments. Overall the program outlined in the BSAP is ambitious, but perhaps overly optimistic considering the economic hardship in Moldova today.

B. Institutional Framework (Government, Academic, NGOs, Private Sector)

In Moldova, primary responsibility for policies and initiatives for environmental protection lies with the Department of the Environment of the Ministry of Environment and Territorial Development. Within the department, primary responsibility for biodiversity conservation falls to the General Administration for Regulation of Ecological Impact and Nature Conservation. The State Ecological Inspectorate (SEI) acts as a semiautonomous entity under the MoE. The SEI ensures adherence to environmental protection by issuing fines and other penalties. The SEI has an office in each of Moldova's counties. The MoE struggles to meet their mandate. There are some highly qualified people in the Ministry. Overall, however, staff numbers are too low and salaries are too low to maintain a dedicated workforce.

Some state authorities are being decentralized to county and village governments. As a part of Moldova's decentralization efforts, each of Moldova's 11 counties has a local environmental office with three staff members. This office has primary responsibility for elaborating local environmental policy and conducting public outreach. Counties have protected areas under their jurisdiction. Protection of these areas is the responsibility of local (town and village) governments. The local governments do not have adequate resources to monitor and managed these areas. While three people might be able to handle the workload, they are not well paid and have few resources for inspections and the sort.

Management of Moldova's four scientific reserves is currently conducted by the State Forestry Service (SFS), which is separate from the MoE. The Law on Natural Protected Areas stipulates that the MoE has responsibility for management of protected areas, but these responsibilities have not been transferred. The SFS conducts some controlled logging for use as heating materials for rural populations, although there is no clear data on the amount of wood harvested. The Ministry of Agriculture has responsibilities related to nature protection on agricultural lands.

The academic and research institutions in Moldova are a critical part of the institutional support for biodiversity protection. They train scientists, conduct research and inventories, publish natural history accounts and status reports, manage scientific collections and archives, and serve on public and NGO committees and commissions. Among the most important institutions are:

- Moldova Academy of Sciences
  - Institute of Botany (Botanical Garden)
  - Institute of Zoology
  - Institute of Genetics
  - Institute of Microbiology
  - Institute of Geography
  - Center of Vegetative Genetic Resources

- Moldova State University
- Agrarian State University
- National Institute of Ecology
- Fish Farming Research Station

While the universities and research institutions provide a critical source of professional biologists, they fall far short of meeting current and future demand. Although biologists are well trained in identification of species, resources are not adequate to conduct research, monitor the government's conservation programs, and prepare physical and management plans. Because of the lack of resources, many talented scientists have moved abroad, creating a potential "brain drain" in the scientific aspects of biodiversity conservation.

Approximately 40 NGOs are actively involved in environmental issues, including protection of biodiversity. However, only a few of these have more than one full-time staff person. The Ecological Movement of Moldova (EMM) was founded in 1990 to help create a legal framework and institutional reforms for environmental protection, and to assist in the development of ecological NGOs. EMM is also active in information dissemination; it publishes Moldova's first environmental newspaper, *Natura*, which is provided free to schools and is available for a small price to the public. This NGO has created information centers in its headquarters and in several of its 10 branch offices. Funding for EMM has come from USAID, the United Nations Development Programme (UNDP), the Regional Environmental Center, and the governments of the United Kingdom and Holland.

The Ecological Center "Biotica" also performs functions in environmental legal reform and NGO development, especially in relation to biodiversity issues. The group has been especially active in protecting the Nistru River and its delta, and has recently been helping develop environmental NGOs in the Transdniester region. As with EMM, much of the funding for Biotica comes from international sources, including the Regional Environmental Center.

Many NGOs in Moldova are fighting to survive. International donors are largely responsible for funding for the better-established NGOs, and there are few prospects for the same level of funding from indigenous sources. As of yet, there have been no programs for training NGOs on fundraising and developing a constituency.

C. Legislative Framework

C1. National Legislation

Since independence in 1991, the Republic of Moldova has approved a series of new legal acts that regulate use, protection, and regeneration of biological resources. Important aspects of these laws include:

- Protection of representative natural areas
- Protection of natural habitats
- Conservation of natural conditions necessary for preservation and reproduction of flora and wild animal species

- Regulation of biological resource use
- Integration of biodiversity conservation requirements into national economic activities

The MoE is currently in the process of drafting two new laws: the Law on the Plant Kingdom, and the Law on Creation of the National Ecological Network. Both laws are being drafted with input from the scientific and NGO communities.

List of Major Laws of the Republic of Moldova Related to Biodiversity Conservation

- Law on the Fund of State-Protected Natural Territories (1998)
- Law on the Animal Kingdom (1995)
- Forest Code (1997)
- Law on Protective Zones Along Rivers and Watersheds (1995)
- Law on Environmental Protection (1993)
- Law on Natural Resources (1997)
- Law on Ecological Expertise and Environmental Impact Assessment (1997)

Despite the efforts to integrate biodiversity conservation into national economic activities, there have been conflicts between laws and government programs. A large conflict arose during the government's agricultural privatization program. Many farm plots were created along the edge of riverbanks, despite legislation requiring buffer zones, the size of which depend on the size of the river.

There is currently a lack of legislative mechanisms in a number of areas, including biotechnology, genetically modified organisms and collection of medicinal plants and certain fauna species (insects, mollusks, frogs). Some laws are noticeably weak in terms of defining responsibilities and implementation mechanisms. For example, the law on the Animal Kingdom requires a comprehensive survey of fauna without defining a mechanism or a date for completion.

Current priorities for legislative reform are focused on Moldova's efforts toward economic integration into the European Union. It is necessary for Moldova to begin the process of harmonization of national legislation addressing biodiversity conservation with that of the EU. As of yet, Moldova has yet to do a comparative analysis of its legislation with that of the EU. This is addressed in the country's BSAP.

C2. International Conventions

Compliance with international agreements related to the protection of biodiversity, signed or ratified, substantially influences the current objectives of the MoE. (See box at right.)

List of International Agreements Related to Biodiversity to Which Moldova Is a Party

- Convention on Biological Diversity (Rio de Janeiro)
- Convention on Wetlands of International Importance (Ramsar)
- Convention on the Conservation of European Wildlife and Natural Habitats (Bern)
- Pan-European Biological and Landscape Diversity Strategy (Sofia)
- Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus)
- Convention on Environmental Impact Assessment in a Transboundary Context (Espoo)
- Convention on Protection and Sustainable Use of the Danube River
- Convention to Combat Desertification

Moldova has made significant progress on the convention on access to information, public participation in decision-making, and access to justice in environmental matters (Aarhus Convention), having been the first country to sign and ratify the treaty. The MoE has taken a leading role in

implementation of the Aarhus Convention by establishing an environmental information center on its premises. The center includes a library and a computer database with access to all national laws relating to the environment.

The national laws discussed above are written, in part, to address requirements of international agreements. To implement these international agreements and new laws, the government of Moldova and other stakeholders face substantial challenges. Implementation will be expensive and requires a long-term plan to train and deploy people with the required expertise. The BSAP and NEAP address the financial requirements of implementation adequately; however, the country may not have the resources required for implementation of the treaties. In addition, requirements for strengthening legal, institutional, and organizational capacities under these agreements may require much longer than the 10- to 15-year timeline outlined in the BSAP and NEAP.

Photo from Government of Moldova. 2000a. Biodiversity Conservation National Strategy and Action Plan, unpublished draft of the English translation.

Yellow Lady's Slipper (*Cypripedium calceolus*) is a rare orchid, listed on the Appendix II of the Bern Convention and Annexes II and IV of the EU Habitats Directive.

D. International Biodiversity Conservation Projects

The international community is financing only a few biodiversity conservation projects in Moldova. The World Bank's Global Environmental Facility's (GEF) Enabling Activities funds have supported preparation of the BSAP. The World Bank will also fund the second phase of the BSAP. The UNDP funded the preparation of the NEAP.

The European Union has funded a number of projects for management of the Prut River and its tributaries through its Technical Assistance to the CIS (TACIS) program. One of the goals of these grants is for joint Ukrainian-Moldovian protection of the Black Sea basin. The project "Environmental Protection Activities for Ukraine and Moldova" (380,000 Euro grant) was completed in October 1999. Objectives of this grant included a plan for wetland restoration on the Lower Prut River and development of a plan for creation of the Prutul de Jos (Lower Prut) Biosphere Reserve. This biosphere reserve has not yet been created.

Other TACIS-funded projects include the Water Management of the Prut River Basin ($2.5 million grant). The objective of this project was the development of a management and monitoring plan, an information center and a database for the Prut River. EU/TACIS has also provided a 1.2 million euro grant for developing a management plan for the Prut River's tributaries. One of the objectives of this grant is to create and develop a database using

geographic information systems (GIS) to evaluate conditions on the Sarata, Girla Mare, and Ciuhur Rivers.

The UNDP, the Danish government, the U.S. Environmental Protection Agency, and others support the Regional Environmental Center (REC) of Moldova. REC works in three main areas: 1) assistance in the development of civil society through funding of small grants to NGOs; 2) capacity building for NGOs and environmental stakeholders through seminars; and 3) information dissemination through a database, Web page and electronic bulletin, and information center in Chisinau. Some of the money from the small grants program is set aside specifically for biodiversity conservation projects.

NATO has partially funded a grant (1.32 million Belgian franc NATO grant, 880,000 Belgian franc equivalent in state funds) for creation of a monitoring system in support of management of the Prut and Nistru Rivers. A planned objective for this project is the establishment of an automated system for monitoring quantitative and qualitative indicators for both rivers.

SECTION V

USAID/Moldova

The USAID assistance program in Moldova for the period 2001-2005 is "geared toward helping ensure that the benefits of a market-oriented, democratically governed state reach the general public." The six strategic objectives and programmatic initiatives of the Mission are described below. The Mission's accomplishments of the past few years are also described, at least for activities that potentially impact biodiversity. Finally, opportunities are identified that would help to minimize impacts on biological diversity or, within the context of the strategic objectives, would assist Moldova to better protect and manage biodiversity.

A. Impact of USAID Program on Biodiversity

A1. Privatization Program

Moldova's privatization efforts began in 1993 with the transfer of a large number of state-owned enterprises to private ownership. In March 1998 the Government of Moldova launched the National Land Program to privatize all applicants of the country's 1,000 state farms. By July 2000, more than 625 farms were de-collectivized and 1.662 million land titles issued to individual farm owners. USAID assisted with land titling and provided experts who assisted farmers and local authorities to understand their rights and responsibilities in the de-collectivization process. USAID provided technical support for liquidation of farm debt and regulatory structure to support a land real estate market.

The rural land privatization process has likely had negative impacts on the environment, though insufficient data are available to specify the extent and nature of the impacts. Different decisions or mitigation programs at various stages of the process might have lessened the impacts or even provided positive benefits to biodiversity and the environment, while still accomplishing the goals of the privatization program. In some cases the privatization program seems to have worked at cross-purposes with other programs and state policies of the Moldovian government. Coordination and cooperation between government agencies was less than ideal. For example, government plans to expand the protected areas system might have made real progress had it been addressed as a component of the privatization program. The process was made more difficult after privatization, because of the need to deal with hundreds of owners where previously there was one or a few state farms to consider — and the land was state-owned. Furthermore, in at least some cases critical habitat has since been lost, native steppe plowed, and set meadows drained. The privatization process further strained the infrastructure for monitoring and regulating natural resources. For example, managing buffer zones around protected areas now requires dealing with hundreds of farmers where management decisions were once made by consulting a handful of collective farm managers. Again, better communication, cooperation, and coordination among government agencies and with international donors might have prevented problems or even found ways to improve the status of biodiversity without undo burden on the privatization program.

The programmatic decisions behind the issues raised above were mostly made before the land titling effort was initiated. In at least some cases the members of collective farms decided early on how the land would be subdivided. In an effort to be equitable, this sometimes resulted in long, narrow farm plots extending from fertile bottomlands up less fertile hillsides. When the land titling program got underway in 1998, farmers expected (insisted on) confirmation of their earlier decisions and that land titles be granted for the land they had been farming for several years.

USAID support to a land and real estate market has the potential to encourage re-aggregation of farms into larger plots that might be managed as a more biologically diverse and environmentally stable landscape. At least that is the theory. More information will be needed to measure the impacts of re-aggregation. Many of USAID's other programs in Moldova (discussed below) are contributing, or have the potential to contribute to improvements in biodiversity management on small farms.

Another component of the privatization program extends to the energy sector, telecommunications, and some of Moldova's largest wineries and grain elevators. These programs are not likely to directly impact biodiversity. However, changes in the energy sector have the potential to influence the cost of fuel for winter heating; high cost will likely increase forest cutting while lower costs may reduce deforestation rates.

A2. Market-Based Economic Restructuring Program

In response to new laws on fiscal and budget management in Moldova, USAID is working with the government to consolidate data on expenditures, sources of revenue and socioeconomic statistics, including a fair and consistent tax code. Computerization of tracking systems for tax processing is helping to ensure better compliance, forecasting, and accountability. USAID activities helped create a professional bank supervision department and early warning systems to detect potential problem areas. USAID is also providing training to accounting professionals in commercial transactions, international accounting standards, and the applicability of new regulations. By 1999, most of Moldova's 20,000 enterprises had converted to international accounting standards. These programs are unlikely to impact biodiversity.

A3. Private Enterprise Development Program

USAID is helping to improve the environment for private enterprise development in Moldova. The program includes new programs being developed to improve access by small and medium enterprises (SMEs) to business skills, market information, and financing. Technical assistance will focus on continued policy reform, business association development, and development of a legal, regulatory commercial code that is more conducive to private sector growth. Also addressed in this program is the agribusiness partnership program, which encourages U.S. businesses to invest in Moldova by providing training and commodity support.

The impact of USAID's SME activities on biodiversity is not clear. However, recent studies elsewhere suggest that little or no consideration is given to environmental issues as part of the credit acquisition process or as technical assistance in SME development. Yet some sectors (crafts, metal works, brick and lime kilns, tanneries, textiles, agriculture, and food processing)

have been shown to have significant negative impact, primarily through depletion of natural resources and disposal of liquid, solid, and gaseous waste.

The privatization program also supports private farmer commercialization activities and a network of farm service centers/farm stores to provide farmers access to inputs, technology, credit, and market information. This combination of activities has enormous potential to contribute to (post-project) mitigation for impacts resulting from the rural land privatization program. Farm stores at the village level provide farm inputs, training, and assistance with marketing farm outputs. There is substantial opportunity for these programs to have a positive influence on natural resources and biodiversity. Introduction of modern technologies for cultivation and use of chemicals may have positive impact on natural resources. Local centers provide a venue for educating farms about agro-forestry and providing them with the inputs required to diversify the natural resource base on farms. Products from the farm stores should include trees and shrubs that can be planted in shelterbelts and along streamsides, food (e.g., nuts and berries), fuel, and resources for water and soil conservation and wildlife habitat .

A4. Democratic Governance Program

USAID has provided resources to assist with the revision and passage of electoral legislation and to develop the institutions at the core of a democratic society such as the parliament, the constitutional court, NGOs, and mass media. This program includes new laws to transfer more responsibility to local government officials, restructure the distribution of resources, and engage community-based organizations in decision making. To further the capacity for local governments to implement this initiative, USAID launched a local government reform project aimed at helping municipalities achieve greater fiscal and administrative efficiency, while inviting more civic associations and NGOs to participate in the process.

The program currently focuses on urban government in selected cities. At that scale, the program is not likely to have major impacts on natural resources. However, should the program be expanded to the village level there would be substantial opportunity to make a positive impact on natural resources. A major impediment to effective natural resources management is the lack of clear authority, resources, and expertise at the village level and a lack of participation by citizens and civil societies. Increasing support to environmental NGOs can go a long way to changing biodiversity management in Moldova.

A5. Social and Humanitarian Assistance Program

Under this program, grants have been awarded by USAID for humanitarian programs that complement the development projects in economic and political reform and assist those most impacted by the reduction of social service expenditures. USAID has distributed — through NGOs — 1,560 tons of humanitarian aid worth more than $27 million to medical centers, farmers, orphanages, and social service organizations in Moldova since 1994. Through a special winter heat project the U.S. Government, together with the Government of Moldova and a U.S. NGO, provided coal and heating oil to vulnerable groups in Moldova during two winter seasons while energy sector restructuring reforms were being implemented. Alleviating poverty can remove pressure from natural resources, including unregulated hunting and other harvesting of

Moldova's few remaining native steppes are a locally valued source of medicinal herbs and horticultural material. Pressure from collectors threatens to eliminate the rarest species, with eventual loss of the knowledge base about these plants.

wild natural resources. To the extent that the emergency winter heating project operated in rural areas, it likely had a positive impact on biodiversity by reducing the harvest of trees for fuel.

B. Recommendations for USAID/Moldova

The following recommendations, coupled with crosscutting initiatives that incorporate components from two or more of the programs described above, would have significant positive impact on natural resources and the environment:

- *Conduct a thorough analysis of the impact of agricultural land privatization on biodiversity and natural resources.* The study should compare and contrast changes on private land with those lands that became communal property. This information would guide potential support for improving natural resource management on the new farms and communal lands. The study should compare and contrast changes on private land with those lands that became communal property. This information should be shared with the Government of Moldova and other donors and made available to help guide land privatization efforts in Ukraine and elsewhere. This study might be considered in terms of a post-project evaluation of the earlier support through the land privatization program.

- *Have USAID's SME program train microcredit officers to identify environmental problems among the microenterprises it assists.* Training could include the basic principles of environmental management in microenterprises, and officers could be equipped with simple, plain-language technical guidelines to help them identify environmental issues. The technical guidelines also would enable the microcredit

officers to either provide their clients with simple mitigation measures, or refer the clients for technical guidance to another source of advice.

- *Include products and services that promote a more holistic approach to the agricultural landscape as part of USAID's current local farm stores activity.* Multipurpose tree and shrub species for farm landscape diversification could be stocked or propagated and sold locally. Extension training should instruct farmers on the use, placement, and management of multipurpose perennials in shelterbelts and other agroforesty configurations. Farmers should be encouraged to plant and maintain forests along streams and rivers. The stores should consider including organic farming and certified organic crops in their business plans, training courses, etc. Agriculture extension programs should promote contour plowing and no-till farming.

- In two to three rural regions, establish pilot programs to improve natural resources management through integrated components of USAID's strategic objectives, including privatization, decentralization, energy efficiency, SME, and public participation through civil societies. Pilot regions could be targeted adjacent to protected areas and include efforts to improve soil conservation, reduced use of chemicals, increase agroforestry applications along streams and in buffer zones of protected areas, and prepare village-level land-use plans to help guide and monitor the status of natural resources.

SECTION VI

Findings and Recommendations

This section summarizes the findings of the assessment and offers general recommendations to the Government of Moldova, international donors and other stakeholders working in Moldova.

A. Summary of Findings

- The original natural communities of Moldova have been severely reduced over the past 100 years. Steppe and steppe-associated wetland ecosystems (meadows and marshes) have been particularly hard hit, with perhaps 99 percent loss of mesic to semi-arid steppe ecosystems in southern Moldova. It is demoralizing to note the continued loss of native steppe in Moldova in order to make way for another couple of hectares of cropland. Wetlands in the steppe and forest-steppe biomes have also undergone drastic declines. Agriculture continues to be a major threat to the few remaining tracts of steppe and wetlands in Moldova. Native forests were reduced to a fraction of their original coverage; many of the forests today are plantations with considerably less biodiversity than the original native forests. Overall forest cover in Moldova is the lowest for any country in Europe. The need for fuel to heat homes is a substantial threat to remaining forests. Riverine and palustrine ecosystems have suffered from urban, industrial, and agricultural pollution and increased sedimentation. Although some forms of pollution have decreased in recent years, problems persist and will likely get worse if new protection measures are not implemented.

- Today's simplified agricultural and forest landscapes unnecessarily diminish biological diversity. Where the entire landscape is reduced to large monocultures, simple windbreaks, and engineered hydrological systems, few opportunities remain for biodiversity to exist. The loss of shelterbelts, orchards and farm forests, combined with mechanized monocultures, have substantially reduced the variety and total value of products locally available to farmers operating small and privatized holdings.

- In the past 80 years, there has been a substantial loss of awareness of the values and roles of biodiversity in the context of the local economy and traditions. Anticipated changes in the economy and recent changes in land tenure provide opportunities to reestablish and diversify natural resources management at the local level, including sustainable use of products extracted from the wild.

- Over the past 10 years, there has been a substantial reduction in pollution from industry and agrochemicals, largely due to general economic decline. Biodiversity has undoubtedly benefited from cleaner air, water, and soils. However, localized but serious contamination associated with the use and storage of agrochemicals and industry is likely significant, but poorly documented. Economic recovery may increase contamination of the environment and harm biodiversity, unless corrective measures are taken, including training and technology upgrades.

- Although, there are insufficient data to show a direct cause and effect relationship between land privatization and loss of biodiversity, there is little doubt that opportunities were missed to incorporate cost-effective programs to improve protection and management of natural resources on the rural landscape in the privatization program. Available evidence suggests that on at least some new small farms, land management practices have increased erosion, reduced forest cover, and converted additional native steppe and wetlands to agriculture. Lands set aside as communal lands, in some cases because they were not appropriate for agriculture, have been converted to agriculture. Furthermore, privatization of rural lands has made management of buffer zones around protected areas and plans for expanding the national system of protected areas increasingly difficult because of the need to deal with many more landowners.

- The protected areas system is inadequate in ecological coverage. Additional protection is most urgently needed for steppe vegetation communities and wetlands, including wet meadows. To protect adequate examples of these ecosystems, it may be necessary to restore degraded but still mostly native ecosystems. Even the larger protected areas will only be ecologically viable in the long run if supported by research-based management and broader landscape initiatives. The smaller reserves must be actively managed as a part of the larger landscape.

- Data and information are inadequate to determine present distribution and condition of biodiversity. Wide variations in management objectives, reporting formats, and research protocols make comparative analysis difficult.

- Considering that the region began writing legislation only 10 years ago, the legal and policy framework is mostly adequate and improving. However, the continued destruction of the few remaining wetlands and native steppe has gone practically unnoticed, suggesting that the laws and regulations are either inadequate to protect these critically endangered ecosystems, neglected, or simply not known by local officials.

- Implementation and enforcement of laws and regulations are inadequate. Low wages and inadequate resources (e.g., insufficient transportation) for inspectors, as well as low penalties for illegal actions, hinder enforcement of laws intended to protect natural resources. Multiple requirements of the many international agreements and new national laws have often overwhelmed implementation capacity.

- The NGO community in Moldova is impressive, but remains too weak to effectively participate and lead in a broad range of biodiversity and natural resources issues, particularly at the village level.

- Conservation at the local level is energized and dynamic but suffers from inadequate organizational capacity, insufficient resources, and a paucity of information. Available data are inadequate for people to gauge how their lives have been impacted

by decisions made by government and industries. The authority to manage natural resources at the village level is inadequate and not consistent with responsibilities for villages to manage public lands.

- Nutrient loading, sedimentation, and industrial contamination are all contributing to a dramatic decline in commercial fisheries in the rivers of Moldova and in the Black Sea.

- The high literacy rate and a generally well-educated population make it possible to use outreach and extension programs to effectively change how people view and use natural resources.

B. Recommendations for Improving Biodiversity Conservation

- Heighten and diversify biodiversity values in the agricultural landscape by improving fiscal incentives and extension capacity for conservation. Provide training and equipment that promote soil conservation and minimize use of chemicals. Promote no-till and contour plowing, and for selected crops consider developing organic certified products.

- In the agriculture landscape, encourage the establishment of multipurpose shelterbelts and woodlots, and the reclamation of gallery forests. Provide environmental awareness training for farm forestry and increase commercial distribution of multiple-use species (preferably native species) appropriate for shelterbelts and shoreline protection. Immediately develop and implement a program to address the decline in forests caused by the need for heating fuel. Establish controlled hunting on private and public lands, including some state forestlands.

- Protect and manage remaining dry and mesic steppe. Acquire selected tracts for addition to the national system of protected areas. Expand existing steppe reserves through habitat restoration. Develop management plans, including buffer zones. Eliminate haying and collecting of plants until research is conducted into the impact these activities have on the ecosystem.

- Provide incentives for restoration of wetlands and disincentives for the destruction of wetlands. Encourage farmers to minimize impact on wet meadows and ephemeral wetlands in the spring and early summer, when these are particularly important for wildlife. Restore selected streams to their natural hydrological processes. Monitor pollution and sedimentation of aquatic systems and establish an aggressive program to reduce these problems. Restore fisheries through improved water quality and controls on commercial takes.

- Develop physical plans, including maps at a village scale that describe appropriate and legal options for land uses. Decentralize the responsibility and fiscal authority to monitor and enforce the environmental code. Publish the plans and distribute them locally to increase people’s awareness of the laws at the local level. Clarify the

authority of the MoE to enforce environmental laws, including on other government agencies.

- Support creation of a national biodiversity information clearinghouse and service center to collect and organize information about biodiversity and to provide all stakeholders with information products. The program should be oriented to serve the needs of land use planning, environmental impact assessments (inspectorates), protected areas (with buffers) selection and management, and monitoring.

- Implement the National Ecological Network. Increase protection of remaining examples of the most threatened ecosystems, including steppe, steppe-associated wetlands, native forests, river gallery forests and wetlands, and the best examples of petrophyte communities.

- Further strengthen the NGO community and their programs to educate the public and work with government and industry to improve environmental conditions and natural resources management in Moldova.

ANNEX A

Sections 117 and 119 of the Foreign Assistance Act

Foreign Assistance Act, Part I, Section 117 - Environment and Natural Resources

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Sec. 117\71\ Environment and Natural Resources--
(a) The Congress finds that if current trends in the degradation of natural resources in developing countries continue, they will severely undermine the best efforts to meet basic human needs, to achieve sustained economic growth, and to prevent international tension and conflict. The Congress also finds that the world faces enormous, urgent, and complex problems, with respect to natural resources, which require new forms of cooperation between the United States and developing countries to prevent such problems from becoming unmanageable. It is, therefore, in the economic and security interests of the United States to provide leadership both in thoroughly reassessing policies relating to natural resources and the environment, and in cooperating extensively with developing countries in order to achieve environmentally sound development.

\71\ 22 U.S.C. 2151p. Sec. 117 was redesignated from being sec. 118 by sec. 301(1) of Public Law 99-529, resulting in the creation of two sections 117. Sec. 301(2) of Public Law 99-529 (100 Stat. 3014) further deleted subsec. (d) of that section, which dealt with tropical forests, and then sec. 301(3) of Public Law 99-529 added a new section 118 entitled "Tropical Forests." This section, as added by sec. 113 of Public Law 95-88 (91 Stat. 537) and amended by sec. 110 of Public Law 95-424 (92 Stat. 948) and sec. 122 of Public Law 96-53 (93 Stat. 948), was further amended and restated by sec. 307 of the International Security and Development Cooperation Act of 1981 (Public Law 97-113; 95 Stat. 1533). This section previously read as follows: "Sec. 118. Environment and Natural Resources--
(a) The President is authorized to furnish assistance under this part for developing and strengthening the capacity of less developed countries to protect and manage their environment and natural resources. Special efforts shall be made to maintain and where possible restore the land, vegetation, water, wildlife and other resources upon which depend economic growth and human well-being especially that of the poor.
(b) In carrying out programs under this chapter, the President shall take into consideration the environmental consequence of development actions." See also sec. 534 of the Foreign Operations, Export Financing, and Related Programs Appropriations Act, 1990 (Public Law 101-167; 103 Stat. 1228), as amended, relating to "Global Warming Initiative." See also sec. 533 of the Foreign Operations, Export Financing, and Related Programs Appropriations Act, 1991 (Public Law 101-513; 104 Stat. 2013), as amended, relating to "Environment and Global Warming." See also sec. 532 of the Foreign Operations, Export Financing, and Related Programs Appropriations Act, 1993 (Public Law 102-391; 106 Stat. 1666), relating to "Environment."

(b) In order to address the serious problems described in subsection (a), the President is authorized to furnish assistance under this part for developing and strengthening the capacity of developing countries to protect and manage their environment and natural resources. Special efforts shall be made to maintain and where possible to restore the land, vegetation, water,

wildlife, and other resources upon which depend economic growth and human well-being, especially of the poor.
(c)(1) The President, in implementing programs and projects under this chapter and chapter 10 of this part, \72\ shall take fully into account the impact of such programs and projects upon the environment and natural resources of developing countries. Subject to such procedures as the President considers appropriate, the President shall require all agencies and officials responsible for programs or projects under this chapter—

\72\ Sec. 562 of the Foreign Operations, Export Financing, and Related Programs Appropriations Act, 1991 (Public Law 101-513; 104 Stat. 2026), added a new chapter 10 to part I of this Act, providing for long-term development in sub-Saharan Africa, and made a conforming amendment by inserting “and chapter 10 of this part” here.

(A) To prepare and take fully into account an environmental impact statement for any program or project under this chapter significantly affecting the environment of the global commons outside the jurisdiction of any country, the environment of the United States, or other aspects of the environment which the President may specify; and
(B) To prepare and take fully into account an environmental assessment of any proposed program or project under this chapter significantly affecting the environment of any foreign country. Such agencies and officials should, where appropriate, use local technical resources in preparing environmental impact statements and environmental assessments pursuant to this subsection.
(2) The President may establish exceptions from the requirements of this subsection for emergency conditions and for cases in which compliance with those requirements would be seriously detrimental to the foreign policy interests of the United States.

Foreign Assistance Act, Part I, Section 119 - Endangered Species

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Sec. 119\75\ Endangered Species--
(a) The Congress finds the survival of many animal and plant species is endangered by overhunting, by the presence of toxic chemicals in water, air and soil, and by the destruction of habitats. The Congress further finds that the extinction of animal and plant species is an irreparable loss with potentially serious environmental and economic consequences for developing and developed countries alike. Accordingly, the preservation of animal and plant species through the regulation of the hunting and trade in endangered species, through limitations on the pollution of natural ecosystems, and through the protection of wildlife habitats should be an important objective of the United States development assistance.

\75\ 22 U.S.C. 2151q. Sec. 119, pars. (a) and (b) were added by sec. 702 of the International Environment Protection Act of 1983 (title VII of the Department of State Authorization Act, Fiscal Years 1984 and 1985, Public Law 98-164; 97 Stat. 1045).

(b) \75\ In order to preserve biological diversity, the President is authorized to furnish assistance under this part, notwithstanding section 660,\76\ to assist countries in protecting and maintaining wildlife habitats and in developing sound wildlife management and plant conservation programs.

Special efforts should be made to establish and maintain wildlife sanctuaries, reserves, and parks; to enact and enforce anti-poaching measures; and to identify, study, and catalog animal and plant species, especially in tropical environments.

\76\ Section 533(d)(4)(A) of the Foreign Operations, Export Financing, and Related Programs Appropriations Act, 1990 (Public Law 101-167; 103 Stat. 1227), added "notwithstanding section 660" at this point.

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

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

(d) \77\ Country Analysis Requirements.--Each country development strategy statement or other country plan prepared by the Agency for International Development shall include an analysis of-

(1) the actions necessary in that country to conserve biological diversity, and

(2) the extent to which the actions proposed for support by the Agency meet the needs thus identified.

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

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

(g) \77\ Actions by AID.--The Administrator of the Agency for International Development shall-

(1) cooperate with appropriate international organizations, both governmental and nongovernmental;

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

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

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

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

obtaining the necessary appropriations, additional assistance necessary for the establishment and maintenance of such protected areas;

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

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

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

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

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

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

ANNEX B

Scope of Work

The Contractor shall perform the following activities:

A. Hold meetings with the Bureau Environmental Officer (BEO) of USAID's E&E Bureau in Washington, the E&E Desk Officers, and others suggested by the Desk Officers to ensure full understanding of EE's program in Ukraine, Belarus and Moldova, USAID environmental procedures and purpose of this assignment. These discussion shall include any policy decisions and approaches which the BEO and Agency Environmental Advisor are taking as per their authority under Reg. 216, which may not be explicit in general legal documentation. The Contractor also shall meet with a representative of EE/EEST environment and energy divisions familiar with the USAID program as well as with a representative of the Bureau's democracy and governance office to cover to civil society-related issues. The Contractor also shall include meetings with relevant World Bank officials and with appropriate international NGOs to obtain current information on relevant studies, projects and initiatives.

B. The Contractor shall review and become familiar with materials provided by USAID and other important literature that is available on the internationally-funded Global Environmental Facility activities on international waterways, including the Danube, the Dnipro and Black Sea programs.

C. The contractor will also become familiar with the Moldova and Ukraine Programmatic Environmental Assessments that have been done for the agricultural sector and should be able to use them as a major resource.

D. Field a team to investigate and synthesize existing information and analyze the status of each country's biodiversity. The written report of this investigation shall include description of:

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

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

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

    4. Current and potential future threats to biodiversity including a general assessment of overall health of ecosystems and major factors affecting ecosystem health such as land use, pests, and/or contamination, etc. or major institutional or policy failures or transboundary issues as appropriate. Special attention should be given to the long term

impact of the Chernobyl disaster, the forest industry in the Carpatians, the development of international transportation infrastructure, and Ukraine's plans to privatize agricultural land.

5. Conservation efforts including national policies and strategies, the status of financing for conservation, the status of country participation in major international treaties (with particular attention to the Convention on International Trade in Endangered Species – CITES), the country's protected area system, and botanical gardens/gene banks (if relevant) and their status, and monitoring systems. This section should also include recent, current and planned activities by donor and multilateral lending organizations (IFIs), international conservation NGOs, and agencies of the USG that support or significantly impact biodiversity conservation, including sustainable forestry, soil conservation, and efforts to combat desertification and establishment of parks. Identify NGOs, universities and other local organizations involved in conservation, and a general description of responsible government agencies. A general assessment of the effectiveness of these policies, institutions and activities to achieve biodiversity conservation should be included. Priority conservation needs which lack donor or local support should be highlighted.

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

E. Prepare a report for Ukraine, Belarus and Moldova that incorporates and summarizes the information obtained and analysis required in the above activities on the status of biodiversity and conservation efforts and the implications for USAID programming and environmental monitoring to ensure compliance with 22 CFR 216 and Section 119(d). This report shall recommend actions that may be taken by Ukraine, Belarus and Moldova to conserve biodiversity, as well as activities that may be useful for USAID to support to ensure compliance with 22 CFR 216 and Section 119(d).

ANNEX C

Contacts

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6. Valeriu Caisin, Chief Engineer, Codru Scientific Reserve
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10. Valeriu Gheric, Professor, State University of Medicine
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13. Nicolai Lupascu, Inspector for Environment Protection, Consilium County
14. Ken Lyvers, Agriculture and Agribusiness Specialist, USAID/Moldova
15. Dr. Stefan Manic, Head of Direction, Protected Areas Direction, State Forest Service & Director, Codru Scientific Reserve
16. Nicolai Micu, Mayor, Village of Lozova, District of Chisinau
17. Constantin Mihailescu, Ph.D., Environmental Officer, CNFA Moldova
18. Vincent F. Morabito, General Director, Center for Private Business Reform

19. Pavel Munteanu, Vice-Mayor, Village of Bugeac, Comrat County

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22. Botezatu Sergiu, Project Management Specialist, USAID/Moldova

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25. Corneliu Stirbu, Project Management Specialist, USAID/Moldova

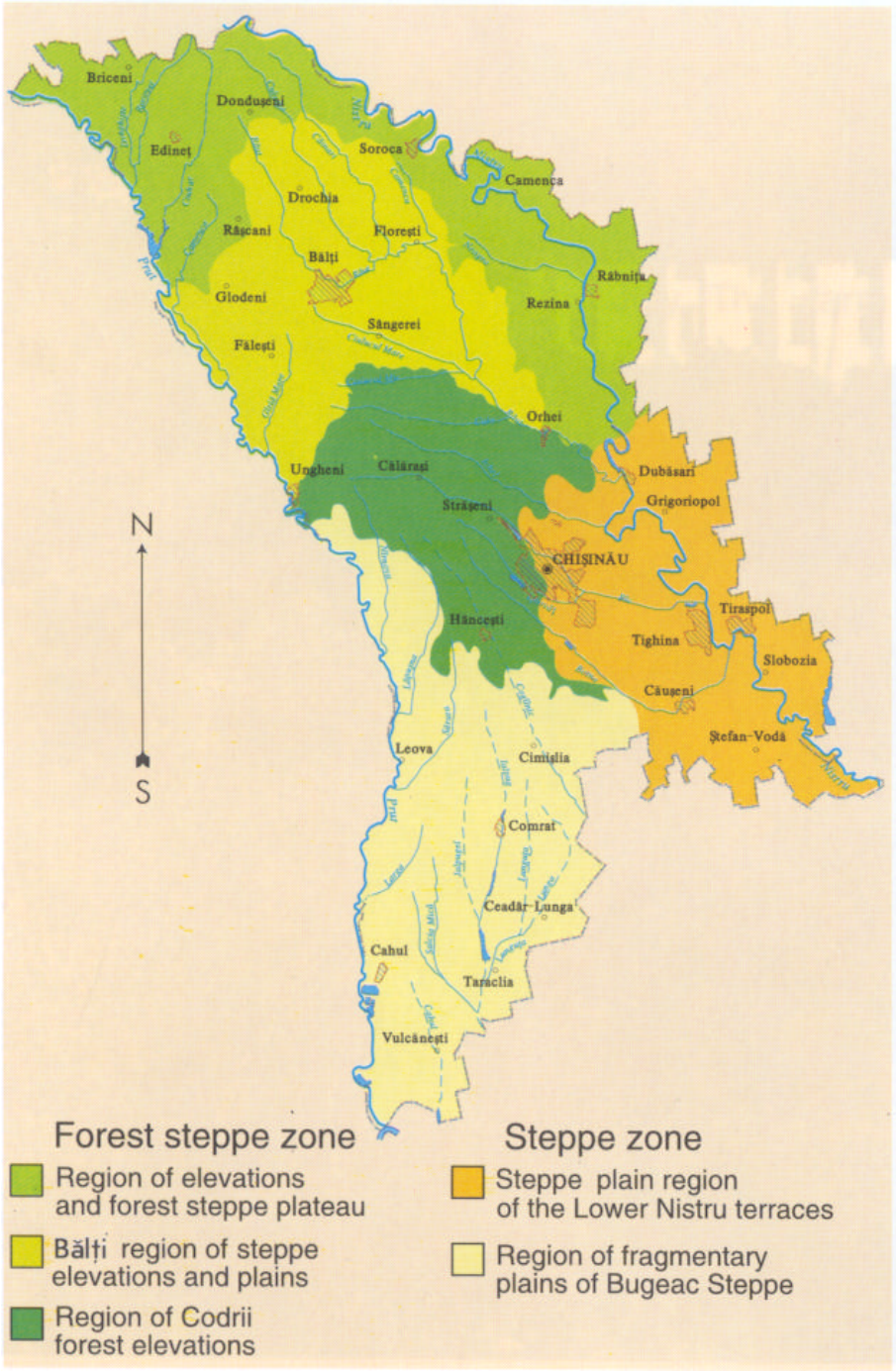
26. Mihai Tampiza, Director, Territorial Ecological Agency, Lapusna County

27. Ilie Trombitsky, Vice-President, Biotica

28. Nicu Vrednic, Head of Direction, Direction of the Public Relation, Mass-Media and Ecological Education, Ministry of Environment and Territorial Development

ANNEX D

Map of Major Vegetation Types in Moldova



Reprinted from: Government of Moldova. 2000. First National Report on Biological Diversity. Ministry of Environment and Territorial Development and the World Bank.

ANNEX E

List of Endangered Species: Red Data List for Moldova

Hilton-Taylor, C. (compiler) 2000. *2000 IUCN Red List of Threatened Species*. IUCN, Gland, Switzerland and Cambridge, UK. xviii + 61pp. Downloaded on 13 August 2001. http://www.redlist.org/.

Amphibians

Scientific Name	Common Name	Red List
Bombina bombina	European Fire-bellied Toad	LR/cd
Hyla arborea	European Common Tree Frog	LR/nt
Triturus cristatus	Great Crested Newt	LR/cd
Triturus dobrogicus	Danube Crested Newt	DD

Birds

Scientific Name	Common Name	Red List
Aquila clanga	Greater Spotted Eagle	VU C1
Aquila heliaca	Imperial Eagle	VU C1
Aspius aspius	Asp	DD
Aythya nyroca	Ferruginous Duck	LR/nt
Circus macrourus	Pale Harrier	LR/nt
Crex crex	Corn Crake	VU A2c
Falco naumanni	Lesser Kestrel	VU A1bce+2bce
Haliaeetus albicilla	Grey Sea Eagle	LR/nt
Otis tarda	Great Bustard	VU A2c
Phalacrocorax pygmeus	Pygmy Cormorant	LR/nt
Tetrax tetrax	Little Bustard	LR/nt

Fish

Scientific Name	Common Name	Red List
Acipenser nudiventris	Bastard Sturgeon (E)	EN A1acde+2d
Acipenser ruthenus	Sterlet	VU A1c+2d
Acipenser stellatus	Star Sturgeon	EN A2d
Alosa maeotica		DD
Alosa pontica		DD
Astacus astacus	Noble Crayfish	VU B2bce+3bcd
Carassius carassius	Crucian Carp	LR/nt
Clupeonella cultriventris		DD
Cobitis megaspila		DD
Eudontomyzon danfordi	Carpathian Brook Lamprey	LR/nt
Eudontomyzon mariae	UKRANIAN BROOK LAMPREY	DD
Gobio albipinnatus	White-finned Gudgeon	DD
Gobio kessleri	Kessler's Gudgeon	DD
Gymnocephalus acerina		DD
Gymnocephalus baloni	Balon's Ruffe	DD
Gymnocephalus schraetzer	Striped Ruffe	VU A1ace
Huso huso	Beluga	EN A2d
Leuciscus borysthenicus	Black Sea Chub	DD
Misgurnus fossilis	Leatherfish	LR/nt
Neogobius fluviatilis		DD
Neogobius gymnotrachelus		DD
Neogobius kessleri	Kessler's Goby	DD
Neogobius melanostomus		DD
Neogobius syrman		DD
Pelecus cultratus	Ziege	DD
Percarina demidoffi		VU D2
Rutilus frisii	Black Sea Roach	DD
Sabanejewia aurata	Goldside Loach	DD
Stizostedion marinum		DD

Scientific Name	Common Name	Red List
Stizostedion volgensis	Volga Zander	DD
Umbra krameri	European Mud-minnow	VU A1ace
Zingel streber	Streber	VU A1ce+2ce
Zingel zingel	Zingel	VU A1ce+2ce

Insects

Scientific Name	Common Name	Red List
Cerambyx cerdo	Cerambyx Longicorn	VU A1c+2c
Coenagrion mercuriale	Southern Damsfly	VU A2c
Formica pratensis var. nigricans	European Red Wood Ant	LR/nt
Lycaena dispar	Large Copper	LR/nt
Maculinea alcon	Alcon Large Blue	LR/nt
Maculinea arion	Large Blue	LR/nt
Maculinea nausithous	Dusky Large Blue	LR/nt
Morimus funereus		VU A1c
Osmoderma eremita	Hermit Beetle	VU A1c

Mammals

Scientific Name	Common Name	Red List
Barbastella barbastellus	Western Barbastelle	VU A2c
Castor fiber	Eurasian Beaver	LR/nt
Cricetulus migratorius	Grey Hamster	LR/nt
Dryomys nitedula	Forest Dormouse	LR/nt
Lutra lutra	Common Otter	VU A2cde
Nyctalus lasiopterus	Giant Noctule	LR/nt
Nyctalus leisleri	Lesser Noctule	LR/nt
Phocoena phocoena	Harbour Porpoise	VU A1c, C1+2b
Spermophilus citellus	European Squirrel	VU A1c

Reptiles

Scientific Name	Common Name	Red List
Emys orbicularis	European Pond Turtle	LR/nt
Testudo graeca	Common Tortoise	VU A1cd

Other

Scientific Name	Common Name	Red List
Fagotia esperi		DD
Hirudo medicinalis	Medicinal Leech	LR/nt
Myxas glutinosa	Glutinous Snail	DD
Pseudanodonta complanata		LR/nt
Theodoxus transversalis		DD
Unio crassus		LR/nt

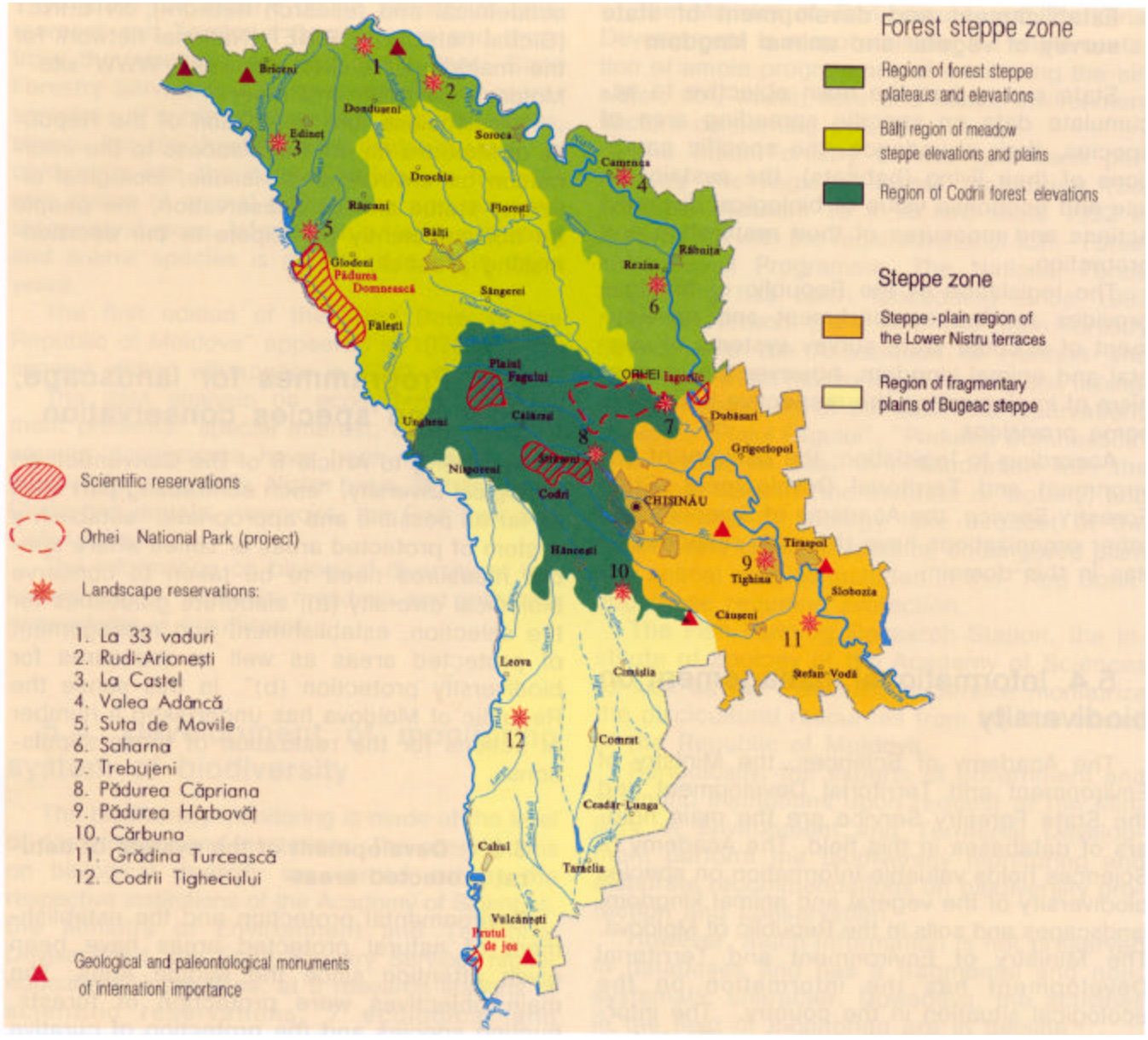
Moldova plant list from *1997 IUCN Red List of Threatened Plants* at http:// www.wcmc.org.uk /species/plants/plant_redlist.html. Downloaded on 10 August 2001.

Plants

Scientific Name	Common Name	Red List
Colchicum fominii Bordz		I
Crocus angustifolius Weston		I
Delphinium fissum Waldst. & Kit.		I

ANNEX F

Map of Protected Areas in Moldova



Reprinted from: Government of Moldova. 2000. First National Report on Biological Diversity. Ministry of Environment and Territorial Development and the World Bank.

ANNEX G

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