

THE ECOLOGICAL NETWORK:
A way to the nature conservation in Moldova

FORWARD

The Conference of Environment Ministers from 55 European countries, which took place in Sofia, Bulgaria, on 23-25 October 1995, resulted in the adopting of Pan-European Biological and Landscape Diversity Strategy.

Keeping in mind the situation in this field, the major goal of the aforementioned Strategy was to significantly reduce and, as far as it is possible, completely remove the threats, which jeopardise the biological and landscape diversity of Europe.

The Strategy also includes an action plan for 1996-2000 which comprises 11 action themes. It is rather significant and symbolic that establishing Pan-European Ecological Network is listed among the priorities. For 2001-2005, it also remains in the focus of conservationists.

This emphasis on Pan-European Ecological Network was not a lucky coincidence or a matter of chance, because namely ecological network, as a bridging link between different components of European natural richness, is intended to stimulate the maintenance of ecosystems, habitats, species and landscapes of European importance.

With the objectives, set out by the Strategy, in mind, each Party is obliged to develop individual action plans to meet these objectives. In our country, the issue of establishing a National Ecological Network is paid due attention, and the action plan in relation to its establishing was given priority status as compared to the other action plans, in line with the Pan-European Strategy.

Ecological Society "BIOTICA" should be specially mentioned as a body among a small number of the public, scientific and non-governmental organisations, which successfully deal with the task of developing and promoting the concept of establishing the National Ecological Network in the Republic of Moldova.

Over the last 3-4 years, problems related to establishing National Network were tackled for many times at the international conferences on the biodiversity of the Nistru River (1998, 1999, 2000), as well as in the collection of scientific articles, dedicated to the 125th anniversary of academician L.S. Berg (2001).

The Concept of establishing the Ecological Network of the Republic of Moldova, published in the collection, results from very important joint work of a team of talented specialists, with financial support of the National Ecological Fund of the Republic of Moldova.

The paper presented to the attention of readers, is aimed at popularising the issues related to establishing the National Ecological Network, among the wide public.

The present brochure will also be useful to the people who will be directly involved in the work on building the National Ecological Network of the Republic of Moldova, which is

sought by the National Strategy and the Action Plan in the field of biological diversity maintenance. I am convinced that the National Ecological Network can be established successfully only if as many as possible of Moldovan residents and decision-makers will be made familiar with its functions and the concept for its establishing. Thus, it can and should be used in environmental education of all levels.

At the same, it will play a special role of a visiting c ard of our country in this field, witnessing that in Moldova this problem is paid such a degree of attention which it deserves.

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INTRODUCTION

If you ask former U.S.S.R. citizens what comes to their mind when they hear the word *Moldova* you will get the following answers. First of all, it is good and inexpensive wine. Secondly, rich sun, boundless fields, gardens and vineyards. A farmer would probably call this a lovely picture. On the contrary, environmentalists are concerned because a number of reasons.

When many lands are used for agriculture, there is not much space left for wildlife. There is no place left for plants and animals. There is no way for soils "to have rest". Children have no opportunity to observe true nature.

It is well known that Moldova is among the leading countries in Europe with highest rates of lands used in agriculture. With exception of forests, cheerless pieces of land that men are not able to exploit are left to our wildlife. So, not only humans but plants and animals as well find it hard to leave in our place. As a result, the diversity of species declines. It is noticeably harder to meet sparrows and doves in the cities. Fortunately, we still have what to save. In order to do that, it is necessary to know whom, where and how to save.

The talk is not about birds, butterflies, science or beauty of the nature. The most complicated and important thing about the environment is how do eco-systems function in order to ensure life on the Earth with its fields, vineyards and gardens.

Let us imagine taking out a component from an engine. The engine is likely to stop working. Let us imagine destroying part of a computer program. The program will work only if it manages to restore itself. And, what will it be, if not? Millions of people do not make attempts to destroy their machines. If a computer is out of order, every boss will call for a system administrator.

The most dangerous tendency is that the degradation of eco-systems due to the disappearance of species and changes in species communities here and there is less noticeable compared to traditional environmental pollution with clear consequences. However, such degradation may be even more important and dangerous.

The nature is much more complicated than a computer. It continues to repair eco-systems after humans take their components out. Even educated people destroy parts and details saying, "Why are they needed? Should not we destroy it?" The question seems stupid, but that is the real sense put in other words.

From time immemorial, hundreds of thousands socialist and capitalist bosses, contemporary feudal lords and democrats, motivated by reason or greed, justice or ambition, in developed states and in poor countries give orders to destroy.

How is this going to stop? Have not enough land been diverted to desert?

Today, Moldova is a country of poor farmers despite good wine, rich sun and boundless fields. Some hundred years ago, humus, which is the most important component of soil, amounted to 5-6% in soil. In 1990 the figure was in average 3.5%. Political and economic systems changed in the country a number of times, but the speed of losing humus was almost the same all the time. Now, some 40.6% of lands have only 2% of humus. The soil scientists' forecast is that 2.5-3% will be the average by the year 2025, if the speed of losing humus stays the same, though in reality it increases. When will the life here become impossible for four million people?

In 1992, the heads of the leading countries from all over the world, being aware that conservation of biodiversity is of outmost importance, signed the Convention on Biodiversity at the Conference on Environment and Development in Rio-de-Janeiro. Since that conference, many have heard of the sustainable development concept. At the first glance, this concept or slogan looks pretty simple. However, many life dimensions are very complicated - economy and politics, energy and clean production, sustainable agriculture, deficiencies in social development, biodiversity. The most complicated task is to realize that everything can be divided into manmade and natural. Manmade things can be restored. Those created by nature during millions of years cannot be traced back, if lost.

Environmental scientists are in search of the ways to solve these problems. It is more or less clear what species shall be protected where. It is understandable that territories where wildlife and rare species are better preserved shall be considered as more valuable. Such territories become strict protected areas, reserves and other protected territories. Moldovan environmentalists adhered to this principle, though there was no established system to measure the land's value.

It took time to find out that even in developed European countries with many protected territories covering large areas the diversity of animals and plants continues to decline, and many are under the threat of disappearance. That is why, the concept of ecological networks started to get more and more support.

The ecological network looks like a simple net with the same design and characteristics. Nets were not invented by man. They were first used by invertebrates - spiders, water larvae of insects (for instance, dragonflies), who build so-called hunting nets. Actually, nets are not the tools of insects only. Some water plants look like small nets. Organisms found the way to use nets for protection. For instance, spider's web does not only feed the spider. It also alarms the spider. When a large-scale animal touches spider's web, its fibers send a message to the spider that determines the size of intervening object and makes a decision how to behave.

Humans actively and consistently use nets for protection as well. Nets camouflage military objects. In circus, nets make the work of acrobats safer. Sometimes, nets are used in construction works. They were used at sailing vessels where setting and striking sails required the actions at a height. It looks that net is a universal structure used by both nature and man. Why shall environmentalists not go ahead?

Environmentalists decided to create an ecological network, or eco-network, linking together nature reserves. They thought it would be beneficial because this would restore and improve the links between large and small pieces of nature that were in better conditions than others.

It is considered that the idea of eco-networks came from Western Europeans. Western Europe suffered earlier and more seriously from human intervention. Then, this idea found support in other European countries. Moldovan environmentalists have come to the idea of eco-network long time ago. They had all prerequisites for that. There was no other country in Europe or in former Soviet Union with so few virgin places and so rapidly increasing population (40 times in 200 years) as Moldova.

In the 1980s, the idea of "biocenotic oasis" was in the air. Remaining pieces of nature in our agricultural lands were supposed to be connected by forest shelterbelts and anti-

erosion plantations. The first project of real eco-network was drafted for part of the country in the area of Lower Dniester River in 1998.

However, two problems still dominate in Moldova as well as in other countries. First, even some environmentalists are often unaware of the eco-network concept. Secondly, the population, which shall help with the creation of effective eco-networks or at least shall not make obstacles in this way, do not know what an eco-network is. The establishment of national eco-network is included in major policy documents of the country. However, there still is a lack of understanding how eco-network may help the economy and prevent desertification, which is a real danger.

In Moldova, eco-network will allow to cover the territory of the country by corridors for migration of animals and plants. It is hard to preserve soil from erosion and water from pollution and softens the climate without such network. It is hard to maintain soil flora and fauna that are so important for "natural chemical production" of every piece of land. It is impossible to develop sustainable agriculture all over the world. However, all these initiatives shall be started together with the establishment of ecological network. In the beginning, the productivity of pastures and hayfields shall be restored. Crop rotation shall be improved. The use of expansive and almost always dangerous chemicals shall be decreased in the interests of land users.

BIODIVERSITY IN MOLDOVA. FACTS AND FIGURES.

Species richness in the country

The entire globe with exception of small pieces like some regions of Arctic and Antarctica is colonized by life. In some places, like poor rocky mountainsides, life is just gleaming. In some others, like tropical rainforests, it is flourishing. In this way, Moldova lies in the middle. It cannot be compared to rainforests, though it is not yet a desert.

It is not definitely known what is the number of species in Moldova or in any other country. However, scientists managed to gather quite reliable information about species diversity of many groups of plants and animals living in our country.

Highest (vascular) vegetation in Moldova is well researched. It includes 1895 local plant species, belonging to 55 families and 101 genera. There are 160 species of Mosses, 130 Lichens and 300 Blewitses. Unfortunately, a significant number of these plants in our country are already in the category of rare and disappearing species. In addition, Moldovan flora has been enriched by many plants - immigrants coming by different ways. Some of them settled down so well that they seem to be natural indigenous species. We can take as an example the Locust that is a part of typical Moldovan landscape, which has its roots in America. The other foreigner - American Maple - presses local flora in floodplain forests of the Prut and the Dniester rivers and is being fought against.

Compared to flora, Moldovan fauna is significantly richer. It is not fully researched. The number of species found in Moldova increases every year. Scientists find and describe many species that are new not only for Moldova but for the world science as well. To a great extent, this is true for insects.

Out of fauna species, land Vertebrates (Mammals, Birds, Reptiles and Amphibians) are better researched because they are better noticeable for man.

Scientific data show that 70 mammal species belonging to 6 orders can be found in Moldova. These are Insectivorous (Hedgehogs, Moles, Shrews) - 7 species, Wing-hand-ed animals (Bats) - 19, Carnivorous (Fox, Weasel, Otter and other) - 13, Even-hoofed Ungulates (Deer, Boar and others) - 6, Rodents (Squirrels, Dormice, Mice and others)- 24, Lagomorphs - 1.

Diversity of birds in Moldova comprises 279 species. More than 30% belong to Perching Birds -104 species. There is a diversity of Shorebirds, Gulls and relatives - 50 species; Diurnal Birds of Prey - 31; Waterfowl - 28; Herons, Storks and relatives -13.

Herpetofauna has a typical European character and comprises 14 species of Amphibians (Frogs, Toads, Tritons) and 14 species of Reptiles (Snakes, Lizards, Tortoises).

Moldovan fauna in the same way as flora was enriched some 30-40 years ago by several species - Raccoon Dog, Muskrat, Pheasant, and others. Unlike plants, the incorporation of animals had less serious consequences because their number stayed relatively low. Only the number of pheasants is quite high. At the same time, the number of many indigenous species significantly decreased because of the human intervention in nature via tree logging, ploughing new lands up, excessive pasture, pollution of rivers and lakes.

As in other parts of the Earth, the richest and least researched group of animals in Moldova is insects. In Moldova, there are not less than 12 thousands of known insect species, which is quite high compared to other land invertebrates - Spiders, Snails and others that make around 3 thousands. It is usually considered that Hymenoptera Order is the richest. It includes Bees (most numerous in this group), different Wasps and Ants (these are just a few species) and especially various Parasitoid Wasps - all together not less than 5 thousands species. The second place belongs to Two-winged Flies (Flies, Gnats and others) - around 3 thousands species. It is considered that fauna of Beetles order is best researched and comprises 1,5 thousand species. Butterflies and Moths - most frequent victims of human taste for beauty - include more than 1200 species.

Residents of water bodies are almost unnoticeable for people. Despite the scarcity of water resources, Moldova has wide variety of water organisms. Special attention shall be given to fish. (The number of all fish species at a territory is called ichthyofauna). Moldova's ichthyofauna has more than 100 species and sub-species. 11 species were introduced or incidentally brought to Moldova in the last 30 years. The majority of species are from Cypriniformes order and Perciformes order. Other water organisms are quite represented as well - Nematodes (Hook-worms), Rotifers, Crustaceans and others. Their number is significantly higher than 2 thousands species. However, all water species become less numerous because of excessive fishing, water pollution by industrial and communal wastes, construction of different hydro-technical structures, and other numerous consequences of human activity.

Diversity of main eco-systems

As a child builds different models from meccano, wild species combine with each other building communities. Every animal or plant shall live where the nature presumes it shall live. For example, Otter shall live in rivers and other water reservoirs, while all endemic plants of the Middle Dniester (Podolijan Schivereckia, Quadrangular Broom and others) can only be seen at calcareous dry slopes.

There are several main types of species communities in Moldova. Species communities that form natural zones are called biomes. There are three biomes in Moldova: forest, steppe and forest-steppe (transitional biome). Besides that, there are azonal communities, formed by floodplain forests, meadows, swamps and wires, mainly along rivers that cross all biomes.

There are just a few forests in Moldova. The official statistics shows forests cover 9.6% of the territory, though in reality the figure is smaller. In spite of that, natural forest communities in our small country are represented by several types of forests. Their common feature is the domination of oak. In Moldova, the main territory covered by forests is Codru - the forest massive in the centre of the country. Oak forests constitute 53% of all forests. Oak forests are formed by three species of oak: Durmast, English and Pubescent Oaks. As additional species, there are also Lime-tree, Cherry-tree, Ash-tree, Hornbeam and other species in oak forests. Forests with Ash-tree as the main one constitute 6% of all forests. Forests with Hornbeam as a main tree make up to 3.6%. The most interesting forests are Beech forests, which can be found in the North-East of Moldova and in the central part of Codru massive. In Moldovan conditions, Beech gives place to Oak and prefers Northern slopes and ravine's slopes. Unbelievably beautiful territories covered by Beech forest and single Beech trees are usually found inside Oak forests.

Willow forests (White, Triandrous, Purple Willows) can be seen in rivers' floodplains and on alluviums (drifts and silts). Poplar forests usually prefer the higher level of lands. Oak woods composed by English Oak and other trees (Ash, Hornbeam and Poplar) prefer high flood-free or poorly flooded places. Very few Oak woods survived by now.

Forests are able to live in the areas with necessary amount of humidity. In areas where humidity is not sufficient forests give place to steppe. Forest-steppe is common to areas where steppe changes forest depending on the climate in a particular zone. Pubescent Oak and some other tree species are resistant to the low humidity of forest-steppe. Hydrophilous Feather grasses, Fescue and others dominate among grass species in forest-steppe. Usually, forest-steppe occupies small spaces compared to steppes and forests. Due to Moldova's geographic position, forest-steppe used to dominate. Now, there is not much left from forest-steppe in the country. Moldova is a crossroad of two large forest-steppes - Podolijan (Northern) forest-steppe and Danube (Southern) forest-steppe. All indigenous species in the Middle Dniester area in Moldova and Ukraine are confined to Podolijan forest-steppe. Gyrnets is the characteristic dry forest of Danube forest-steppe. Gyrnetses are ingrained into steppe and have numerous small glades inside them with incredibly beautiful fragments of steppe.

Steppes in Moldova covered two regions. These are Northern region (Balti meadow steppe) and Southern region (Budjac steppe). These two were divided by a zone of forests and forest-steppe, covering the centre of Moldova. Balti steppe almost disappeared in the end of the XIX century. Some few remaining untouched areas allow concluding that Balti

steppe was full of hygrophilous Feather grass and Fescue. Some drought-resistant plants were present as well in Balti steppe. The flora of Budjac Steppe was less homogeneous. In its northern part hydrophilous species of Feather grass, Fescue and other species were common. Close to the South, you can observe more drought-resistant species of Feather grass.

At the first look, steppe is quite monotonous with scanty wildlife. There is a famous folk song with words "Steppe and steppe all over the world". However, if you look more carefully or do scientific research, you can notice the opposite. According to the data of botanists, the species diversity in Budjac Steppe was very high, around 75 species per 100 square meters.

Budjac Steppe was relatively luckier than the Balti steppe. Nowadays, the inconvenient lands in this area have many secondary plant communities formed as a result of human activity. Beard-grass is dominating in such areas. Before mid-1970s, such lands made up to 45-65% of all lands used for agriculture in Cimislia and Comrat regions. Secondary communities based on Fescue were less common (12-15%). The natural steppe flora covered only 0.3-0.5% of the steppe. Now, the situation is more aggravated.

The significance of unbroken lands, which are not used by humans for cities, farms and roads, is sometimes underestimated even by environmentalists. In turn, a farmer finds it difficult to resist the opportunity to use untouched lands because such lands are more fertile than soil that had been used for long time. However, this shall not be allowed because steppe may "serve" human not only in its capacity of fertile land.

Let us talk about steppe soil. Steppe has favourable conditions for soil formation as it does not have heavy rains and has long warm periods. The high rates of nourishing substances in soil almost guarantee good crops. That is why man had heavily used steppe resources. Today, almost all steppes in Europe and on all Earth are broke.

At the first glance, there is no substantial difference between broke steppe with wheat and unused steppe with Feather grass, Beard-grass or Fescue. Wheat is naturally a steppe plant as well. The difference lies in the complexity of natural plants that use soil better. The matter also lies in the fact that broke lands are permanently traumatized by machines. Such lands are plowed and suffer from pesticides and fertilizers. In wild steppe, roots and creeping suckers form a web in soil (called tussock), together with plants' leaves and stems. Dead roots, leaves and stems that have not been eaten or mowed by animals enrich soils with nourishing substances. Being unaware of that, humans often burn the eddish or take straw out of fields making no use of it.

In steppe regions the virgin grassland plays the same part as forests do in woodlands. Tussock looks like a sponge because it is porous. Townspeople see quite often how heavy rains cause streams and even "rivers" on the streets. In steppe that would almost be impossible because rainwater goes deeply into the land. Absorbing the water, the tussock, first of all, stores the water and secondly, prevents soil water erosion and the formation of ravines.

Unbroken fragments of former steppes are used by man for livestock pasture. This is a right and necessary procedure. Steppes originally formed as a result of relationships between flora and ungulate animals (Wild Horses, Bulls, Antelopes, Deers and others) using this flora as food. Steppe flora is well adjusted to the permanent influence by herbivorous mammals.

This conclusion came from the experience of Askanya-Nova state reserve in Ukraine in 1921. The main idea behind the reserve was to protect untouched parts of the steppe. The pasture was **absolutely** prohibited in the reserve. As a result, weeds forced out typical steppe species like Feather grass, Fescue and Beard-grass. That is why some moderate pasture was introduced in Askanya-Nova. In a couple of years after the herbivorous mammals' return, steppe recovered.

It turned that steppe flora is well adapted to be the place for moderate pasture and food of herbivorous mammals, which is not the same for other flora. In time of pasture, grass is edged. Also, animals' hoofs break into pieces the tussock making it possible for Turfy grasses and Herbage to grow up. In Moldova, remaining steppes do not suffer from lack of pasture; it is hard to ensure appropriate grazing limitation in reserves even.

Different ungulate animals eat away and trample down a lot of grass. The appetite of goats is inconceivably high. However, the problem lies in man. The usual scenario begins at the good pasture with a lot of grass where man brings many cows. There becomes less grass but man does not decrease the number of cows. The grass reproduces harder and harder and, finally, disappears. At the end of scenario, the pasture suffers from erosion and becomes a desert.

First, environmental and then, economic crises turned down the power of Ancient Greece. Goats were very important milch animals in Greece. However, goats eat every grass, thorny sprouts, leaves of shrubs and trees. Finally, goats disposed of vegetation in many places. Brilliant agricultural skills of the population did not help this highly populated country.

Goats were brought to Saint Helen Island in Mediterranean Sea, the one where Napoleon was in exile. Goats were prospering, as man did not hunt there, as there were no carnivorous animals. Goats reproduced speedily and with no limits. Finally, the situation turned into collapse, as there was no grass, no bushes and no trees anymore in many sites. Everything was eaten away by goats. Soil also disappeared because the water washed it away. This is a very recent European example of the introduction of alien species.

Some 6 thousands years ago, clay scorching deserts of the Middle East were covered by high-grass savannah with many animals (Rhinos, Lions, different Antelopes). However, with development of agriculture and cattle breeding by men, the economy progressed and put an end to savannah. The concept of traditional agriculture without the use of machines and chemicals is often recalled nowadays. However, there are doubts whether tradition is a way out here.

Pastures shall be treated carefully to keep them alive. Parts of steppe lands shall remain untouched so that steppe plants could spread into other pasturelands in order to nourish and restore them.

Forest is the other natural resource in Moldova. At the first glance, wood is the most important resource in forest because it can be used for heating, for construction and in industry. In order to get wood, there is no need to reduce forests to zero. Nowadays, there are sparing methods to get wood. A unique technology keeping trees alive was developed in Scandinavia, the region famous for its careful attitude towards nature. Willow is rarely

used in industry because its wood is of low quality. Technologists in Sweden were not embarrassed by this fact. They found the positive feature of Willow - its unbelievable capacity to speedy growth. Now, there are Willow plantations in Sweden where growing suckers are cut off by special machines. Then, suckers are crumbled and compressed into heating briquettes.

The other important forest resources are so called "gifts of nature" - wild berries, mushrooms, nuts and, last but not least, herbs. Many readers may know that fruits of wild plants taste better. This is a fact, not a mirage. The explanation is quite simple. Fruits cultivated in the system of intensive agriculture grow faster and do not manage to store up enough essential oil, sugars and other substances that make the taste and smell better. That is why, the wild "sisters" of Garden Strawberry, namely Hautbois Strawberry and European Wood Strawberry, are so tasty.

However, good taste is not the only merit of forest plants. Usually, forest plants better survive against illnesses and pests, compared to their domesticated relatives. Plant-breeders use forest plants to cultivate steadier sorts of plants for agriculture. In China, scientists tried to reveal wild Soy but their attempts were unsuccessful. At the same time, the ancestors of major part of the plants used in agriculture are still alive nowadays. For instance, it is quite easy to find Wild Cherry-tree, Wild Pear-tree, Wild Apple-tree or other relatives of agricultural plants in Moldovan forests.

Many forest plants have medicinal qualities. They are an alternative to synthetic medicines because their side effects are softer and they influence human body in a softer and more complex way. However, natural medicines are undeservedly rarely used.

The Hawthorn's drupe has many useful substances: stimulators of nerve-activity, fatty acids, vitamin C and others. Its flowers have very valuable substances called Tryterpine acids. They prevent heart neurosis and stimulate heart work, which is so important at the initial stages of hypertension.

In Soviet period, the scientists in Kharkov developed the medicine called crategid which helps to decrease the blood tension for a significant period of time and has good anti-arrhythmic and sedative effect. When you look at Hawthorn, you hardly imagine its medicinal significance. There are many other undiscovered "ugly ducklings". Some medicinal qualities of forest plants have been researched by scientists but are not used.

Forests have a very important indirect effect. They play a substantial role in the formation of microclimate. School students read in their textbooks that forests have the capacity to store up the enormous amount of water and then give them away when necessary. Unfortunately, after graduation people forget about this and cruelly cut down the forests unprotected by the state. Agricultural lands situated nearby forests edge or protected by good forest belt do not suffer from drought as much as other less lucky fields.

There are just a few water bodies in Moldova. However, as it was already mentioned, there are some 100 species and sub-species of fish, which is not that bad for a small country like Moldova. 15 species are commercial fishes: Herring, Pike, Sea-roach, Chub, Grass Carp, Asp, Tench, Undermouth, Bream, Ziege, Sazan, Bighead, Silver Carp, Wels and Pike-perch. A reader would probably be surprised as Moldovan waters also have such valuable species as Sterlet, Vimba, Russian Sturgeon, and Barbel. However, they are not in the list because the notion of commercial fish means that the fish species are economically valuable for men and that there is enough fish resource. The populations of

many valuable fish species are quite low as they suffer from commercial fishing that shall be recognized as cruel and illegal in its essence.

Moldovan fish-breeders had a long fight with the exhaustion of fish resources. Millions and millions of fish larvae were introduced every year. The fish business never reached the level of 1914, when 7200 tons of fish were flogged only in Lower Dniester. Nevertheless, in 1988 the total fish business catch in Moldova was 382.3 tons, which is four times more than in 1995 (84.6 tons). Later, ichthyologists could not manage to perform the calculation of total catch, though it is evidently lower than in 1995.

Such catastrophic decrease in the number of fish resources is not only caused by exhaustive catch. The main reason is the change in eco-systems caused by the construction of dams, drainage of spawning places in floodplain, destruction of spawning places in the riverbed when construction materials are extracted directly from the water. Serious problem is the pollution of water by substances, which are poisoning fish (communal wastes, pesticides washed off the fields, mineral fertilizers and others). Nowadays, fish-breeders do not have financial capacity to restore fish resources by introducing fish fry and larvae.

The Dubasari water reservoir, drained lakes and bogs that are dug over again and again, streams and rivers dammed up all over the world are the result of human "creative" use of water. Before the construction of Dubasari dam, Sturgeon, Beluga, Bull-trout were going up the Dniester River, spawning at the stony parts of its bottom. Today, two irresistible barriers are on their way - the Dubasari dam in Moldova and Dnestrovskaya dam in Ukraine. Other species (pike, carp and bream) need spring floods in order to spawn. The network of water reservoirs at the Dniester, that are filled in and out according to human will, prevents normal spring floods. The same situation is true for other Moldovan rivers, which are smaller and may have some different causes for the change of spawning conditions.

Fish is more sensitive to poisoning substances than humans. Poisons can enter human body with food or via lungs. Human skin is a reliable barrier against biological or chemical "attack" from outside. As for fishes, poisoning substances penetrate all over the body especially through gills as gills' surface is designed to absorb the maximum amount of oxygen. In practice, gills absorb poisoning substances together with oxygen.

ENVIRONMENTAL LEGISLATION IN MOLDOVA. BIODIVERSITY CONSERVATION. DUTIES OF LOCAL AUTHORITIES.

In order to preserve the remaining beauties of the nature, Moldova endeavours to establish the proper legislative framework. In fact, Moldovan legislation on nature conservation encompasses the international experience adapted to local conditions. Besides that, Moldova is part of some international environmental conventions, which have priority before domestic legislation in case there is a controversy between international and domestic rules.

There are quite a lot of laws designed to conserve biodiversity. The Land Code (1991) declares that environmental conservation of lands is a priority task. It defines what are the "lands for nature protection purposes" and fixes that they are exclusively in state property.

The Forest Code (1996) defines the powers of the central organ in the management of natural protected areas. All forests of Moldova are declared to serve only the function of environmental protection. The Natural Resources Law (1997) defines the principles of natural resources management and establishes the priority of international law for the management of transboundary resources that include fauna. The Water Code (1993) establishes major measures for water protection, including water-protective zones, the way to use waters in connection with fishing and hunting resources. It also introduces the notion of reserves to protect water resources. The Environmental Expertise and Environmental Impact Assessment Law (1996) requires the assessment of all activities capable to influence flora and fauna, their diversity and species under threat in negative way. The assessment is also required for documents that have a relation to the use of natural resources, state and protection of the environment. If large-scale measures with potential impact on landscape are designed, it is required to prepare the description of territorial nature protection plans, compensation measures, etc. The Environmental Protection Law (1993) declares that natural resources, including lands, flora and fauna, are a national heritage. This Law defines the powers of state bodies, local authorities, businesses for the protection and preservation of biodiversity.

The Wildlife Law (1995) determines wildlife to be public property. It states the main measures for protection and rehabilitation, including measures to save habitats, conditions for reproduction and migration of species, monitoring of processes and phenomena in wildlife.

The Law on Water-Protective Zones and Belts for Rivers and Water Bodies (1995) restricts the use of some territories in order to protect water resources. Water-protective zone is 1000 meters (for the rivers the Dniester, the Danube and the Prut), 500 meters (for small rivers and water bodies) and 15 meters (for streams) at both banks. There are stricter rules for water-protective belts (from 100 meters for large rivers to 20 meters for small rivers). Their width depends on the peculiarities of erosion, relief, and floodplain. Pasture and agriculture are prohibited in water-protective belts. Belts are only open to wild animals and plants and shall be the connecting links of the eco-network. Unfortunately, laws are often not implemented in Moldova.

The Law on the Natural Territories under State Protection (1998) classifies such territories and their regimes. Rules determining the functioning of protected territories are in different Regulations depending on the type of protected territory. Scientific reserves have the status of scientific institutions and report to the central state organs. Land users manage all other protected territories. Apart from natural reserves, the State Forestry Service manages forest reserves. Local authorities manage all other protected territories.

The legislation gives local authorities significant powers in nature protection at the local level. Local authorities are empowered to establish and manage protected areas in their jurisdictions.

The Local Public Administration Law (1998) empowers local councils to play an important role in environmental protection. Local bodies of public administration in cities and villages shall establish and manage protected areas (Art. 13). Parks and green zones are in public domain (Art.1) and local authorities have power to establish and manage them. Local authorities have a right to initiate and approve decisions on all issues of local importance, except for the issues, which are in the competence of other public authorities (Art. 18-1).

Local council approves the programs on territorial planning and equipment. It approves local programs on environmental restoration and protection, promotes the preservation of historical and architectural monuments, and protects parks and reserves. Local council is entitled to establish new reserves and to declare the protection of natural monuments. For example, the local council of the village Cricova near the city of Chisinau has established the reserve "Tiganca Cave" famous for its diversity of bats. Non-governmental organization FAUNA advised the council in this process.

According to the Law on the Natural Territories under State Protection (1998), local public authorities are entitled to:

- 1) transfer some natural territories into the category of protected areas and include these territories in the documentation on territorial planning and equipment;
- 2) exercise actions for preservation, ecological restoration and reconstruction in the limits of protected natural areas, which are indicated in subpoints c) - g) of the art. 4 (nature memorials, natural reserves, landscape reserves, resource reserves, territories of multifunctional use).

Local public administration manages the following categories of natural protected areas: territories for multipurpose use, monuments of nature, natural reserves, landscape reserves, resource reserves, botanical gardens, dendrological gardens, monuments of garden and park art, zoological gardens.

THE ROAD FROM FIRST CONVENTIONS TO NATURA-2000 AND THE PROJECT OF PAN-EUROPEAN ECO-NETWORK

Michurin once said that we shall not wait for the gifts of nature but we shall take those gifts from the nature. Michurin was a great selectionist and gardener. He was not an environmentalist. Biodiversity resources are also not managed by environmentalists. They are rather managed by politicians and economists. The problems started as the humanity first thought to subordinate the nature having no knowledge about it. Now we are paying for that. The pay comes not only from ordinary citizens in both material and immaterial way. Governments also bear the costs, spending the money of taxpayers and approving laws to protect the environment in their attempt to clear the trash. Unfortunately, we spend more money cleaning trash-bins rather than preventing the pollution.

Nature has no borders. Birds change continents, crossing the borders of two, three or more states. Other animals though they are more settled may be found long distance from their place of birth. The efforts of states need unification in order to protect the nature effectively.

International law on nature protection has its roots in the 1970s. The first significant international convention was signed in Ramsar in Iran. The **Ramsar Convention** is the first international treaty where states-parties recognize that it is important to protect wetlands, lakes and other water bodies for the normal existence of animals and plants. Scientists and economists managed to make it clear for politicians that water eco-systems are not only the source of bloodsuckers like gnats and mosquitoes or annoying smell.

They showed that water eco-systems are not lands in vain that could be drained and used for agriculture. They are extremely important for the survival of Earth's eco-systems. Wetlands are a valuable resource that may give dividends. Wetland birds and other animals need protection as advised by the environmentalists, so that hunters could find whom to hunt for and wetland tourism could give profit. The main idea of Ramsar Convention is to protect wetland birds. The existence of wetland birds is a major criterion for a wetland to be covered by the protection of Ramsar Convention.

Next to Ramsar Convention there comes the **Bonn Convention** (1979), designed to protect migrating wildlife species. It covers birds and land and sea animals (Bats, Seals, Dolphins, Whales and others). The attachments to Bonn Convention are the lists of migrating species under threat of disappearance or having the potential to fall under this category.

The difference between these two documents is quite clear. Ramsar Convention is supposed to protect major territories, which are shelters for species, while Bonn Convention protects species when they migrate. That is why these documents sometimes cover similar issues. In 1995, the Bonn Convention was complemented by additional Agreement on protection of migrating Afro-Asian aquatic birds

The Bern Conference adopted an extremely important document in 1979. The **Bern Convention** provides not only for the protection of flora and fauna but also for the international cooperation in this field. The Bern Convention has some other new aspects of international protection. It is the first document of such level to include the provisions on legislative and administrative measures to protect wild flora and fauna, therefore, introducing the responsibility for the violation of the Convention. The possession of and trade in the species enumerated in the Attachment to the Convention is prohibited. Certainly, the UN International Court in Hague will not try such claims as the parties to Bern Convention have only taken the obligation to improve their domestic legislation. The Bern Convention is the second oldest and exclusively European convention in the field. It was amended with several provisions to protect points of migration ways.

In 1980s, there was an interesting program called CORINE Biotopes in Western Europe. The intent behind the program was to determine places within larger regions where "environmental heaven" is best preserved. This program was a predecessor of many large and improved international projects. The basic idea of the program was to protect wild nature areas - core sites. The drafting of the working plan for CORINE Biotopes resulted in the development of criteria to select such areas. It is not the purpose of this book to expand on this issue. However, it needs to be mentioned that the predominant criterion was the existence of rare and disappearing species or biocenoses.

CORINE Biotopes was the first major regional achievement. It was not perfect. For example, the European Union was divided into geographic regions based on administrative system that did not necessarily follow natural biological and geographic boundaries.

Undoubtedly, the achievements of CORINE Biotopes included the use of unified standards for all areas irrespectively of political, economic and other conditions that do not depend on scientists. The other important thing was the determination of the technical conditions for project implementation. Researchers were offered some standard rules to summarize the data. The theoretical part is supplemented by an attachment with useful rules explaining how to fill out the forms.

At the first glance, Conventions look like stark documents written on stone for ages. In fact, the majority of conventions have working bodies, for example, permanent committees that are supposed to prepare reports and modify conventions according to new visions.

In 1996, the Program EMERALD Network supplemented the Bern Convention in order to define through international assessment the national natural protected areas. This adapted the convention to the emerging concept of eco-networks.

In 1992, the European Union passed the Directive on Conservation of Natural Habitats and Wild Flora and Fauna (Council Directive 92/43/EEC (1) 21.05.1992). The Directive is operational only in the border of EU.

It requires that states protect typical natural territories (253 types!) valuable for the maintenance of existence of 200 animal species and 453 plant species that are considered important for the EU. Today, the EU accession countries need to implement this and other environmental directives. This requirement is quite serious as non-implementation may be a reason for non-admission.

The Directive defines the categories of objects that are of interest for EU countries. These are natural habitats (areas with defined borders) and animal and plant species that are in need of human support to survive.

Our research shall not forget the **Convention on Biological Diversity** (1992), though it does not have any direct relation to eco-networks. It is a universal document with two extremely important provisions. First, it recognises the sovereignty of a state in respect of the biological diversity at state territory. Secondly, it declares state responsibility for the protection of biodiversity. Such protection is impossible without an eco-network unless the country is absolutely virgin.

In 1992, the EU countries motivated by the desire to protect nature diversity initiated a new project. The novelty meant the unification of protected areas in the EU into a single "network". The initiative was called "Natura 2000". This Program has to create some single mechanism uniting the areas identified by the EU in the framework of two documents, the Directive on the conservation of wild birds (Council Directive 79/409/EEC, 02.04.1979) and the above mentioned EC Directive on Conservation of Natural Habitats and Wild Flora and Fauna (1992). Every member state had to make its own contribution by providing protected status. The contribution depended on the existence of types of habitats in member states.

Many wonderful parts of nature are in the lands controlled by or subordinated to local public authorities of different levels. Therefore, the purposes of the program included the involvement of local authorities and, consequently, the public, in the protection of European flora and fauna. By declaring their desire to include a habitat in the common European network, people from a locality take international responsibility and can be proud of that.

Therefore, in addition to the international law for the protection of species and habitats, the European Union has its own requirements for the most developed European countries. This shall be a sign for politicians of other countries that the protection of wildlife is a worth and economically reasonable task.

The EMERALD Network is the totality of zones with special status of protection, which shall be established at the territory of countries-parties to the Bern Convention. This includes the countries of the European Union and other countries, as well as countries given the status of observers in the Convention.

However, all these above mentioned documents and ideas are aimed at separate territories, which are oases in the desert of lands used for production and human settlements. Though some of them are called networks, having no threads to link knots they are not networks.

In the beginning of 1990s, the UN Economic Commission for Europe started the Environment for Europe process. The process was guided by the conferences of environment ministers. One of the decisions taken by the ministers established the **Pan-European Biological and Landscape Diversity Strategy** (PEBLDS). PEBLDS is a committee coordinating the implementation of the Convention on Biological Diversity in Europe. This committee is under the patronage of the Council of Europe and of the United Nations Environment Program.

PEBLDS organises its activities according to several main themes. The major theme is the creation of Pan-European Ecological Network.

Moldova is a party to all conventions described above. It is also a participant of the Environment for Europe process.

ECO-NETWORK PROJECT IN MOLDOVA

What is an eco-network?

At the first glance, eco-network looks like an ordinary fishing net. It has similar threads (**biological corridors**) and knots (**core areas**). The quality of the net depends on the strength of its threads and knots as well as on the size of cells. However, the similarity is superficial and the characters of key elements are quite different. Besides that, an eco-network has two additional elements, namely the **restoration territories and buffer zones**.

Core areas

Core areas are those wonderful places with greater diversity of various plants and wild animals. A **core area** is an area that has an outstanding value for nature conservation in different aspects (species, habitats, eco-systems and landscapes). Usually, the conditions are more diverse if the territory is larger. At a large territory you may see different types of forest and glades, wet meadows with totally different flora, some ravines and hills, streams or lakes. Therefore more species will find an appropriate place for living in a larger territory. This means that such territory better serves the goal to protect species diversity. This is especially true for Moldova that has relatively few natural territories, which are good for the existence of all plants, and animals that are unable to survive in the agricultural fields, gardens and parks.

Species richness and the diversity of vegetation determine to a great extent the diversity of fauna. Many insects and mites use just one or two species of plants. That is why the variety of plant species in a territory allows the variety of insects -plant feeders. These insects are a food for other insects that also eat just some particular species. Such chain provokes the increase of biodiversity.

On the contrary, animals and birds usually use quite diverse food. They need relatively varied food for appropriate nutrition. If there is no varied food, animals try to avoid the place. If there is no other place to live nearby, they feel uncomfortable. Animals may be compared to people. They use some plants as everyday food, others - as delicacies, and some plants as medicines.

The huge Wasp Giant stores up for its children just larvae of Rhinoceros Beetle, which is quite rare in Moldova and probably the larvae of some other big beetles. Both species are included in Moldova's Red Book.

Some animal species are also quite squeamish about food and suffer quite a lot because of that. Just a few zoos are proud of having Big Panda. It uses as food some species of bamboo only. Therefore, if bamboo is attacked by drought or sickness, animals starve and even die.

However, in many cases the diversity of animals is limitedly dependent on the diversity of plants. The majority of bumblebees and some species of bees almost do not care about which flowers to use. However, plants species that each give flowers in different time create the flower circle. If we look at the predatory Ground Beetles, their diversity is dependant on other factors. Therefore, a territory, which seems unimportant for the protection of flora diversity, may be extremely important as habitat for animals and vice versa.

So, the living space is a significant factor for the value of core areas, because it influences the diversity of conditions, diversity of plant and animal species that are quite interdependent. It may seem that the size of the territory plays no important role for the conservation of species compared to its ability to provide food, shelter and other resources, which are necessary for the survival of various species. However, this is not true.

If the size of the territory is larger it has more good places and food resources for a particular kind of species. It means that the number of representatives of this kind will be higher. If the territory is larger, more species will maintain the viability of the populations.

It is accepted that the population of many species shall exceed 5000 specimens, so that they would not die out because of genetic degradation. That is why plants as well as animals, which are too immovable, are more vulnerable. They almost do not have or have a relatively small exchange of genes between distant populations. Small plants and animals are less vulnerable than big ones, because a small sized territory may be a shelter for larger population of small plants and animals.

Cheetah is a well-known predator from the family of Cats, famous for its speedy race. It lives from North Africa to Central Asia. In ancient times, people used Cheetah for hunting. It is still used for hunting in some Arab countries. Nowadays, the natural habitat of Cheetah is rapidly narrowing. Scientists decided to help Cheetah by the breeding in captivity. Scientists noticed that there are extremely repetitive cases of miscarriage interrupting the pregnancy. They have checked the genetic resources of cheetah and found out that cheetahs irrespectively of origin are genetically extremely similar. After calculations, scientists concluded that Cheetahs passed through the "bottle's neck" of the critical decrease of population about 10-15 thousands years ago. That is why it still suffers from genetic sicknesses. This is an example of degeneration that may happen with animals and plants if their number decreases below a certain limit.

European bison is one of the most famous European animals. It was a frequent guest at Moldova's territory, though it never settled permanently in Moldova. By the middle of XX century, European Bison was almost gone. Later, scientists managed to reproduce and resettle European Bisons in some regions of Central Europe and in the Caucasus. It seemed that the threat to lose European Bison was over. However, all contemporary European Bisons are the offspring of two specimens. Nowadays, the effect of this fact gives its results. Sicknesses caused by genetic degradation are striking down these huge animals. Will European Bison pass through "the bottle's neck"?

There is one more factor, which is often forgotten. Just a few species form almost a single population inhabiting throughout the area. The presence of significant part of animals and plants in an area is determined by likelihood. In a larger core area, the probability of any species presence and number is higher.

Finally, it is clear that if more rare species find shelter in a core area, such area becomes more important. A system of criteria (characteristics) was drafted to assess the importance. The characteristics mostly measure how many species of animals and plants are supported by a territory, how many species declared under threat in a particular country are present in a territory, how important is this core area for the population of these species. The system also takes into account the existence of natural and historical monuments and unique communities.

What do we have?

Clearly, the protected areas, which already exist in Moldova for long time (zapovedniks i.e. strict protected areas and other reserves according to current terminology), shall be considered as core areas. However, such decision shall not be automatic. First, Moldovan law divides national reserves into several categories, more or less closely to international classification. The national classification partially follows the criteria of the degree of human intervention into natural processes, and the criteria of protection level depending on the value of a reserve. However, such value have never been compared and measured in different reserves. Secondly, there is no clear logic behind the fact that some Moldovan

reserves are called landscape reserves, when others are called nature reserves or natural monuments. Today, such "measurement" or assessment is accomplished. As a result, not every protected area was assessed, as there are almost no data about plants and animals in some protected areas. Some other protected areas were not categorized as core areas to a great extent because of the lack of knowledge about their flora and fauna.

The ecological network of Moldova has four levels of core areas:

- 1) *International (most valuable, 7 territories) - scientific reserves Codru, Padurea Domneasca and Prutul de Jos, reserves with other status Casauti and Ciumai, future national park Talmaza Wetlands and industrial-natural complex Cuciurgan- **Picture 1**, Pag.84;*
- 2) *National (8 territories) - scientific reserves Plaiul Fagului and Iagorlic, other reserves and their complexes the Rashkov Petrophite's complex, Rudi-Arionesti, Trebujeni, Saharna and Togai Swamp, as well as the area with no status called Cremenciug-Holosnita - **Picture 1**;*
- 3) *Zonal (5 territories) - reserves Padurea Girbovet, Tigheci Codrii, Budjak, Radoaia and Baraboi, - **Picture 1**;*
- 4) *42 protected and unprotected core areas of local importance - **Picture 2**, Pag.85.*

*Moldova is divided into 12 natural regions (**Picture 3**, Pag.86). Not all of them have core areas of national and international levels. In such regions, most valuable core areas of local importance are given the higher status of zonal core areas in order to reflect their special role in nature conservation.*

In the end, all former zapovedniks (today called scientific reserves) after assessment were given the status of core areas of international or national importance. Such reserves are the largest core areas (and therefore, have the best conditions for habitation): Codru - 5177 hectares, Padurea Domneasca - 6032 hectares, Prutul de Jos - 1691 hectares, Plaiul Fagului - 5642 hectares, Iagorlic - 836 hectares. The majority of core areas of international importance before the creation of eco-network in Moldova were the reserves of lower categories or unprotected areas. In turn, some scientific reserves were assessed as core areas of national importance, therefore taking one step down compared to the existing classification.

Besides scientific reserves, 15 landscape reserves, 2 monuments of nature, 10 nature reserves and 3 territories for multifunctional use became core areas.

The core areas of the National Ecological Network include:

- 1) *5 scientific reserves with total size of 19378 hectares;*
- 2) *30 reserves with various status starting from a monument of nature and coming to a territory for multipurpose use - 22278 hectares;*
- 3) *Territories that shall expand those reserves - 2547 hectares;*
- 4) *13 areas not included in the list of natural areas under state protection - 4350 hectares;*
- 5) *14 wetlands without any protection status - 24592 hectares. Therefore, the total area covered by core areas is 73145 hectares.*

Codru, the oldest reserve in Moldova, was established in 1971. Scientists have done a lot of research in respect of this reserve. Students of biology, soil scientists and environmentalists visit Codru. There are public excursions to Codru, so the reserve is well known by the public. 924 plant species, 138 bird species and 45 mammals were registered in Codru. Unfortunately, during the last 10 years the situation in Codru changed dramatically. The State Budget almost stopped to finance scientific reserves. They are subordinated to the State Forestry Service, which is self-financed. That is why reserves survive by means of "sanitary" felling, which often destroys the shelters of many rare animals and trees preferred by raptorial birds. Many raptorial birds are, in turn, under threat of disappearance. The research in Codru does not almost take place, so there are no significant data about the changes in flora and fauna.

Other large reserves (Plaiul Fagului, Padurea Domneasca, Prutul de Jos, Iagorlic) are to be discovered by scientists and the public in much more degree than now.

The reserve **Plaiul Fagului** (Beech Place) was established in 1992 at the territory of Redensky reserve. It is situated in the central part of Codrii forest area. It has the size of 5642 hectares. The name of this reserve indicates that first of all it protects Beech trees. Plaiul Fagului is famous for unique combination of parts of Beech forest with belts of Oak and Hornbeam forests. Totally, there are 814 species of highest vegetation in Plaiul Fagului. 30 of them are included in the Red Book of Moldova. As in other large reserves, Insects are poorly researched in Plaiul Fagului. However, the fauna of Vertebrates is fully described. There are 42 mammalian species. Rodents occupy the first place (18 species). They are followed by Carnivorous (8 species) and Insectivorous (6 species). Bird's fauna is mostly characterized by forest birds and to a lower extent water species, field birds and synanthropic birds. All together, there are 138 bird species in Plaiul Fagului. Over 20 species only migrate through Plaiul Fagului. Other 90 species are inhabitants which nest and bring up their nestlings in this area. The following rare species live in Plaiul Fagului: Black Stork, Booted Eagle, Honey Buzzard, and Lesser Spotted Eagle, in summer - Mute Swain. In migration period, you can meet Corncrake in Plaiul Fagului, which is an exceptionally rare bird that many people have never seen or heard of.

The other forest reserve **Padurea Domneasca** (Lord's Forest) was established in 1993. Its size is 6032 hectares. It protects habitats in floodplains, which are full of rare species that makes them even more valuable. In Padurea Domneasca one can see old groves and rare associations of floodplain forests from Oak, Maple, Hornbeam, Beech and other species. Their underbrush is very rich and diverse as well, with Forest Vine, Dog rose, Cornel and other species. Totally, there are almost 600 vascular plants, including some rare species like Toothwort Glandular, Small Fritillary, and Common Adder's-Tongue Fern. There are 49 mammal species (out of 70 mammal species in the whole of Moldova!). Walking in Padurea Domneasca, one may meet such rare species as Otter, Ermine, Silvatic Marten, and Wild European Cat. Local Reptiles and Amphibians (Smooth Snake, European Pond Turtle, Spade-footed Toad and others) are interesting as well.

There are 159 bird species in Padurea Domneasca, 52 out of them migrate via the reserve, other 107 nest in the reserve. Many birds in Padurea Domneasca (like Chaffinch, Nightingale and Crow) are quite usual for human eye. However, the importance of this reserve follows from the fact that it has many species included in the Red Book of Moldova (Black Stork, Booted Eagle, Honey Buzzard, Lesser Spotted Eagle, Squacco Heron, Great White Egrette, Spoonbill, etc.).

The reserve **Prutul de Jos** (Lower Prut) was established in 1991 in the lower part of the Prut River. Its size is not big. It covers only 1691 hectares. The reserve includes the floodplain lake Beleu. Lake Beleu, depending on precipitation, occupies from 500 to 950 hectares. The reserve also includes floodplain forest (312 hectares), reed and cattail undergrowth (124 hectares) and water eco-systems of the river's tributaries near Slobozia village. The reserve also has some land, wetlands and water surface in the Prut's floodplain. There are beautiful steep terraces nearest to lowland in Prutul de Jos as well.

Usually, the reserves have their own "centre of attraction" which is the object that justifies the creation of the whole reserve. In Prutul de Jos such centre is Lake Beleu. It is a very ancient lake that was in existence from time immemorial, some 5-6 thousands years ago, when major part of the Danube's delta was covered by the Black Sea. In 1992, Lake Beleu dried up. As all ancient floodplain lakes, it became shallow long time ago, and one day it will disappear. However, Lake Beleu may disappear ahead of time. First of all, the water reservoirs in the middle of the River prevent floods. In years with low water, the water in the Lower Prut does not raise enough to fill the lakes. Secondly, after the banks were drained for agriculture, dams surrounded the river. The river stopped flooding and the riverbed became deeper. Now its is here for the water from the river to reach the lakes. This is the main factor.

Lake Beleu is a brackish lake. It is not as salt as a sea, and it is not fresh as rivers or usual lakes. There are diverse Molluscs and Crustacea here, including brackish-water species and some relicts of ancient sea among them - Molluscs: *Dressena*, *Hypantia* and *Monodacna*.

In Prutul de Jos there are 160 species of Vascular plants. Three of them are included in the Red Book of Moldova (White Water-lily, Water-Chestnut and Aquatic Fern *Salvinia*).

A hydrobiologist would undoubtedly start to describe the wildlife of Prutul de Jos from the description of fish. Prutul de Jos has from 22 to 36 species. This discrepancy can be explained by the fact that the level of waters constantly varies, coming back to normal after good rains or floods at the Prut River. The floodwaters bring fish, and sometimes, new species, for example even the American Sunfish from the Danube. Before the territory became a reserve, Sazan, Bream, Pike Perch and Catfish were fished out for business purposes. In Prutul de Jos there are such rare species as Sterlet and Burbot. One can also see here the species under threat of disappearance - European Mudminnow and Danube trout that are endemics from the Danube and the Dniester rivers.

However, even fish is not the main value of the reserve. The ornithologists in their research works in the reserve in different years have found 168 bird species there. If we add to the area of Prutul de Jos the territory of the valley nearby and the territory of Manta Lakes which lie up the river, there are 203 birds species and 139 out of them nest regularly here. 21 out of 139 are the species included in the Red Book of Moldova (Whopper Swain, Mute Swain, White Pelican, Dalmatian Pelican, Montagu's Harrier, Hen Harrier, etc.). The valley together with the border of the terrace nearby became the first wetland recognised as wetland of international importance when Moldova joined the Ramsar Convention in 2000.

As it logically comes out, the area of Prutul de Jos has animals that are confined to wetlands and floodplain forests, though some other species are present here as well. Totally, there are 37 species. Among them, one can see rare mammals like Otter, Wild

European Cat, Pygmy White-Toothed Shrewmouse (the relative of Russian Muskrat), Ermine and Mink.

To a great extent, the diversity of local flora and fauna in Prutul de Jos comes from the geographical location of the reserve. It is not far from the Danube delta and lies on a big bird migratory way. Due to its resources, the reserve has an outstanding importance for nature conservation, for the protection of animals and plants.

Iagorlic is the smallest scientific reserve in Moldova. It is an unusual reserve. The major parts of other reserves are covered by forests. These reserves were designed to save remaining natural forests. In Iagorlic, the object of protection is Iagorlic gulf, stony soils nearby and lime slopes with specific steppe flora.

In Iagorlic there are 719 vascular plant species. 50 species out of them are rare species. Water plants - Reed, Cattail, Hornwort and others, that are used by fish to spawn, abundantly cover the coastal part of Iagorlic gulf. Some Phytophagous fish species spawn directly at plants. The reserve Iagorlic is the main "kindergarten" in the Middle Dniester. Fish reproduces and grows up here due to microscopic plants and animals that are all over the gulf. There are 23 fish species in Iagorlic.

The reserve is also famous of its mammals. They are not "under threat of disappearance" here as in other reserves. The interesting species are Roe, Wild Boar, Stone Marten, Fox and Raccoon Dog. There are some rare species like Ermine and European Gopher in Iagorlic. The latter became rare because of the deep intertillage of soil. The rare Reptiles are Smooth Snake, Yellow-Bellied Wood Snake (Colubrid) and European Pond Turtle. The diversity of biotope in Iagorlic determines the diversity of birds. There are 121 bird species here. Mute Swain, which is included in the Red Book of Moldova, nests in Iagorlic. The other Red Book species, Osprey and Hen Harrier, migrate through.

The smallest reserve out of those assessed as core areas of international importance is the "**Steppe in the South of Budjac**" near the village Vinogradovka. It can also be called **Ciumai** because it is situated near the famous winemaking factory Ciumai. The law defines it as a territory for multipurpose use, which is quite obscure because it occupies only 50 hectares or a little bit more together with protected zone. Any use seems unreasonable here. There are over 422 species of higher vegetation at this small piece of land! The size of Ciumai is more than 100 times smaller than that of the scientific reserve with richest flora. However, Ciumai has only 2.2 times less plant species, so the concentration of flora species is very high. In Eastern Europe, scientists identified 20 areas with highest flora density. One of them is called "Budjac - Dniester's estuary". Guess, what is the reason behind?

The core area undoubtedly is the key element of every eco-network. It shall have certain characteristics to fulfil its task, which is to prevent species from dying out in the region. Such characteristics shall include the **size of territory, relief diversity, diversity of types of flora, high concentration of species, especially species under threat of disappearance**. In addition, **good level of protection and good governance** are important characteristics that shall be ensured by State and society. There is no way to improve the nature. However, our society and we need to become better in our attitude towards the nature.

Several best-known core areas were covered in this report. Totally, there are 62 core areas in Moldova. When new data become available, new core areas shall be identified. This is

a task for the next steps in planning and establishment of the eco-network in Moldova. It is expected that many new core areas of local importance will appear.

The question is whether all core areas shall have the status of natural areas under state protection. The answer is probably not, because sometimes that would be impossible to realize. A good example is water reservoirs used in time of migration by many wetland birds (Ducks, Geese, Herons and others). The refrigerant reservoir of Cuciurgan Electric Power Station attracts many birds in winter because of its warm water. When the station works more intensively, the conditions are even more attractive and draw attention of higher number of birds. This reservoir, together with neighboring wetlands of the Cuciurgan River (known for the rare fish called European Mud-minnow) and wetland forest between the reservoir and the Dniester arm, looks like a real Ramsar Site.

Irrespectively of the status, there shall always be some regime of protection. A lot depends on the attitude of local population. Not every local community can be proud of having a core area nearby. Not every local community understands that the beauty of local area is a great property of its people.

Biological corridors, what are the purposes?

They are supposed to be the links connecting core areas. Core areas need to be connected because of a number of reasons. First of all, such links allow plants and not active animals to settle down in a new place. Secondly, such links decrease the deaths among those species, which migrate by instinct irrespectively of opportunities to migrate. There are many species of this type among insects (Insects-Pollinators, Predatory Beetles, and Parasitoid Wasps). Thirdly, links allow connecting small populations that are under threat of genetic degradation because of the lack of genetic exchange. Fourthly, the links facilitate the life of those species, which perform long distance passages or flights.

Corridors also help distant migrants like migrant birds and bats. For small species, corridors are like large countries giving them more opportunities than an agricultural field. For example, Earthworms were almost dying out in fields because of chemicals, frequent ploughing and loss of humus. However, they survived in forest zones, reproduced and came back to the fields.

Usually, corridors are almost unbroken belt-like components of an eco-network. Some species do not need continuous biological corridors. Migrant wetland birds are good flyers. They need corridors, which look like chains of water resources where they find temporary shelter to have rest and food. However, parts of water chain may be quite distant from each other, which makes the way harder. That is why all birds prefer to fly along large rivers.

Many animals are able to pass through agricultural lands like pastures, hayfields and meadows. It seems that a biological corridor shall not be continuous. However, for some species, the corridor is a guiding line. For other species, corridor is airflow along the belt of trees. For the third category, the corridor is a place to have rest. In general, animals prefer to escape from eyes of a stranger in order to feel well.

Corridors, passing through forest, and corridors, passing through an open space like a steppe, essentially differ from each other. Steppe corridors need more space. Men or transport scares animals. In steppe, the spectrum of vision is wider than in forest.

Various species need different corridors that vary in their width and structure. A Noble Deer is a sensitive animal and needs a wide corridor - some 100-200 meters. Smaller animals like Hares and Squirrels would be fine with a corridor of 30-40 meters or less.

In general, a corridor looks like a giant thread. However, it has certain size as well and can be considered as a combination of small core areas that are able to protect many species. Corridors can be places of reproduction for insects (Bees, Bumblebees, Ants) and places of nest and feed for birds. Small animals (Hedgehog, Hare and others) may move from one core area to another within a corridor.

Therefore, different species may view biological corridors as ways of migration, places for feed or permanent habitats.

By now, the fragments of four international corridors had been identified in the territory of Moldova. Two of them lie along the Dniester and the Prut. The directions of some corridors of national level were identified as well, based on the possible options. Besides that, some important local corridors were outlined. They may be recognized as corridors of higher level. All corridors are shown at **Picture 4, Pag.87**.

Taking into account that a lot of lands in Moldova are used for plant cultivation, it becomes clear that linking the components of eco-network is a hard task in Moldova. It is an impossible task without the application of restoration territories. The use of such territories in agriculture shall be over for both economic and environmental purposes.

As a last resort, parts of agricultural lands may be used to ensure the integrity of corridors of significant environmental importance. Lands in public domain may be transferred to the management by the Central State Environmental Authority or remain under the management of a farmer who shall use them as recommended by the Central State Environmental Authority for a particular corridor (forest plantations, seeding grassy lands or their combination, some types of plantations that can not be intensively used for agriculture, etc.).

Absolute expropriation of private lands may be realized only with ransom or other compensation. The other way, apart from expropriation, is to give private lands the status of green plantations. Lands may be left in the property of former or new landowner with the mandatory change in the regime of use as recommended by the Central State Environmental Authority for a biological corridor.

Buffer zones.

To protect a core area from external human impact, buffer shall surround a core area. This is a mandatory provision for reserves. The buffer shall support the capacities of a core area. There are different techniques for the functioning of buffer zones, including the restrictions on their economic use.

There are two types of buffers depending on their structure and purposes. These are **geosystem buffer and protective buffer**.

Geosystem buffers are supposed to strengthen the effectiveness of eco-network in respect of the improvement of geosystem balance, i.e. improvement of local microclimate, preservation of humidity, oxygen production, prevention of landslides, ravines, etc. Geosystem buffers are divided into **territories for nature development and accumulating crops**.

Territories for nature development are "wild" territories (almost untouched by men) that cannot be recognized as core areas and do not protect core areas. These are also isolated parts of large corridors. Such territories may be divided into four categories, though a territory may fall under more than one category:

- 1) Potential core areas which may reach the level of core areas after taking measures to increase their characteristics as habitats, or after the value of this territory is discovered;
- 2) Spacious regions of forestry;
- 3) Pastures used in a right way;
- 4) Health restoration zones.

Accumulating crops are agricultural lands that positively influence on soil organisms and state of soil and are good habitats for fauna. Other task of accumulating crops is to improve land's resistance to the process of destruction like washing out of soil, formation of shallow gullies turning into ravines, etc. Not every plant may be used for accumulating crops. The perennial plants (Clover, Lucerne, others) are appropriate for accumulating crops. Such plants attract various animals, create good tussock making soil resistible to washing out. Some plants enrich the soil with nitrogen, making fertilizers unnecessary. Many medicinal and spicy plants may be used in accumulating crops. Mixed accumulating crops are good as well.

Protective buffers perform the same functions as geosystem buffers and an additional function. They are a shield between wildlife and man. Protective buffers may protect core areas or biological corridors from the lands intensively used by men for human settlements or agricultural lands. Protective buffers may also protect lands from the particularly aggressive impact of factories, highways, "dirty" production circles, and fields with experiments on genetically modified plants.

Unfortunately, nowadays only large forests may be considered as geosystem buffers of high rank. Still, large forests are not uniformly spread throughout the country (**Picture 5**, Pag.88). Small forests (at least 50 hectares) that may serve as geosystem buffers of local importance are shown at **Picture 6**, Pag.89. The reserves, which were not identified as core areas, are among geosystem buffers.

Restoration territories and the principles for their identification

Some territories do not bring any profit irrespectively of efforts and methods applied. Other territories degraded so much that even feeble use for agriculture might cause desertification. Environmental authorities need to intervene to save such lands. The legislative rules for such intervention are not perfect. However, there is a system of characteristics, which allows making a decision on the state of a territory and the need for its restoration.

The concept of eco-network requires tight links between its components. Every piece of land, which is used for agriculture or other human activities, shall be considered to determine its value for the preservation of biodiversity. That is why lands in need of improvement shall be classified as restoration territories. In future, they may become core areas or buffer zones or biological corridors.

Restoration territories usually have some elements fully or partially destroyed because of intensive human activities that caused the natural process of destruction. Heavy overgrazed meadow and steppe lands, destroyed or carved out forests could be examples.

Additional examples are eroded agricultural lands with lost or decreased humus, which cannot be used in agriculture anymore. They keep some characteristics as habitats for plants and animals and can be partially restored or transferred in other regime that ensures their well-being. In their new quality, such territories may preserve and improve the chances to be used with some profit.

It is extremely hard to restore steppes. It takes several years to restore untouched steppes in the reserves.

It may take some decades to restore a steppe that was ploughed, if other conditions are favourable, namely if there are untouched parts of the steppe nearby and there are some seeds of steppe plants in the soil.

If steppe suffered from ploughing up or unlimited pasture for decades, it will not restore so easily. Some centuries need to pass. In USA, such attempts were undertaken to restore prairie. In Russia, there were efforts to restore Kulikovo Field.

If steppe is exploited for thousands of years, there comes a clay desert, which is not restorable, as in the Middle East. These lessons are not only for environmentalists. Is Moldovan "elite" aware of these facts?

Is it aware that in many Moldovan pastures there remained just some belts of soil?

Usually, the population understands if it is economically unreasonable to use a particular degraded piece of land. However, they often do not know what shall be done for the restoration of such land, which is a long process. The other problem is how the decision on restoration shall be made if it touches the interests of different groups? How shall such decision be taken for common good? How shall actions on restoration be coordinated? Local authorities shall rely on scientific and expert advice during all decision-making and implementation process to achieve positive results and to use the resources efficiently.

At the same time, restoration territory shall not be considered in isolation from the whole landscape and other elements of the eco-network. That is why, when identifying the restoration territory it is better to work taking into account both national and local perspectives. It is also needed to take into consideration the planning of local eco-network and to determine the potential importance of the restoration territory for the national eco-network.

Restoration territories have capacities to be and shall be used as elements of corridors of local, national and international importance. To ensure the integrity of such corridors, restoration territories may be taken out of the economic circle of production. Then, forests are planted at such territories, if it is considered appropriate in the course of ecological melioration, or rehabilitation regime is established for the growth of grass.

If a local corridor needs to pass via a restoration territory, such territory is taken out of economic circle of production or the rehabilitation regime is applied in the framework of existing land use, for example by special crop rotation regime.

The identification of restoration territories shall be well founded because lands generally are extremely economically exploited. Justifiable reasons include the need to use environmentally and economically sound forms of land use and the capacity of natural

eco-system to restore. Certainly, soil and geological features of the area (like level of subterranean waters and their salts concentration) need to be taken into account. In addition, aesthetic, historical and cultural motives shall also be considered. That is why the complexity of reasons requires that decision could not be made without expert advice.

Usually, a territory may be classified as restoration territory according to its soil appraisal characteristics. Main characteristics in this respect are:

- 1) Quantity of humus shall not be less than 70% of original level;
- 2) Significant washing out of the upper soil horizons;
- 3) High rates of secondary saline soils;
- 4) The level of washed out soil within the limits of the territory exceeds 20%.

An agricultural land may be classified as a restoration territory if the following conditions are met:

- 1) The owner gives agreement to change the character of use, according to the regime defined by the Central State Environmental Authority; or
- 2) The owner gives agreement to get ransom (compensation) and refuses from the land.

Ransom shall come from the budget or from specialized non-budgetary funds or other resources. In the second case, the Central State Environmental Authority or any other legal entity or natural person may get ownership for the land. In this case, such legal entity or natural person shall be obliged to provide according to the Civil Code for the regime necessary to maintain the restoration territory as recommended by the Central State Environmental Authority.

HOW THE NATIONAL ECOLOGICAL NETWORK COULD BE CREATED IN MOLDOVA

A lot of efforts are necessary to create the national ecological network. This process does not require large financial resources, which is extremely important for such relatively poor country as Moldova.

It is important to organize a well-planned research on flora and fauna in the reserves and other natural areas. The planning of National Eco-Network needs to be done in three parts of the country by scientists (zoologists, geographers, botanists) and experts from the Central State Environmental Authority and other state authorities.

Existing laws need improvement. At the same time, it is important that scientists, lawyers and parliamentarians draft new legal acts on eco-networks.

There is a need to develop international regional documents together with Romania and Ukraine. It is needed to develop agriculture by assisting small landowners to cooperate and to use reasonable technologies for the sound management of otherwise hopeless lands. All interested groups and individuals shall be involved in this process.

The tasks, which require urgent actions, are:

- 1) To identify extremely degraded lands and transfer them into restoration territories especially for those lands in biological corridors of international or local importance;
- 2) To realize land planning for restoration territories necessary to ensure the integrity of network's basic elements of international and national importance;
- 3) To realize administrative measures to establish procedurally the regime at restoration territories ensuring the integrity of eco-network;

- 4) To establish the most efficient rehabilitation regime at restoration territories;
- 5) To organize the work of local authorities and experts on land planning in communes in accordance with the Local Self-Governance Law;
- 6) To make order in water-protective belts, beginning with coastal protective belts.

The following practical steps need to be taken:

To give an official state order to the State Forestry Service to introduce the rehabilitation regime in restoration territories of the basic elements of the National Eco-Network of Moldova. Such rehabilitation regime shall include full or partial forestation, shrubby or other special plantings in corridors, plantations, etc.

To approve tax and administrative instruments to stimulate local authorities, communities and landowners to transmit degraded lands for rehabilitation or to change the character of use at such lands;

To establish a fund of environmental land use by attracting foreign investments in order to stimulate environmentally sound techniques of land management.

The restoration of lands clearly is a complicated process, which requires the understanding and support of local population as well as political will. In this respect, some objective and subjective difficulties exist in Moldova.

One of them deals with poor economic situation of land-users that decreases their capacities and psychological readiness to search for more appropriate solutions on the rational use of natural resources.

In addition, the current situation when some reserves and nature protection activities are financed from local budget contributes to the conflict of interested groups.

There is a lack of domestic and foreign sponsors and investors. As a result, tourism business is underdeveloped.

Local authorities sometimes intentionally do not address the issues of barbarian attitude towards nature because of political situation. Moreover, as local budgets are extremely poor, local authorities mostly spend all funds for social purposes, even when such spending violates the law.

At the same time, some factors may contribute to positive attitude towards the restoration of degraded lands. First of all, there is an understanding of the need for nature protection among the general public in rural areas. The other reason is that some landowners do not work on their lands because of the lack of capacity and resources or because of economic and environmental reasons.

In general, the factors for negative and positive perception balance each other. Therefore, taking into account the evident long-term benefits of the restoration of degraded lands, this process shall go on to bring local population a number of long-term profits.

The most important thing is to realize that all actors need the eco-network. Rural inhabitants, business, government need it in practical life. The beauty of the nature is a prerequisite to tourist business that plays an important role in every country, from USA to Denmark, from Kenya to Slovenia and Luxembourg. Unfortunately, today Moldova is an exception.

Tourism is an image of a country, a sign of its stability. It means the increase of employment, currency inflow and additional money to restore the nature. Unsurprisingly, tourists do not visit countries with unfavourable environmental situation.

PLANNING OF LOCAL ECO-NETWORKS

The very first planning of local ecological network in Moldova was done in the right bank of the Lower Dniester. This eco-network occupies the territory from floodplain of the Botna River to the border with Ukraine. The east boundary of the territory is the Dniester. The Causeni - Palanca highway forms the west boundary. This is beautiful area where steppe with dominance of Fescue and Feather-grass meets azonal flora of floodplain (wet forests, meadows and swamps) as well as dry Oak forests - gynets, which are tree stands combined with bright glades full of steppe herbs. The original mixed character of this area is connected with peculiarities of its climate as well as with the impact of winding river and complexity of relief along the river. There are also relatively high slopes of the upper terrace of the Dniester. Outside rural settlements, mainly anti-erosion plantations cover these slopes and some remaining original oak forest with fragments covered by steppe flora. In some places, such slopes are quite close to the river and continue until the border with Ukraine. All this has predetermined high diversity of flora and eco-system diversity. Today, fields cover most of these lands, while floodplain is drained and used in agriculture.

The first task in establishing this local eco-network was to identify core areas. Some of them were evident in the beginning like two reserves with upland forest (Copanca and Leuntea making together 197 hectares), floodplain forests Turkish Garden (224 hectares), Olanesti (108 hectares), wetland Togai Bog (50 hectares). In any case, there was a need to assess them to be sure what comes under protection. The available data about Copanca upland forest and Turkish Garden were too outdated, especially taking into account that last years were too "unstable" for the nature. Moreover, when research on these lands took place, the concept of National Eco-Network was just an idea (1999).

The field research at the territory of the local eco-network in the Lower Dniester have identified the following basic features of this territory that were important for the eco-network planning:

- 1) There are biotopes valuable for the preservation of rare and resource species of plants and animals, as well as the rich diversity of flora and fauna in the area.
- 2) There is a place important for the rest and feed of birds in the area. This place is part of the transboundary flying migrant root. There are some wonderful forests and wetlands in Talmaza Wetland.
- 3) Places that are almost not visited by people are quite frequent in the area.
- 4) Floodplain habitats are partially connected by water-protective plantations and the belt of unused land along the state anti-flood dam, even when dammed lands used in agriculture interrupt the coastal protective belt.
- 5) There is a potential opportunity to connect by means of corridors three isolated pieces of upland forest situated like an arc: forest tracts Copanca and Orehovka and the forest between village Cioburciu and village Rascaieti.
- 6) There is a need to create steppe micro-reserve close to the forest near village Rascaieti.

The final eco-network is shown at **Picture 7**, Pag.90. The arc between Copanca and Rascaieti forms the western sector of the eco-network. It is necessary to use 50 meters wide forest belts as corridors to connect forest tracts Valea Stinei and Zaozernoie, Zaozernoie and Orehovo, Orehovo with both Grusevo and Arpentievo, and both Grusevo and Arpentievo with large forest Cioburciu-Nagornaya.

Part of the floodplain along the Dniester forms the eastern sector. The main core area of the eco-network will be the future natural territory under state protection called Talmază Wetland (around 1200 hectares).

Internal corridors shall connect the piece of upland forest at the forest tract Copanca near the village Leuntea along the old bed of the Dniester with the landscape forest reserve Turkish Garden and with forest tract Talmază Wetland.

Through floodplain parts of the lower fragment of the network in the area of natural reserves Olonesti Forest and Togai Bod, this network shall be connected with protected wetlands in Ukraine. This link may be strengthened by means of coastal and radial corridors at Turunciuc Island.

A reader may have a look at the list of core areas and geosystem buffers in the end of this book and research the maps in order to understand what areas are the candidates for core areas or buffer territories of international, national or local importance according to the concept of the National Eco-Network of Moldova.

Nowadays, it looks that we failed to notice an interesting piece in the lower (southern) part of this territory. This piece, situated a little bit up from the village Olonesti, has steppe flora at landslip slope and is connected with some pieces of forest. It may well be connected with a piece of upland forest between the villages Olonesti and Crocmaz.

Many people are able to build a local eco-network or its fragments. The beauty of the environment is the best criterion to select what needs to be protected. Local inhabitants understand the beauty of local place better than strangers. Secondary school students often plant bushes and trees. However, it is important to know where to plant trees and how to take care of them. The picks of ravines, landslips, water protective zones of small rickers and streams are the best places to plant trees and bushes. Unfortunately, a cow herd or a flock of sheep or goats, which tend to trample down or eat new plantations, often destroys many new-planted trees.

A lot needs to be done by local population in Moldova to attract agro-tourists by natural products, fresh air and beauty of the nature. Experts are ready to help so that local efforts would do best for the nature.

LINKS BETWEEN MOLDOVAN ECO-NETWORK AND NETWORKS IN THE NEIGHBOURING COUNTRIES

The eco-network in Moldova and the European Eco-network are at the very beginning. There is no uniform methodology to create eco-networks, which makes it hard to ensure transnational coordination of this process. Of course, core areas may be components of international systems established by agreements and conventions because Moldova is a party to many conventions and will join some other agreements in the near future (Ramsar sites, EMERALD Network, future expansion of Natura-2000). However these agreements do not create a real and efficient eco-network. **Such eco-network needs to be planned through connections** in order to be effective. When there are no corridors between core areas, so there is no network.

The concept of eco-network is developed to a certain extent in Ukraine, our eastern neighbour. The Parliament of Ukraine passed the Law on the Program of Establishment of the National Eco-Network in Ukraine in 2000-2015. This allows linking the main ecological corridors of two states. The common corridor for Moldova and Ukraine goes along the Dniester at the eastern border of Moldova. Parts of transboundary corridors in the Lower Dniester, near the River Iagorlic and near Rudi-Arionesti and Unguri, are quite important (Picture 4).

The areas near South, East and Northeast boundaries of Moldova have corridors connected with the rivers Danube and Dniester as well as lakes near the Danube River in Southern Bessarabia. Nowadays, there are research activities aimed to establish an ecological corridor that would pass along Black Sea coast and connect Danube delta via Lower Dniester with mouth of the Dnieper River. This corridor will pass through South-East Moldova.

Situation is not so clear in Romania, where the concept of eco-network was not developed. It is evident that the ecological corridor along the Prut River will be dominant in the East of Romania where it borders with Moldova. Taking into account geographic, landscape and biological characteristics, potential Romanian eco-network may presumably be linked with Moldovan eco-network near Cahul as well as via a corridor between Leuseni and Ungheni that is perpendicular to the state border. Such corridor would connect Moldovan "Codru" with Romanian forests to the South of Iasi.

In general, a stronger coordination is needed between all countries of the region to establish uniform approaches to the planning and implementation of eco-networks in order to restore the merited role of the nature in the life of humanity.

INSTEAD OF CONCLUSIONS

How to find the most rational approach to the planning of an eco-network in a particular territory? How to cover the larger space using less materials, funds and efforts?

These are the issues to be answered every time. If you plant the banks of a stream by willow, you shall think in advance who will use its wood and who will take care of it. If you attempt to transform a damaged pasture into a hayfield somewhere without permission, you need to think who will find profit to mow and protect the land from unlimited grazing? If you restore a forest belt, how can it be protected from cattle, people and cars? If inconvenient land shall turn into forest, how to preserve flowering glades? How to plant forest at 5 hectares so that it would spread into another 10?

These are the questions to be answered by all of us - central and local authorities, farmers, teachers, NGOs and other stakeholders - with help of scientists and experts.

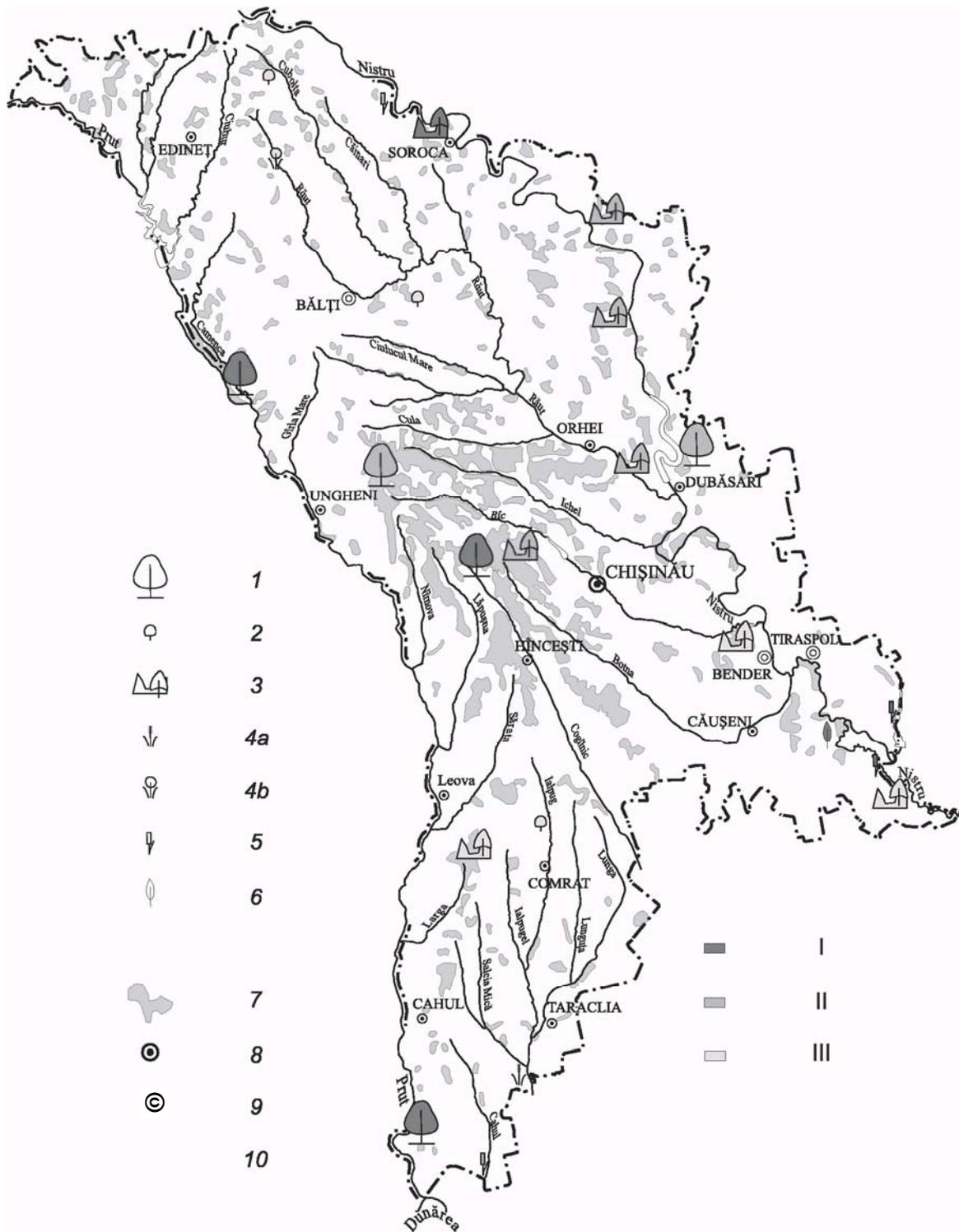


Fig.1. Positions of international, national and zonal core areas:
 level of core areas - international (I), national (II), zonal (III); categories of objects and complexes: 1 - scientific reserves, 2 - nature reserves of medicinal herbs, 3 - landscape reserves, 4 - areas of multifunctional use: representative areas of steppe vegetation (a) and representative areas of meadow vegetation (b), 5 - wetlands; 6 - areas for which the assignment of the sites protected by the state is envisaged; 7 - state forest fund; settlements with population of: 8 - 660 000 inhabitants, 9 - 100 000-200 000 inhabitants, 10 - 10 000-65 000 inhabitants

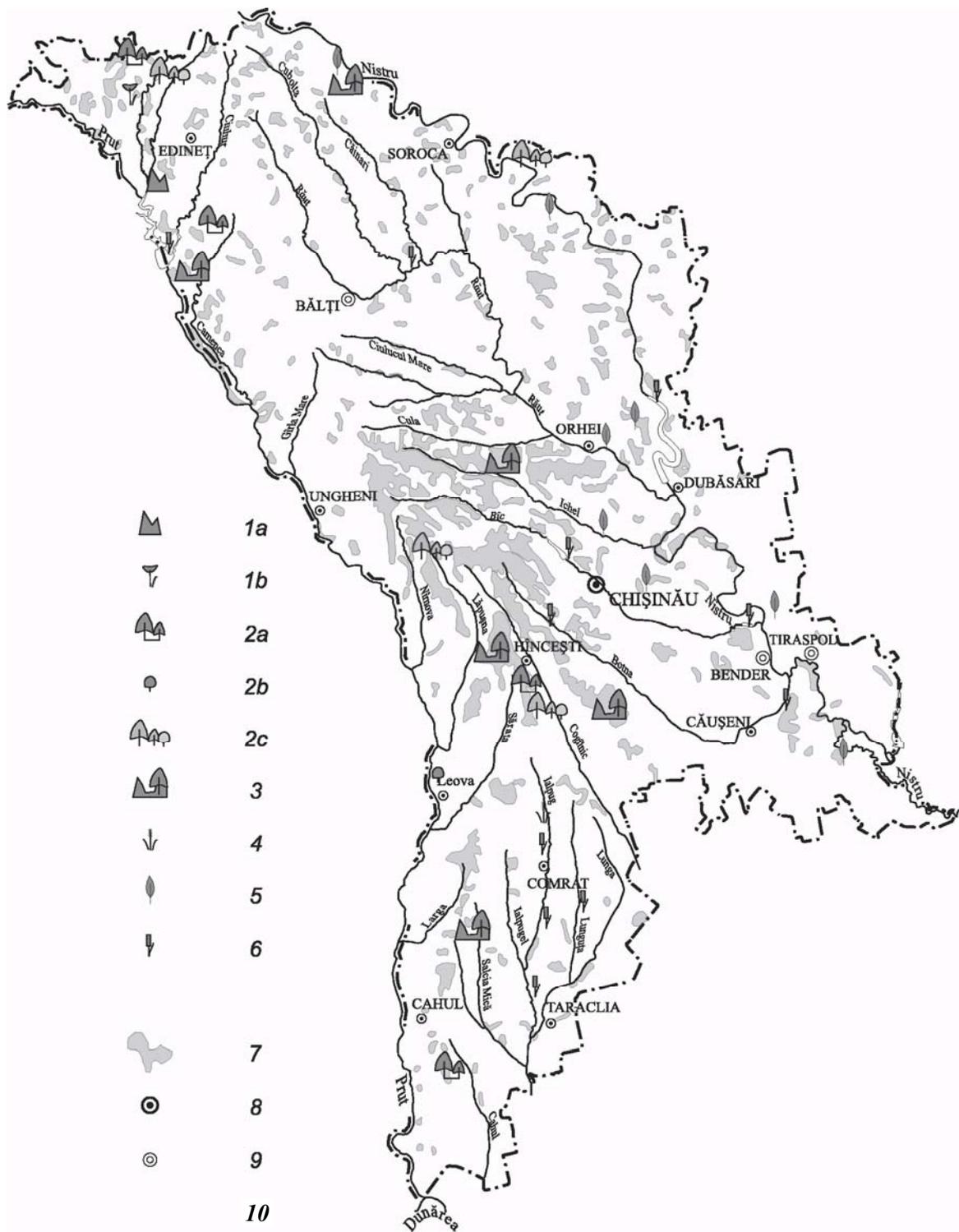


Fig. 2. Position of local core areas: categories of objects and complexes: 1 - nature monuments: geological and palaeontological (a), botanical (b), 2 - nature reserves: forest (a), of medicinal herbs (b); mixed (c); 3 - landscape reserves, 4 - areas of multifunctional use: representative areas of steppe vegetation; 5 - areas for which the assignment of the sites protected by the state is envisaged; 6 - wetlands; 7 - state forest fund; settlements with population of: 8 - 660 000 inhabitants, 9 - 100 000-200 000 inhabitants, 10 - 10 000-65 000 inhabitants

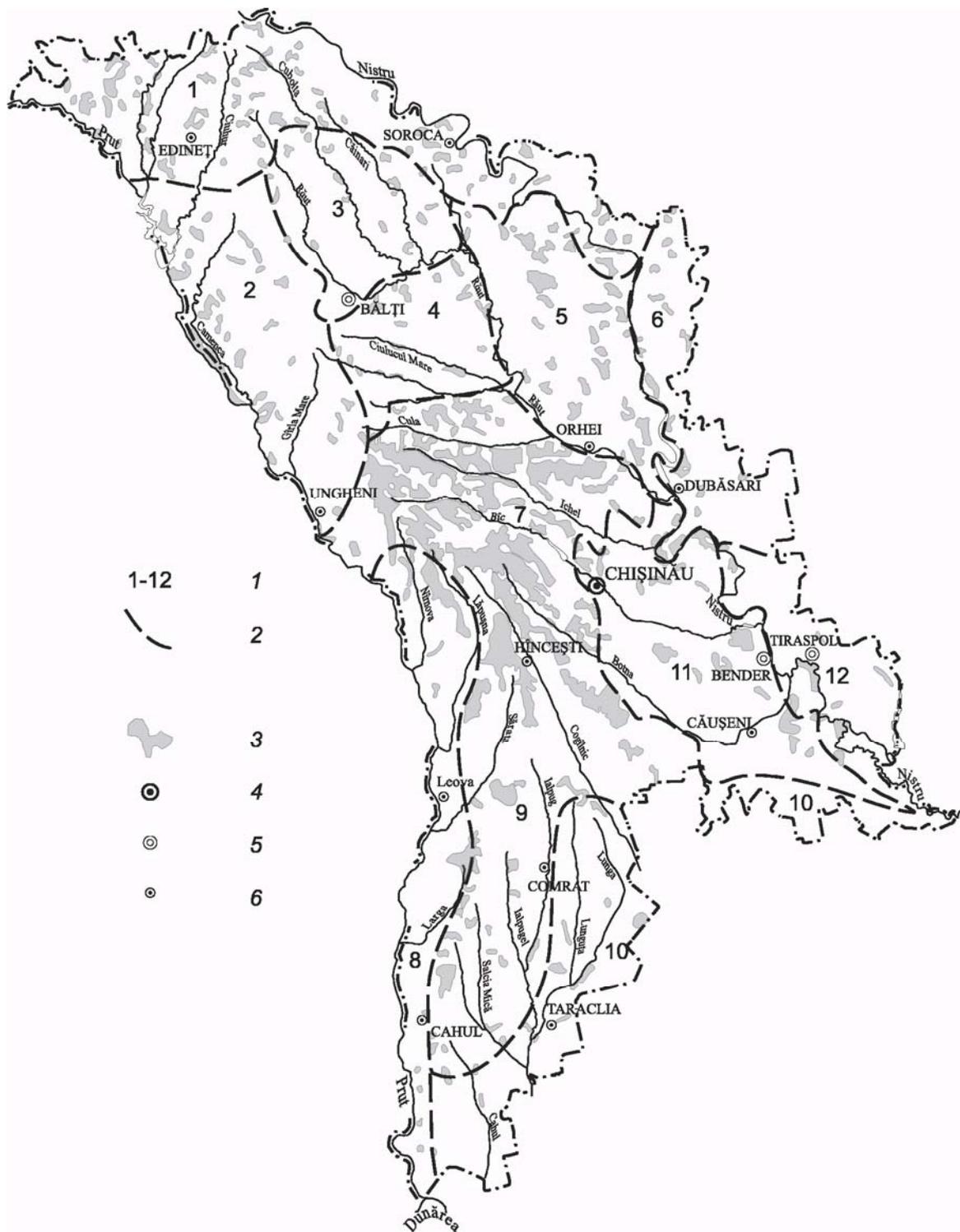


Fig. 3. Ecological zoning:

1 - the numbers of districts: the district of North Moldova forest steppe (1), the district of the Middle Prut forest steppe (2), the district of Balti steppe (3), the district of Chiuluc-Solonet steppe (4), the district of Raut-Nistru forest steppe (5), the district of the Middle Nistru forest steppe (6), the district of Codrii forest (7), the district of Lower Prut forest-steppe (8), the district of South Moldova forest steppe (9), the district of Lower Dniester forest steppe (10), the district of Lower Dniester steppe (11); 2 - borders of districts; 3 - state forest fund; settlements with population of: 4 - 660 000 inhabitants, 5 - 100 000-200 000 inhabitants, 6 - 10 000-65 000 inhabitants

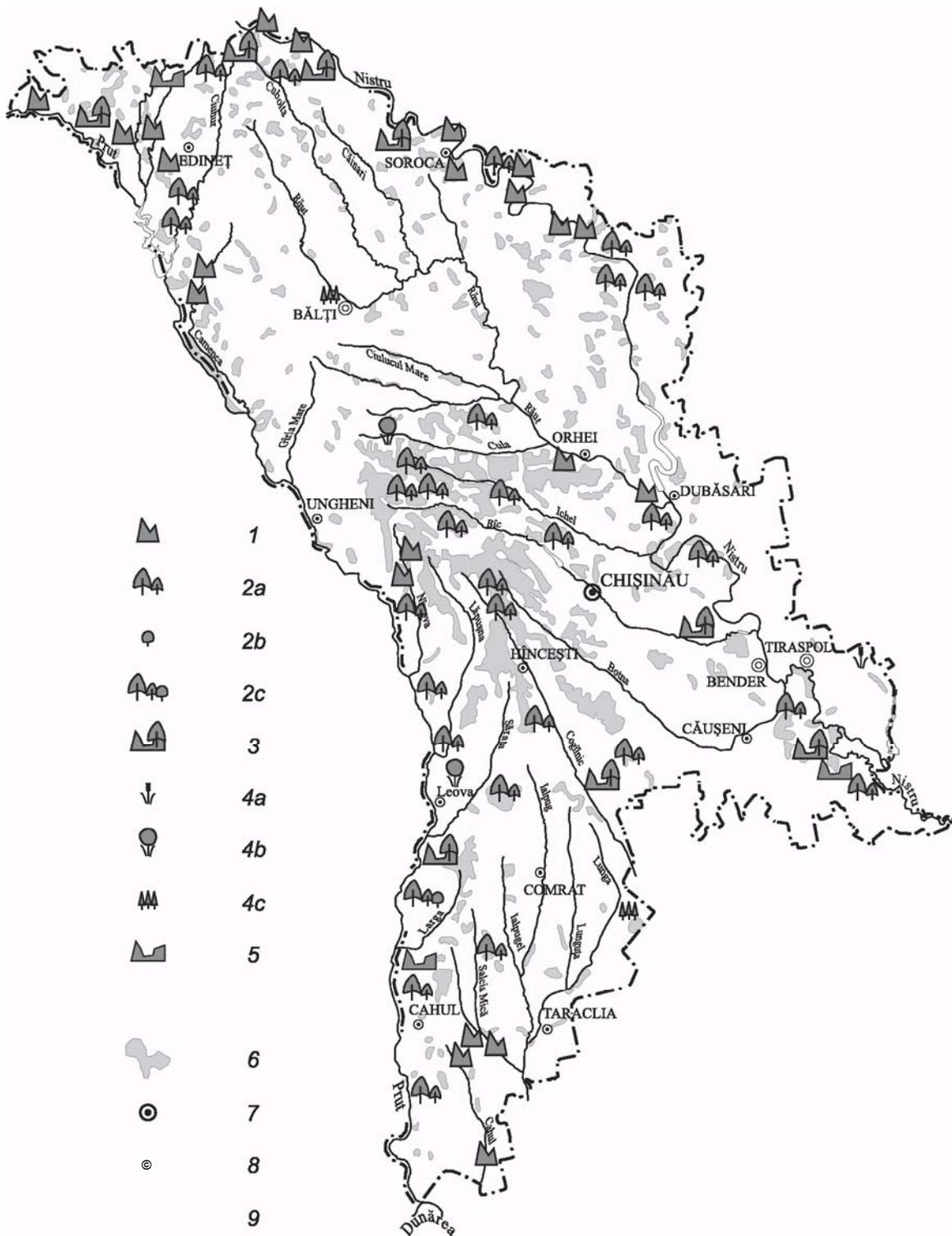


Fig. 6. Positions of local geosystemic buffers categories of objects and complexes:

1 - geological and palaeontological nature monuments; 2 - nature reserves: forest (a), of medicinal plants (b), mixed (c); 3 - landscape reserves; 4 - areas of multifunctional use: representative areas of steppe vegetation (a) and representative areas of meadow vegetation (b), protection forest belts (c); 5 - forests out of special protection (not less than 50 ha); 6 - the state forest fund; settlements with population of: 7 - 660 000 inhabitants, 8 - 100 000-200 000 inhabitants, 9 - 10 000-65 000 inhabitants

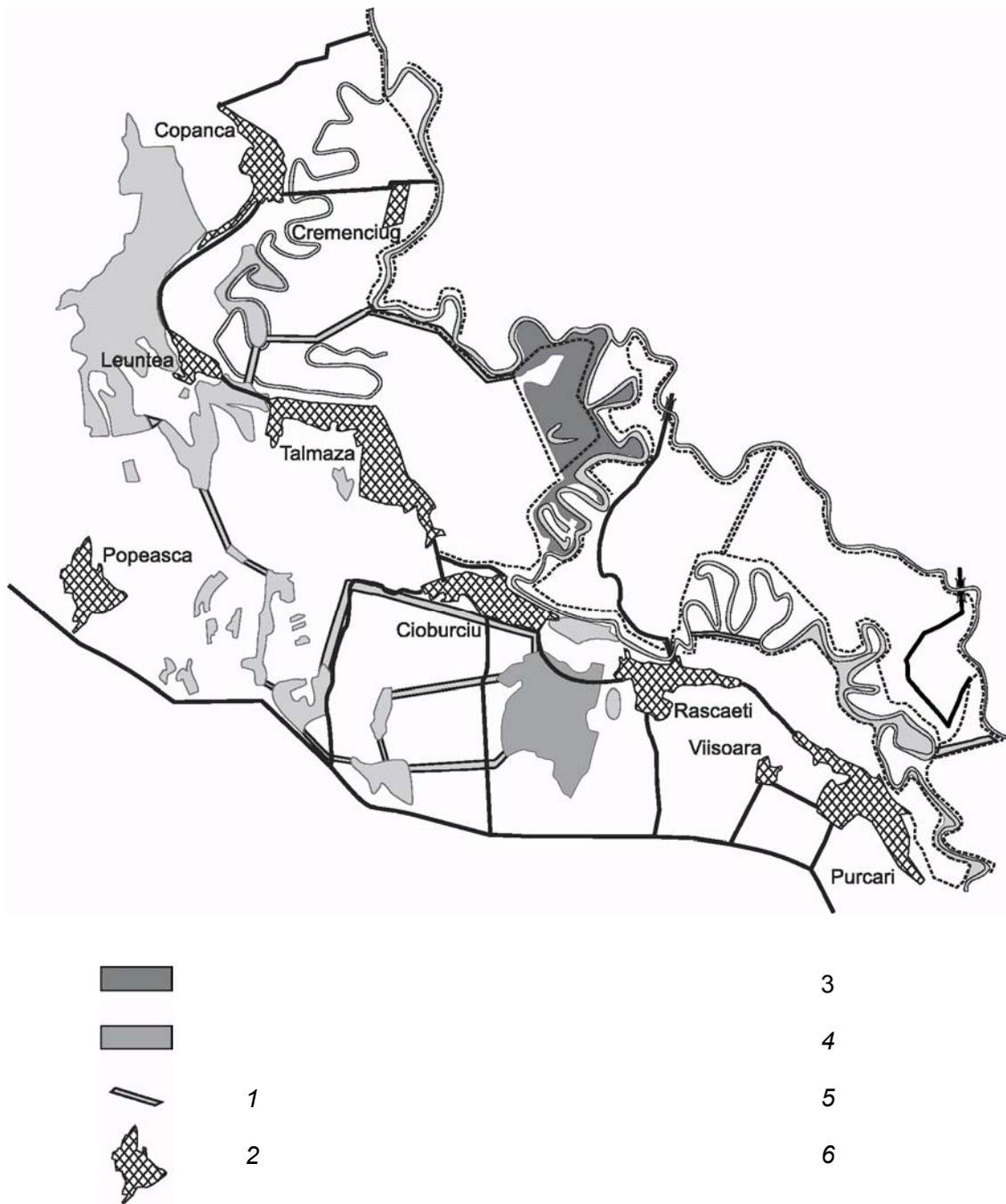


Fig. 7. A fragment of the ecological network:
 elements of the ecological network: I - the international core area Talmaza Wetland,
 II - the local core area Cioburciu-Stinca-Rascaiet, 1 - projected biological corridors of
 the local level; 2 - settlements; 3 - rivers, 4 - roads, 5 - anti-flood dams, 6 - forests

DICTIONARY

biological diversity - totality of species, genes and/or ecosystems occurring in a particular area;

biogeographical area - a geographically delimited area, at which certain assemblage of species occurs characteristic mainly of this area;

species diversity - the number of species in a particular area; species diversity can be estimated within an individual group (e.g., species diversity of plants of Moldova);

geosystem - a unit, which unites such parameters, as geological rocks, features of land surface and water objects, vegetation cover in a particular site, as well as climate features; in other words, it is geographical foundation for functioning of ecosystems;

geosystemic balance - proportion between the total number natural and human-modified geosystems, which ensures ecological equilibrium;

landscape - a territorial system, relatively homogeneous in terms of structure and conditions of development. Its characteristic feature is close inter-relation of constituent components and congregations;

landscape diversity - diversity of landscapes natural complexes within a larger area, it depends on the number of elements and the relationship between the surface areas, covered by these elements. The larger number of the elements in an area and the more similar their surface areas, the higher is considered to be the landscape diversity.

population - a group of organisms, which belongs to the same species and is normally can exist over long time; for this group, absolute or partial isolation from the other groups;

natural habitat - a confined area, where a certain species occurs or grows, and finds conditions favourable for its existence and normal development; for example, the development of the plant of white water lily requires stagnant or slowly moving waters;

natural (ecological) framework - a system of inter-connected natural areas, which ensure maintenance of ecological equilibrium and counterbalancing effects, which can potentially disturb it;

ecosystem - a totality of organisms (bacteria, plants and animals), which populate an area and interacting with each other, as well as the system of their interaction between each other and with components of "non-living" nature;

endemic - a species, confined to a natural district and not occurring in other such districts.

THE OBJECTS OF THE NATIONAL ECOLOGICAL NETWORK

Network elements legend:

The first letter means: N - core area territory, B - system buffer;

The second letter means the level of territory: I - international, N - national, Z - zonal, L - local.

N	Objects	Area, ha	The element of the Network
1	The karst cave "Emil Racovita" and surroundings	80,0	BL
2	Namalvii ravine	100,0	BL
3	Proterozoic uncovering near the village of Cerlina	60,0	BL
4	Reefs of Brinzeni	44,0	NL
5	Canyon of Buzdugeni	100,0	BL
6	Canyon of Trinca	70,0	BL
7	Canyon of Fetesti	68,0	BL
8	Part of steep bank of the Dniester River	308,0	BZ
9	Tectonic break near the Village of Naslavcea	82,0	BL
10	Ravine "La Izvoare"	115,0	BL
11	Ravine "Becirov Iar"	46,0	BL
12	Caracuseni	2374,0	NL
13	Rososeni (Caracus)	1108,0	NL
14	Rososeni (Caracus)	368,0	NL
15	Geological and paleontological complex of the Lopatnic River basin	452,0	BZ
16	Sitischi	90,0	BL
17	Vadul	135,0	BL
18	Ocnita	103,0	BL
19	Climauti	70,0	BL
20	Hligeni	70,0	BL
21	Hrusca	170,0	NL
22	Karst cavities (Hrusca)	80,0	BL
23	Cernoleuca	337,0	BZ
24	Tetcani	164,0	BL
25	Bugornea	606,0	NL
26	Valea Adinca (Bugornea)	214,0	NL
27	"Rascov" (Bugornea) Complex	123,0	NL

N	Objects	Area, ha	The element of the Network
28	Colohur (Bugornea)	178,0	BL
29	Glubocaia Dolina (Bugornea)	520,0	NL
30	Rudi - Arionesti (RA)	916,0	NN
31	Calarasovca (RA)	252,0	BL
32	Unguri (RA)	100,0	NL
33	La Castel	746,0	BZ
34	Fetesti	555,0	BZ
35	Zabriceni	596,0	BZ
36	33 wades	184,0	BL
37	Cosauti	585,0	NI
38	Holosnita	199,0	BL
39	Climautii de Jos	668,0	BZ
40	Curatura Glade	692,0	BZ
41	Complex of sylvan gray and dark-gray soils of the silvo-steppe zone of the North of Moldova	52,0	BL
42	Cremenciuc-Holosnita	1100,0	NN
43	Padurea Domneasca	6032,0	NI
44	Hundred burial mounds	1072,0	NL
45	Canyon of Butesti	110,0	BL
46	Stinca Mare	105,0	BL
47	Stinca	55,0	BL
48	Pociumbeni	53,0	BL
49	Sapte Bani	17,0	NL
50	Izvoare - Risipeni	1162,0	BN
51	Costesti-Stinca Reservoir	5900,0	NL
52	Canyon Duruitoare	40,0	BL
53	Canyon Varatic	10,0	BL
54	Reef of Proscureni	10,0	BL
55	Baraboi	149,0	NZ
56	System of forest belts near Balti	200,0	BL
57	Meadow of the Raut River	200,0	NL
58	Radoaia	73,0	NZ
59	Radoaia	248,0	BL
60	Alexandreni I (Radoaia)	163,0	BL
61	Alexandreni II (Radoaia)	286,0	BL
62	Alexandreni III (Radoaia)	79,0	BL

N	Objects	Area, ha	The element of the Network
63	Pohrebeni	1049,0	BN
64	Trebujeni	500,0	NN
65	Saharna	674,0	NN
66	Tipova	306,0	BZ
67	Dobrusa	2634,0	BN
68	Sanatauca-patuni	100,0	NL
69	Piatra-Orhei	100,0	NL
70	Matrasanca-Orhei	50,0	NL
71	Molochisi-Ocna	600,0	NL
72	Iagorlic	836,0	NL
73	Dubasari	93,0	BL
74	Erjova	123,0	BL
75	"Tamaslic" Dry Valley	394,0	BZ
76	Dubasari Reservoir	8100,0	NL
77	Codru	5177,0	NI
78	Plaiul Fagului	5642,0	NN
79	Seliste tectonic displacement	240,0	BL
80	Orhei Canyon	100,0	BL
81	Molesti-Razeni	250,7	BL
82	Sadova	229,0	BL
83	Bogus	89,0	BL
84	Leordoiaia	158,0	BL
85	Scafareni	97,0	BL
86	Voinova	192,0	BL
87	Sarata Galbena	220,0	NL
88	Sarata Galbena	424,0	NL
89	Caracui Villa	84,0	BL
90	The etalon parcel of smoke tree oak-grove	110,2	BL
91	Seliste-Leu	315,0	BZ
92	Condrita	61,0	BL
93	Roscani	134,0	BL
94	Telenesti	111,0	BL
95	Loganesti	710,0	BZ
96	Seliste	315,0	NL
97	Carbuna	607,0	NL
98	Tiganesti	680,0	NL
99	Voloca Verbca	407,0	BZ

N	Objects	Area, ha	The element of the Network
100	Cabaiesti - Pirjolteni	1213,0	BN
101	Temeleuti	209,0	NL
102	Hincesti Forest	4499,0	NL
103	Cazimir - Milesti	500,0	BZ
104	Nisporeni Villa	3499,0	BN
105	Dolna	389,0	BZ
106	Capriana - Scoreni	1762,4	NN
107	Valea Mare	373,0	BZ
108	Tall oat-grass meadow	4,0	NZ
109	Sheep's fescue meadow	57,0	NZ
110	Foxtail meadow	59,5	NZ
111	Sheep's fescue meadow	21,4	NZ
112	June-grass meadow	12,8	NZ
113	Sadova-pasune	100,0	NL
114	Cricova	50,0	NL
115	The Ghidighici Sea	900,0	NL
116	Ialoveni Reserve	528,0	NL
117	Canyon near the town of Nisporeni	200,0	BL
118	Prutul de Jos	1691,0	NI
119	Dancu	131,0	BL
120	Poganesti	203,0	BL
121	Zberoaia-Lunca	147,9	BL
122	Vadul lui Isac	68,0	BL
123	Cantemir	132,0	BL
124	Lebeda Alba	30,0	NL
125	Water-meadow along Antonesti	93,6	BL
126	Water-meadow with marsh vegetation	50,0	BL
127	Cahul	343,0	BZ
128	Baurci	93,1	BL
129	Xerophyte Cernoziom of the forest of the Danube steppe province	200,0	BL
130	Paleontologic excavations near the village of Pelinei	5,0	BL
131	Canyon Budei	5,0	BL
132	Canyon Musait	5,0	BL
133	Hirtopul Moisei	101,0	BL
134	Liceul Bolgrad	54,0	BL

N	Objects	Area, ha	The element of the Network
135	Ostianova	211,2	BL
136	Flaminda	71,0	NL
137	Bugeac	56,0	NZ
138	The sector of steppe of the Northern Bugeac	4,0	BL
139	Chioselia	307,0	NL
140	Codrii Tigheci	2519,0	NZ
141	Canyons of Cimisia	256,0	BL
142	Sector of the steppe near Dezhingea	15,0	NL
143	Comrat Reservoir	204,0	NL
144	Congaz Reservoir (RC)	500,0	NL
145	Uncovering Baurci (RC)	1,0	BL
146	Taraclia Reservoir	550,0	NL
147	Cnezeuca	25,0	NL
148	The parcel of steppe in the south of Bugeac - Ciumai	50,0	NI
149	The system of forest belts near the village of Tvardita	80,2	BL
150	The pond Tomai	250,0	NL
151	Uncovering of clays near the village Etulia (LC)	10,0	BL
152	The Cahul Lake (LC)	540,0	NL
153	"La Humarie" Valley	64,0	BL
154	Zoloceni	69,0	BL
155	The Hirbovat Forest	2218,0	NZ
156	Telita	124,0	NL
157	Cimiseni	50,0	NL
158	Botna Wetlands	110,0	NL
159	Salas Reservoir	350,0	NL
160	Copanca	167,0	BL
161	Talmaza Wetlands	1100,0	NI
162	Olanesti	108,0	BL
163	"Togai" Wetlands	50,0	NN
164	Turkish garden	224,0	BL
165	The complex alluvial, carbonate, chernoziomic, meadow, oozy soils of the Bessarabian steppe province	200,0	BL
166	Sector with steppe vegetation	71,0	BL
167	Cioburciu- Stinca-Rascaeti	670,0	NL
168	Cuciurgan	6 200,0	NI
169	Bicioc	300,0	NL