



The Project Ecological Network of Moldova

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Concept of the NEN is further developed through inclusion of NATURA 2000 considerations in the criteria system, renewal of staggered numeric criteria that incorporated data on species of the international concern (in line with the Annexes of Bird and Habitat Directives, Bern Convention and the IUCN Red List of Threatened Species).

54 potential Natura 2000 sites were identified during 2008. The list of such sites in the Core Areas was increased to 126 units after the project ended in 2012.

New Core Areas

As the result, the National Ecological Network now incorporates 113 Core Areas, including 9 of international, 13 of national and 91 of local importance.

Five Core Areas of international importance are situated within three recognized Ramsar Sites, in a site under consideration, or in a probable Ramsar Site; two other Core Areas support outstanding plant species concentrations mainly of steppe origin; and other two maintain high biodiversity and include the outstanding concentrations of archaeological findings.

It is revealed that the cross-boundary zone of Ukraine at the north of Moldova supports 13 Core Areas, one of which may be recognized as area of international, two of national and 10 of local importance. One of these sites is a trans-boundary one, bordering Moldova.

Economy of ecological network creation

The first national monetary assessment of ecosystem services was prepared, analysing the 10 years volume of ecosystem services of the NEN, using the parameters indicated in the National programme for NEN establishment. It revealed that the volume is three times higher than the assessed cost of physical creation with all restoration works!

Indicative maps

Geographic Information System of the NEN has been developed, biodiversity data incorporated and the indicative maps created:

1. Core Areas NEN: major biodiversity values
2. Core Areas NEN: target species. Map shows levels of presence of endangered species following the national law and international lists.
3. Pilot implementation of Natura 2000
4. Pilot implementation of CORINE BIOTOPS classification within the NEN
5. Assessment of the integrity of major NEN corridors. A map showing distribution of integral bands, stepping stone elements and nature-stripped sectors to be ecologically improved in two major corridors.



6. The NEN Core Areas in support of landscape diversity. A map demonstrating uneven contribution of eco-network in support of natural landscape elements due to the land cover transformation.
7. The NEN Core Areas showing anthropogenic pressure on the environment. A map that compares Core Areas distribution through the country regions with different levels of landscape and agriculture related transformations.
8. Pilot zoning of the NEN Core Areas, elaborated for Ramsar Sites: 1316 Lower Dniester and 500 Unguri-Holosnita. The map shows the patchy distribution of the most biodiversity valuable areas within natural and semi natural ecosystems constituting these Core Areas.
9. Sector of the Pan-European Ecological Network in the cross border zone of Northern Moldova and Ukraine, the first transboundary ecological network planning in region.

Directory

Directory of the NEN Key Elements was developed incorporating data on all 125 recognized Core Areas of Moldova, including Ukraine in the transboundary zone:

- geographical position, geological and landscape backgrounds;
- major ecosystems and forest composition;
- species richness and numbers of species under the national and international protection (highest plants, insects, amphibians and reptiles, mammals and birds, macrozoobentos);
- examples of rare and characteristic species;
- general description including the applied and necessary protection measures, and land tenure;
- threats and damaging factors;
- socio-economic significance including the probable forest originated profits, and use of resources including the use required for ecological restoration and tourism;
- archaeological and paleontological values.

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ECOLOGICAL NETWORK SEEN THROUGH ITS CORE AREAS



Brief guide on management of Core Areas of Ecological Network

Legal context

The legal basis for creation of the National Ecological Network (NEN) of Moldova was formulated in 2007 when the Law on Ecological Network and the Programme on establishment of National Ecological Network for 2011-2018 were approved. Among other, the National programme supposes development of land use plans and zoning of areas that are integrated in the NEN.

The two important documents in general reflect the "Concept of Ecological Network of the Republic of Moldova" (2001), elaborated by BIOTICA Ecological Society, which incorporated national experience and findings of documents related to the Pan-European Biological and Landscape Strategy, such as "Development of an Approach to a Pan-European Ecological Network: concept and criteria" (1988) and "Guidelines for the Development of the Pan-European Ecological Network" (1999).

Protected Areas and Core Areas

Core Area of ecological network can be conceived as Protected Area (PA) in the common use of this term. However, on one hand a Core Area might be under common economical use and on the other hand, high biodiversity value could sometimes be determined by the economic use (e.g. waterfowl concentrations in managed water bodies). Core Area often comprises PA and adjacent territory under the economic use, given that the ecosystem approach defines its borders. Core Area might also be a part of large PA with diverse tenures and uses e.g. in Ramsar Site.

Values of Core Areas

Forest ecosystems are diverse but largely damaged in the Republic of Moldova. Therefore very important feature of Core Areas is precisely the presence of seed origin forests and especially of old-growth stands. Diversity of herbaceous plants under forest canopy is significantly determined by levels of shading and varies from 79 to 206 species; forest glades and edges support about 800 species, mostly the ones characteristic for steppes and meadows. About 500 plant species are the typical ones for forests and forest-linked habitats, 172 of them are rare and 103 species are under state protection. The Operational List, recently updated list of threatened and regionally extinct but visiting species, includes 134 species. Forest-linked habitats support 20 endemic and about 40 relict plant species. There are many threatened insect species, including 4 listed as Vulnerable globally (according to the IUCN Red List Categories and Criteria), like for example *Cerambyx cerdo*. Forest habitats support almost all amphibian and reptile species of Moldova, create conditions for many bat species (14 in some Core Areas) and majority of mammals, many of which are included in Bern Convention and Habitat Directive lists. The most vulnerable group of birds, raptors, nest there and are most diverse in lowland forests.

Steppes that historically covered nearly 60% of the country are worst conserved in Moldova; primary ecosystems are small and strongly fragmented. Some of the crucial actions would be the conservation of habitats supporting more than 420 typical steppe species, use of the genetic resources for ecological restoration and transition to sustainable use based on the NEN elements. While there are 72 state-protected species of steppe ecosystems, the Operational List contains 126 of them including some endemics, and two with very narrow distribution. Probability of depletion of typical steppe insect fauna is high; 16 threatened species inhabiting steppe biotopes are found in Operational List including *Onconotus servillei* and *Saga pedo*, while only 5 species are nationally protected. Fauna of vertebrates is not rich in steppes, but rarest species live there: 4 reptile species, 2 of which have not been registered for a long time, such as Meadow Viper (*Vipera ursini*), Ground Squirrels (e.g. *Spermophilus citellus*) and Saker Falcon (*Falco cherrug*). Nevertheless many birds of prey forage in steppes.

Meadows support 269 plant species that are typical for these ecosystems, including plants of saline substrates. Operational List numbers 52 species present while 29 of them are under protection. Meadow fragments with typical ecosystem-forming species became rare. Taking into account needs of ecological restoration, the Core Areas have resource importance. There are a few specific rare invertebrate species, such as Large Copper (*Lycaena dispar*). However, 5 species protected under the national law and 25 species of the Operational List are met here. Many amphibians listed in annexes of the Bern Convention inhabit meadows; protected mammals hunt or live here, e.g. European Hamster (*Cricetus cricetus*). Some birds nest in meadows, like Corn crane (*Crex crex*), but a great number of species forages there, e.g. Greater Spotted Ea-

gle (*Aquila clanga*), Short-eared Owl (*Asio flammeus*), Black Stork (*Ciconia nigra*), Glossy Ibis (*Plegadis falcinellus*).

Typical plants of **swamp** (72 species) and **water** habitats (73 species) are wide spread. Nevertheless 14 law-protected and 35 rare species occur in Moldova. *Trapa natans* L. and *Salvinia natans* L. are listed in the Bern Convention but are numerous in Southern natural wetlands of the country. Core Areas support noteworthy concentrations of dragonfly species. Invertebrate species of European concern that can be seen here are *Hirudo medicinalis*, *Leucorrhinia pectoralis* and *Coenagrion mercuriale*; among mammals European Otter (*Lutra lutra*) became typical, whilst Eurasian Water Shrew (*Neomys fodiens*) and European Mink (*Mustela lutreola*) remain extremely rare. The Dniester and Prut Rivers serve as important ways of seasonal bird migrations and lowland ecosystems provide stopover opportunities for them. This is why many bird species, including the Northern ones, are observed in Core Areas. Some Southern water reservoirs are used by birds following the Northern Black Sea migratory mainline.

Natural and historical heritage of Core Areas embraces archaeological sites as additional values, spanning from later Acheulian till mid medieval period. Number of such monuments reaches tens in some Core Areas with its maximum of 71 in Rudi-Arionesti. Typical values of Core Areas include geological outcrops of the European and global concern, distinctive landscapes combining different phenomena of exogenesis (eolation, ravine erosion, crumbling and taluses, land sliding), or landscapes with ancient oxbows. Some Core Areas contain paleontological objects, such as the location of hipparion fauna of European importance.

Management of Core Areas

Threats to biodiversity in forest ecosystems of Moldova are:

- conditioned by difficulties of forest policy implementation
- influenced by fragmentation of natural ecosystems and presence of many vulnerable species
- linked with disturbed regimes of watering in large rivers' floodplains
- conditioned by recreation and tourism
- result of protective regimes violation and other illegal activities.

Threats to biodiversity of steppes and meadows are caused mainly by uncontrolled overgrazing and haying that lead to extinction of rare species, loss of carrying capacity, disappearance of pollinators.

Threats to biodiversity in swamp and water habitats are more diverse and include diminution of waterfowl nesting space, loss of many invertebrates due to barring the riparian zones and trapping otter and mink in fishing nets.

Climate change sharpens and fastens many threats to natural ecosystems and complicates management problems.

Threats to geological and archaeological monuments are mostly resulting from illegal mining and excavation.

Managerial constraints of Core Areas are quite numerous and divided into: (a) institutional-legal problems; (b) administrative-territorial and economic issues; (c) socio-economic aspects; (d) challenges related to underdeveloped infrastructure and indirect uses of nature-historical heritage. Lack of conservational management, discrepancy of different interests, and linkage of illegal grazing and "wild" recreation with poverty can be mentioned as few examples.

Ecosystem management directions

Main recommendations for Core Areas management :

1. introducing the personal responsibility for major Core Area parts;
2. differentiation of penalties for regime violations in PAs and Core Areas; and for general abuses out of these zones;
3. elaboration of individually developed protection regimes for each concrete Core Area including the zoning if applicable;
4. awareness rising for local communities on the national natural and historical heritage within their administrative territories.

Forest ecosystems management directions:

1. implementation of measures to protect the most valuable forest (especially old), steppe and meadow areas within the forest fund and access limitation;

2. carrying out of measures directed to implementation of principles and standards of the sustainable use of forest;
3. creation of NEN that includes ecological corridors;
4. elaboration of hunting organization documents, winter dieting for hoofed, control of foxes and feral dogs, etc.;
5. elaboration of common plans for management of subordinated forest areas done by the local authorities.

Grassland ecosystems management directions:

1. bringing to conformity the grazing area and number of livestock;
2. carrying out activities for surface improvement of steppe fodder lands;
3. putting into practice the regulated haying.

Wetland ecosystems management directions:

1. maintenance of ground waters' level and water bodies' depth as stable as possible;
2. normalization of bank regimes.



Action plan for Core Area

Action plan is usually based on scientific ground and realistic zoning. As a rule, old-growth forests stands are destined for the strict protection, while grasslands may be placed under strong protection with special supportive management. Presence of the sites under NATURA 2000 and Emerald Networks criteria should be taken into account.

Simple as possible and sometimes detailed management objectives should be determined for major part of the NEN Core Areas taking into account that NEN legal regime and administrating will be established in future, and distinguishing Core Areas from large PAs with own administration.

Forest management in the NEN Core Area should be reflected by relevant changes in forest organization documents. Ecological reconstruction is allowed in damaged forests and plantations. As a rule this is a long-term process that follows the established norms of forestry works. For the oak formations it should be directed towards conversion of low-stemmed vegetative origin stands to the long-boled ecosystems. Conversion from even-aged to uneven-aged forest is a long-term objective, ranging from 30 to 50 years.

Conservation and development of secular forest, based on internationally recognized principles, is one of the major directions of forest management. Rehabilitation of forest edges, maintenance of glades and thickets, conservation of windbreak on boundaries of different ecosystems is another important direction.

Grassland management depends on economical use and level of protection. Besides rational grazing and haying, the on-going care of grasslands is necessary and includes the set of surface improvements for steppe, and rejuvenation and soil aeration increase for meadow. Haying as a prevention of ecosystem degradation due to surplus accumulation of plant rag, removal of forest growths, especially of aggressive alien trees, is necessary for the grasslands.

Swamp and water ecosystems management includes creation of strict protected zones in head parts of water bodies and on segments of streams. Creation of waterside (hyrotechnical) structures is necessary sometimes in order to restore natural flood regimes and ground water level; that necessity will be increasing due to the human transformed and climate change-dependent water discharges. Conservation of wood blockages on forest brooks is also desirable.

