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HABITATS OF RARE PLANT AND ANIMAL SPECIES IN SOROCA AND STEFAN VODA DISTRICTS, REPUBLIC OF MOLDOVA

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Habitats of rare plant and animal species in Soroca and Stefan Voda districts, **Republic of Moldova** / Ungureanu Laurenția, Titica Ghenadie, Baban Elena, Nistreanu Victoria, Bogdea Larisa, Bulat Dumitru, Bulat Denis/ Editura …… Chisinau, 2017. – x p. –ISBN

This monograph provides information on habitats of rare plant and animal species in Soroca and Stefan Voda districts of the Republic of Moldova. The list of habitats was selected based on the list of species with rarity status identified on the territory of Soroca and Stefan Voda districts and published in the Red Book of the Republic of Moldova, III edition, the Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, the Council Directive 79/409/EEC on the conservation of wild birds, and supplemented with habitats of national importance. This study presents an overview of habitats, local plant and animal species and species with rarity status.

This study is intended for specialists in environmental protection, forestry, agriculture and water resources, land administrators, environmental nongovernmental organizations, professors and students.

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CONTENT

FOREWORD

Wild flora and fauna is the natural heritage of aesthetic, scientific, cultural, recreative, economic and intrinsic value. It has to be protected and transferred to future generations, and conservation of natural habitats is one of the key elements of wild flora and fauna protection. Provisions of the Bern Convention, at the European level, were implemented through Council Directive 2009/147/CE of 30 November 2009 on the conservation of wild birds (Bird Directive) and through Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive). These directives lay the ground for the common framework for habitats, wild flora and fauna conservation within the EU and represent the main EU legal tools for maintaining biodiversity in Member States. The directives set for the legal framework for the Natura 2000 Network, one of the most extensive protected areas networks in the world.

The Habitats Directive aimed to conserve both wild plant and animal species and natural habitats in the European Union. Pursuant to Habitats Directive and Birds Directive, the designated sites constitute the Natura 2000 network that accounts for over 25 000 sites and stretches over 18% of the EU's land area and 6% of its marine territory. The contribution of each Member State to the development of Natura 2000 Network was proportionate to the types of natural habitats and habitats for species present on its territory. All plant and animal species conservation measures shall take account of economic and social aspects at regional and local level.

Habitats Directive just like the Birds Directive establishes the minimum threshold standards for biodiversity conservation that are adopted by Member States and are a key element of the Fifth Environmental Action Programme. Under the Treaty of Rome (Article 130 r), amended by Single European Act and subsequently by Maastricht Treaty, all EU policies and tools must comply with the EU environmental legal framework, these two directives are no exception.

Pursuant to Habitats Directive, Natura 2000 Network includes sites with natural habitats listed in Annex I and habitats of species listed in Annex II. Implementation of this Directive will ensure maintenance of the types of natural habitats and habitats of species in a favourable conservation status in their natural range, or where appropriate, their rehabilitation. For animal species ranging over wide areas, these sites correspond to the places within their natural range, that present physical and biological elements essential to their life and reproduction. For aquatic species ranging over wide areas, this kind of sites were proposed only where it was possible to clearly delimit the area with physical and biological elements essential to their life and reproduction.

In special areas of conservation, the Member States take all necessary measures to ensure habitat conservation and avoid their deterioration as well as significant endangering of species. To develop and implement such actions, globally, and in Europe, particularly, a series of international treaties (conventions, directives, protocols) defining the single policy in the field of environmental protection and setting out criteria for the identification of most vulnerable and rare species and habitats have been adopted. One of these conventions was the Convention on the Conservation of European Wildlife and Natural Habitats, known as Bern Convention, after the place of its conclusion. The Bern Convention entered into force in 1982 and is enforceable on the territory of all signatory members that have committed to conserving wild flora and fauna species and their habitats. In the European Union countries (EU), these measures are driven by a number of directives, the Habitats Directive being one of them.

This publication includes the habitats of rare species of plants and animals from Soroca and Stefan Voda districts that are widespread, but rapidly declining or tend to reduce their area because of economic activities (drainage, modification of the riverbed, alluvium extraction, deforestation, etc.) or land

use changes. The selection of habitats requiring special protection in the Soroca and Stefan Voda districts was made taking into account the category of habitats protected under the Bern Convention, the Habitats Directive and the list of species of plants and animals with rarity status on the territory of these districts and by consulting bibliographic sources on rare plant species, flora and vegetation of scientific reserves, plant monitoring methods [8, 13-15, 17, 18, 21, 24, 28, 30-33, 35, 44, 45, 50, 54, 56, 59, 61, 63, 78, 81-83].

The list of rare plant and animal habitats from the territory of Soroca and Stefan Voda include 4 types and 7 subtypes.

The types of habitats are as follows:

- FRESH WATER HABITATS
  - Standing water
  - Running water
- NATURAL AND SEMI-NATURAL GRASSLAND FORMATIONS:
  - Semi-natural xerarch meadows and communities
  - Semi-natural tall-herb humid meadows
- ROCKY HABITATS AND CAVES:
  - Rocky slopes with saxicolous vegetation
- FORESTS:
  - Temperate deciduous forests
  - Mediterranean deciduous forests

Description of habitats was made based on the following algorithm:

- **Sequential number and name of the habitat** in line with Annex I of the Habitats Directive. The habitats marked with an asterisk (*) are considered to be priorities for protection on the territory of the European Union, as provided by the Habitats Directive;

• **Name of the habitat** on the territory of the Republic of Moldova;

• **General characteristics** that include information on structure and conditions for the creation of habitat on the territory of the Republic of Moldova, regional and landscape affiliation, specificity of plant or plant community growth and spreading according to regional climatic and phytocorological conditions of the Republic of Moldova, particularity of the economic or management system, coupled with other categories of habitats with edaphic, phytocenotic inter-relations or common territorial environmental complexes;

• **Floral and ecological classification syntax** corresponding to the phytocenosis or phytocenoses. The plant and animal species common to the habitat, including those with protection status (hereinafter referred to as species included in the Red Book of the Republic of Moldova, III edition).

For certain types of habitats (forests, in particular) additional criteria are presented: key elements of the biotopical and biological diversity that represent specific (biological and landscape) components of the environment, ensure the diversity of conditions and/or are areas populated by plant and animal species with narrow specialization, dependent in the ontogenetic cycle on a certain sublayer, age, and origin of forest plantations assigned to the category with special value. The type of forest and indigenous communities for forest habitats are presented in accordance with the typology accepted in the Republic of Moldova. For most types of habitats, rare plant and animal species for which the given habitat is essential have been presented.

GLOSSARY OF TERMS

Adventitious - Invasive character of species originating from other geographic regions, which have been massively dispersed by humans, and integrated into different spontaneous or cultivated cenosis.

Alliance - Syntaxomic unit, regrouping several related plant communities

Areal - Constant distribution (spread) area of a taxon - species, plant or animal population

Biocenosis - Assemblage of population of bacteria, fungi, plants and animals that represent the living component of an ecosystem

Biodiversity - Abundance of living entities on the Earth, represented by bacteria, fungi, plants, animals, the genes they contain and the complexity of the ecosystems they form in the biological environment

Biogeographic region - Region that extends over territory of several states and that presents fauna, flora and biological environment conditioned by ecological factors such as climate (precipitations, temperature) and geomorphologic factors (geology, landscape, altitude)

Biotope - Place, land (area), characterized by relative uniformity of abiotic components of the environment (air, land, climate, water, chemical and geological elements) that provide for conditions necessary for the existence of living organisms of a biocenosis.

Birds Directive - Council Directive 2009/147/CE of 30 November 2009 on the conservation of wild birds

Cenosis - Grouping of individuals of the same or different species, determined by certain abiotic factors (climate conditions, soil structure, etc.) or biotic factors (intra and interspecific relations, food source, etc.)

Cenotaxon (**syntaxon**) - Plant classification unit in the chemotaxonomic system

Characteristic species - In phytosociology, a plant species which presence is more frequent (but not mandatory) in a plant group (where it contributes to the characterization) than in other groups of the same hierarchical level.

Chasmophyte - Characteristics of a plant community to adopt and develop in cracks and rifts of stones.

Chemotaxonomy (**syntaxonomy**) - Hierarchal and inductive plant classification system that includes cenotaxons of different ranks.

Community - Totality of plant, animal, fungi and bacteria organisms, ranging over a certain geographical area and being inter-related

Conservation - Series of measures required to maintain or restore the natural habitats and the populations of species of wild fauna and flora at a favourable status.

Conservation status of a species - The sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within the territory referred to in Article 2. The conservation status will be taken as "favourable" when:
- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis

Differential (species) - Capacity to discriminate (individualize) a group of phytocenoses belonging to a particular community, sub-community, facies or geographic variants, to similar once, within their general range of the cenotaxon in question

Ecosystem - Dynamic complex of plant, animal and micro-organisms communities, as well as the totality of abiotic factors of the environment, integrated into organic unity through mutual relations.

Ecotype - Population satisfactorily adapted to a certain set of environmental (physical and geographical and/or biocenotic) conditions, with genetically and ecologically determined adaptive qualities

Edificatory (species) - A dominant species, present in a biocenosis for several generations, being of great importance within the system

Edificatory species - Species which by its number or coverage of its phytoindividuals, forms the largest part of the phytomass, thus imparting the physiognomy of the phytocenosis, the particularities of their phytoenvironment, but also determining (partly) the specific floristic composition

Endemic species - Species that lives within a limited territory (i.e. it exists only in a certain area)

Eurytopic - Species that can leave in a great range of biotopes, spread over an extensive areal and capable to resist variations of environmental factors without losing their functional position within the ecosystem

Extrazonal - Capacity of a plant community to spread over disjunctive stations, peculiar from ecological point of view, outside the areal where the phytocenosis in question has a relatively continuous distribution, in normal stational conditions, compliant with pedoclimatic conditions of the geographical region in question.

Facies - Inferior classification unit of the plant community that is distinguished by the quantitative affirmation of a species, without affecting the qualitative structure of the community

Fauna - All the animal species from a particular area and time.

Flora - all plants of a certain area and time

Forest formation - Forest formation from nemoral area (forest field) or nemoral layering (only hill stations), consisting of stands mixed with at least three species of *Quercus*, *Carpinus* and *Tilia* arborescent species

Forest massif status - Feature attributed to a stand when the mass of component specimens achieves a sufficient density so that it influences reciprocally during growth and development

Forest type - Main taxonomic unit of the forest typology, grouping all stands of the same species or mix of species that can be found installed in stations.

Forestry planning - Multidisciplinary works, consisting of a system of measures aimed at organizing and managing forests in order to fulfil the multiple ecological, economic and social functions.

Forestry station - In forest conception, it represents a terrestrial ecosystem, component or subsystem of inorganic nature, place of living of the biocenosis or physical environment of the ecosystem (similarly to the forest biotope)

Forestry unit - Forest sub-parcel

Fundamental natural forest type - Forest type installed naturally on a certain territory, for several generations, so as to present a close concordance between the vegetation and station

Habitat - 1) Vital space, place where an individual/a population lives and where it finds all the necessary for its feed, reproduction, development, prosperity, etc. 2) Environment defined by abiotic and biotic factors, where one species lives at any stage of its biological cycle.

Habitat (in the meaning of Natura 2000) **-** A systemic complex comprising the corresponding ecotypes and its biocenosis.

Habitat of community interest - Natural habitat listed in Annex I of the Habitats Directive

Habitats Directive - Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

Hygrophilous **-** Capacity of being adapted to a permanent aquatic habitat or at least to conditions of extended water-stagnation for most of the year

Invasive species - Indigenous or allochthonous species that has expanded the distribution area or was introduced accidentally or intentionally into an area and/or reproduced to such an extent and so aggressively that it dominates/ replaces some of the indigenous species, causing changes in the quantitative and/or qualitative structure of the natural biocenosis, specific to a particular type of biotope.

Litter - Organic layering, located mainly at the surface of forest soils, consisting of dead leaves, fruits, branches

Main blending species - Species that achieve the same heights, but is of relatively lesser importance than the main target species.

Basic species - Main species in a biocenosis, dominant species

Main species - Species that is of greatest economic importance and is particularly important in the life of stands concerned

Main target species - Species that is actually the main target of the wood management.

Mesophilous - Capacity of being adapted and preferring intermediate conditions of humidity and moderate temperature

Natura 2000 network - European ecological network, comprising all sites of Community importance, designated in the Habitats and Birds Directive

Natural habitat conservation status - The sum of the influences acting on a natural habitat and its typical species that may affect its long-term natural distribution, structure and functions as well as the long-term survival of its typical species within the territory referred to in Article 2.
"The conservative status" of a natural habitat will be taken as "favourable" when:
its natural range and areas it covers within that range are stable or increasing, and
the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
the conservation status of its typical species is favourable

Natural habitats - Terrestrial or aquatic areas distinguished by geographic, abiotic and biotic features, whether entirely natural or semi-natural

Natural protected areas - Terrestrial, aquatic and/or underground area, with a legally established perimeter and special protection and conservation regime, with species of wild plants and animals, elements and biogeographical, landscape, geological, paleontological, speleological formations or of other nature, of particular ecological, scientific or cultural value

Phenophase - Phase in the annual life cycle of the phytocenosis characterized by a certain phonological (physiological) state of most species, forming the community concerned

Phytosociological Nomenclature - Set of regulations on the name of phytosociological (cenotaxon) classification units

Phytosociology - Science dealing with the complex study of the structure and dynamics of phytocenosis, its relation with the abiotic and biotic environment, its spread, types and classification.

Pioneer (**vegetation**, **species**) - Capacity to occupy habitats that are at incipient stages of succession.

Pioneer species - Species that is less demanding in terms of climate and soil, which often and abundantly fructifies, having the ability to disseminate at great distances and to easily settle in bare soils.

Plant community (**Phytocenosis**) - Collection of plant populations within certain biocenosis.
The basic (elementary) unit of the chemotaxonomy (syntaxonomy), defined by a set of phytocenoses, with similar common floral, ecological, dynamic, chorologic, statistical and historical characteristics.

Plant sub-community - Inferior vegetation classification unit including phytocenoses that differs from the community by obvious ecologic and/or dynamic variations that are individualised by differential species.

Population - Set of individuals belonging to the same species, that occupy the same fraction of biotope and that can easily exchange genes during the reproduction period.

Population dynamics - The value showing the variation over time in the size of a population in terms of the increase or decrease of the stock under the influence of biotic and/or abiotic external factors.

Priority natural habitat types - Natural habitat types in danger of disappearance, which are present on the territory referred to in Article 2 and for the conservation of which the Community has particular responsibility in view of the proportion of their natural range which falls within the territory referred to in Article 2; these priority natural habitat types are indicated by an asterisk (*) in Annex I.

Priority species - Species referred to in (g) (i) for the conservation of which the Community has particular responsibility in view of the proportion of their natural range which falls within the territory referred to in Article 2; these priority species are indicated by an asterisk (*) in Annex II

Rare species - Species which population is reduced from distribution or/and numerical point of view and which, even if it is not currently endangered or vulnerable, but may be at risk.

Rupicolous - Capacity to be adapted and prefer rocky soils, i.e. with a lot of rocks at the surface.

Saprophagous - Organism feeding on decomposing organic matters

Saproxylic - Species that depend during a period of their vital cycle on decomposed (or decomposing) woody material or dry wood (vertical or laying on the ground) or on wood-based fungi, or on the presence of other saproxylic organisms.

Secondary (community, vegetation) - Capacity of being part of a dynamic series, but without being the head of the series (the most evolved community type)

Secondary plant species - Species that participate in restocking the stands and help both improving vegetation conditions and developing specimens belonging to the main species (similarly – helper species)

Site - Geographically defined area which extent is clearly delineated

Site of Community importance - A site which, in the biogeographical region or regions to which is belongs, contributes significantly to the maintenance or restoration at a favourable conservation status of a natural habitat type in Annex I or of a species in Annex II and may also contribute significantly to the coherence of Natura 2000 referred to in Article 3, and/or contributes significantly to the maintenance of biological diversity within the biogeographic region or regions concerned.
For animal species ranging over wide areas, sites of Community importance shall correspond to the places within the natural range of such species which present the physical or biological factors essential to their life and reproduction

Special Area of Conservation - A site of Community importance designated by the Member States through a statutory, administrative and/or contractual act where the necessary conservation measures are applied for the maintenance or restoration, at a favourable conservation status, of the natural habitats and/or the populations of the species for which the site is designated

Species - Basic taxonomic unit in the classification of living organisms with common ancestors, biologically (reproductively) isolated, with morphologic, genetic, ecological, ethological, etc. features, relatively stable, that can freely reproduce and give birth to fertile descendants.

Species of Community interest - Species which, within the designated territory are:
i) endangered, except those species whose natural range is marginal in that territory and which are not endangered or vulnerable in the western Palearctic region; or
ii) vulnerable, i.e. believed likely to move into the endangered category in the near future if the causal factors continue operating; or
iii) rare, i.e. with small populations that are not at present endangered or vulnerable, but are at risk. The species are located within restricted geographical areas or are thinly scattered over a more extensive range; or
iv) endemic and requiring particular attention by reason of the specific nature of their habitat and/or the potential impact of their exploitation on their habitat and/or the potential impact of their exploitation on their conservation status. These species are listed or may be listed in Annex II and/or Annex IV or V

Specimen - Any animal or plant, whether alive or dead, of the species listed in Annex IV and Annex V, any part or derivative thereof, as well as any other goods which appear, from an accompanying document, the packaging or a mark or label, or from any other circumstances, to be parts or derivatives of animals or plants of those species

Stand - Separate tree community, homogeneous in terms of stational, vegetation and structural conditions, sufficiently spread to be subject to management (minimum 0.25 ha)

Stand composition - Stand structure, represented in brief, as the proportion of tree species present.

Stand density - Relation between the area covered by horizontal projection of tree crowns and the area of the land in question (stand crown closure index)

Stand development stage (development phase) - Distinct phase of stand development, characterised by certain processes and specific features

Stand, **structure -** Stand characteristics in terms of diverse structural elements in both horizontal plane (for ex., specific composition, consistency, density, its shading degree, stand average diameter, basal area, horizontal crown projected area, etc.), and in the vertical plan (stand layering, stand profile, stand closure, average height, crown average length)

Strip - Area situated at the edge of a forest, which cenosis contains elements of transition to forest and neighbouring ecosystems

Synecology - Discipline of ecology that studies the relationship between species (populations) in a biocenosis and their interaction with the environment (abiotic and biotic factors)

Thermophile - Character of the organism to be adapted and prefer conditions of increased heating

Types of natural habitats of Community interest - Those which, within the territory referred to in Article 2: are in danger of disappearance in their natural range, have a small natural range following their regression or by reason of their intrinsically restricted area, present outstanding examples of typical characteristics of one or more of the five following biogeographical regions: Alpine, Atlantic, Continental, Macaronesian and Mediterranean. Such habitat types are listed or may be listed in Annex I.

Vulnerable species - Species in danger of extension (for ex., spontaneous state), as it meets any of the criteria A- E of the IUCN classification system for species

Wood - Dense group of trees living in close interdependency, with the rest of plants and animals and with environmental factors, forming thus a community of complex but unite life, capable to fulfil multiple ecological, social and economic functions

Wooded steppe - Vegetation area situated between steppe and wood, where rare trees grow alongside herbaceous vegetation

Xerophilous - Capacity of the organism to adapt to and prefer conditions of hydric deficit

HABITATS OF RARE PLANT AND ANIMAL SPECIES IN SOROCA DISTRICT, REPUBLIC OF MOLDOVA

31 Standing water bodies

3130 Floodplain meadows communities with creeping spike rush (*Eleocharis palustris L.*)

General overview. The habitats are found near marshy areas, in river valleys periodically flooded throughout the year, along the water basin banks, near the Dniester river and its tributaries [53]. The substratum consists of the alluvial deposits with sandy and clay soils. [6, 64].

The creeping spike rush (*Eleocharis palustris* L.) is the dominant species of the habitat. The sea club rush (*Bolboschoenus maritimus* (L.) Palla) is another species growing along with the creeping spike rush, as a codominant and pioneer species, on moist soils with alluvial deposits. In terms of the vegetation structure, the first layer is dominated by large size mesophilous species: common reed (*Phragmites australis* Cav.), flowering rush (*Butomus umbellatus* L.), reed canarygrass (*Phalaroides arundinacea* L.), greater pond sedge (*Carex riparia Curtis*), Rough meadowgrass (*Poa trivialis* L.), narrow-leaf water-dropwort (*Oenanthe silaifolia* Bieb.), purple loosestrife (*Lythrum salicaria* L.), floating Sweet-grass (*Glyceria fluitans* L.), plicate sweet-grass (*Glyceria plicata* Fries.).), field meadow foxtail (*Alopecurus pratensis* L.). The following species form the middle layer: European water-plantain (*Alisma plantago-aquatica* L.), marsh horsetail (*Equisetum palustre* L.), common marsh bedstraw (*Galium palustre* L.), hairy sedge (*Carex hirta* L.), shortawn foxtail (*Alopecurus aequalis* Sobol.), and celery-leaved buttercup (*Ranunculus sceleratus* L.). The inferior layer of the phytocenosis, found near the standing water bodies is represented by accompanying species, such as creeping cinquefoil (*Potentilla reptans* L.), creeping buttercup (*Ranunculus repens* L.), black medick (*Medicago lupulina* L.), white clover (*Trifolium repens* L.), strawberry clover (*Trifolium fragiferum* L.).

The floristic composition consists of floral species living alongside with edificatory species: greater pond sedge (*Carex riparia* Curtis), true fox-sedge (*Carex vulpina* L.), narrow-leaf water-dropwort (*Oenanthe silaifolia* Bieb.), lesser bulrush (*Typha angustifolia* L.), great water dock (*Rumex hydrolapathum* Huds.), brooklime (*Veronica beccabunga* L.), and water mint (*Mentha aquatica* L.). During the dry period, the floristic composition is dominated by the following species: European water-plantain (*Alisma*

plantago-aquatica L.), lanceleaf water plantain (*Alisma lanceolatum* With.), creeping bentgrass (*Agrostis stolonifera* L.), fowl bluegrass (*Poa palustris* L.), timothy-grass (*Phleum pratense* L.), common marsh bedstraw (*Galium palustre* L.), common skullcap (*Scutellaria galericulata* L.), European bugleweed (*Lycopus europaeus* L.), and purple loosestrife (*Lythrum salicaria* L.). The following species also are important components of the phytocenosis: brown galingale (*Cyperus fuscus*), toad rush (*Juncus bufonius* L.), needle spikerush (*Eleocharis acicularis* L.), roundfruit rush (*Juncus compressus* Jacq.), shrubby cinquefoil (*Juncus compressus* Jacq.) [23, 46, 53].

Plant communities: The creeping spikerush (*Eleocharis palustris* L.) is a typical species of this habitat and forms the main mesophilous phytocenosis along the banks of water basins, represented by *Eleocharitetum palustris* Schennicov 1919 and *Eleocharitetum palustris* Urbrizsy 1948 [12, 16, 23].

• Meadow communities with creeping spikerush (*Eleocharis palustris L.*)

Rare plant species: The bulrush (*Scirpus triqueter* L.) that according to the IUCN (2001) Red List Criteria and the Red Book of the Republic of Moldova (III ed.) is a vulnerable species (VU) [10, 27, 743, 52, 55, 76] was found on limited areas in shallow areas, where humidity is maintained for a long time.

Fauna. The banks of water basins are populated by several hygrophilous and semiaquatic mammals: muskrat (*Ondatra zibethicus* L.), water vole (*Arvicola terrestris* L.), Eurasian shrew (*Sorex araneus* L.), Eurasian pygmy shrew (*Sorex minutus* L.) [48]. The freshwater basins are overflown by several common bat species: noctule (*Nyctalus noctula Schreber*), pipistrelle (*Pipistrellus pipistrellus Schreber*), soprano pipistrelle (*Pipistrellus pygmaeus Leach*) [38]. More than 100 semiaquatic and pond bird species nestle in this territory and about 60 species are known as migratory species [5]. The following species are typical for this habitat: great crested grebe (*Podiceps cristatus* L.), great cormorant (*Phalacrocorax carbo* L.), common little bittern (*Ixobrychus minutus* L.), black-crowned night heron (*Nycticorax nycticorax* L.), little egret (*Egretta garzetta* L.), common mallard (*Anas platyrhynchos* L.), garganey (*Anas querquedula* L.), Eurasian marsh harrier (*Circus aeruginosus* L.), Eurasian goshawk (*Accipiter gentilis*

L.), Eurasian sparrowhawk (*Accipiter nisus* L.), common kestrel (*Falco tinnunculus* L.), European water rail (*Rallus aquaticus* L.), corn crake (*Crex crex* L.), Eurasian coot (*Fulica atra* L.), Northern lapwing (*Vanellus vanellus* L.) [37]. The following two species of snakes of common reptile species have been reported: grass snake (*Natrix natrix* L.), dice snake (*Natrix tessellata* Laur.) [80]. The entomofauna is mainly represented by aquatic and hygrophilous species, such as: yellow may dun (*Heptagenia sulphurea* Muller), common mayfly (*Efemera vulgata* L.), great diving beetle (*Dytiscus marginalis* L.), whirligig beetle (*Gyrinus marinus* Gyll.) [42] etc.

Rare animal species. The floodplain meadows are the main biotope for many rare animal species, included in the Red Book of the Republic of Moldova (III ed.), such as rare species of mammals: Mediterranean water shrew (*Neomys anomalus* Cabrera) (EN), Daubenton's bat (*Myotis daubentonii* Kuhl) (VU), pond bat (*Myotis dasycneme* Boie) (EN), gray big-eared bat (*Plecotus austriacus* Fischer) (VU), Nathusius' pipistrelle (*Pipistrellus nathusii* Keyserling et Blasius) (EN), ermine (*Mustela erminea* L.) (VU), common otter (*Lutra lutra* L.) (VU), european forest wildcat (*Felis silvestris* Schreber) (VU); rare species of birds: common squacco heron (*Ardeola ralloides* Scop.) (EN), purple heron (*Ardea purpurea* L.) (VU), eurasian bittern (*Botaurus stellaris* L.) (VU), mute swan (*Cygnus olor* Gmel.) (VU), black-winged stilt (*Himantopus himantopus* L.) (VU), hen harrier (*Circus cyaneus* L.) (CR), lesser spotted eagle (*Aquila pomarina* Brehm.) (CR), red-footed falcon (*Falco vespertinus* L.) (VU), some crake species (*Porzana parva* Scop., *P. porzana* L., *P. pusilla* Pall.) (VU); reptile endangered species: European pond turtle (*Emys orbicularis* L.) (EN), amphibians – tree frog (*Hyla arborea* L.) (VU) and common spadefoot toad (*Pelobates fuscus* Laur.) (CR). [9, 10].

• The wildcat (*Felis silvestris* L.)

• Purple Heron (*Ardea purpurea* L.)

32 **Running water bodies**

3280 Mediterranean perennial rivers with riverine *Salix* and *Populus alba* forested curtains

Dniester is a heavily meandered river, which meanders reach 12-15 km in length, and the radius of curvatures is of 2-10 km. There are few ramifications, the river flowing in a single stream. It has a stony riverbed, with few boulders here and there and even rock fragments, with partly clay riverbanks and riverbed vegetation. The

• Dniester riverbed downstream of Soroca town

riverbanks are mostly steep and high. [11].

Small, low, flooded, grassy and shrub-covered islands are rarely encountered. The dejection cones from lateral valleys and ravines, made of rocks of different size (from gravel to large boulders), over time covered with mud and sand, that form stony banks, play an important role in the formation of the riverbed.

Sand and gravel ridges and beaches with a length of up to 100 m and width of 10-20 m are frequently encountered. Thresholds with a length of up to 400 m were formed owing to the crystalline rocks emerging in the Dniester riverbed, near Soroca town and Poroghi village.

At present, these thresholds are destroyed by explosions, with only few remaining habitat fragments common to species of reophilic, benthic, lithophilous and psammophile fishes. [11].

This segment of the Dniester river is characterised by sudden daily water-level fluctuation (up to 1.5 m, for 10-20 minutes) and unbalanced thermal regime. In spring and autumn, the water temperature varies between 5-16 °C, and 16-26 °C during summer. The transparency of water is of 50-100 cs in spring and autumn and 15 - 50 cm during summer.

The waterflow speed varies between 0.3 m/s and 2.0 m/s. The flash-flood regime is a characteristic feature that causes large amplitude of water flow oscillations over the annual cycle. Flash-floods can be recorded in any season of the year, but their number may vary depending on the amount of precipitations. Thus, the water flow increases considerably during the snow break and summer torrential rains. The character of water flow in the Dniester river also depends on Ukrainian Novodnestrovsk catchment management [65-67].

The water salt content of 300-410 mg/l is below 400 mg/l in over 95% of cases. The content of dissolved oxygen is of 8-12 mg/l, pH 7-8. The average content of suspended

• Steep slopes of the Dniester river, near Soroca town, covered with trees and shrubs.

particles is of 40-100 mg/l, sulphates - 58, chlorides, calcium - 25-64mg/l. Phenols and phosphorus content is of 0.002-0.006 mg/l and 0.05-0.10 mg/l respectively, petroleum products - 0.02-0.04 mg/l, copper - 2-8 mcg/l, zinc - 10-13 mcg/l. The content of mineral nitrogen (about 1.4 mg/l) and organic nitrogen (about 1.6 mg/l) is within acceptable limits. [67-69, 77, 86].

The vegetation of the Dniester plateau consists of deciduous forests and steppe communities. Extensive shrub thickets grow on steep and often rocky slopes of the Dniester River.

Reduced abundance of planktonic organisms in this sector of the Dniester river is represented by different species of waterweeds, superior aquatic plants that serve as substrate for diverse epiphytic organisms.

Aquatic vegetation includes about 60 species of superior plants from 23 families and 27 genera and about 60 species of algae. There is an abundance of macrophytes of *Potamogeton* and *Cladophora enteromorpha* species, muddy thicket of hollow green weed (*Entheromorpha etc.*), superior vegetation sector consists of shining pondweed (*Potamogeton lucens* L.), curly-leaf pondweed (*Potamogeton crispus* L.), coontail (*Cerathopyllum demersum* L.) and arrowhead (*Sagittaria sagittifolia* L.) [34]. The rippled area of the river is densely populated by submerged macrophytes, a habitat for different invertebrate species. Their loss due to daily changes in water level of the river negatively influences the physical and chemical parameters of the water and of the underwater deposits, leading to an obvious secondary pollution of the river.

Fauna. The benthos consists mostly of oligochaetes, molluscs, crustaceans, amphipods, mysids and insect larvae. Typical representatives of molluscs are: Lister's River Snail (*Viviparus contectus* Millet) and river snail (*Viviparus viviparus* Linnaeus) [79]. This habitat provides food to 13 species of aquatic birds, 3 bird species living near water during nesting, 43 species of birds that stop along the river banks during migration and 19 species that winter here [5]. There are also several species of semiaquatic and hygrophilous mammals: common otter (*Lutra lutra* L.), water vole (*Arvicola terresiris* L), muskrat (*Ondatra zibethicus* L), Mediterranean water shrew (*Neomys anomalus* Cabrera), Daubenton's bat (*Myotis daubentonii* Kuhl), pond bat (*Myotis dasycneme* Boie), and more [40].

• Dniester riverbed downstream of Soroca town

The reptiles are represented by grass snake (*Natrix natrix* L.), dice snake (*N. tessellata* Laur.), slow worm (*Anguis fragilis*, L.), and the amphibians are represented by marsh frog (R*ana ridibunda* Pallas), pool frog (*Rana lessonae* Camerano) etc. [38] The dice snake (*N. tessellata* Laur) and the amphibians are attached to the shoreline.

The intervening species, such as gobies, dominate the fish fauna of this sector, which consists of 22 fish species. In some places with sandy-stony substrate and transparent water, the density of monkey goby (*Neogobius fluviatilis* Pallas) in the shoreline reaches up to 3-4 ind./m^2. The abundant presence of three-spined stickleback (*Gasterosteus aculeatus* L), southern ninespine stickleback (*Pungitius platygaster Kessler*) and black-striped pipefish (*Syngnathus abaster* Risso) in this sector is an alarming indicator for the structural and functional status of the local ichthyocenosis. There is a sizeable increase in share of some eurytopic limnorheophilic fish species such as bleak (*Alburnus alburnus* L.), European bitterling (*Rhodeus amarus* Bloch), common roach (*Rutilus rutilus* L.), northern pike (*Esox lucius* L.), Prussian carp (*Carassius gibelio* Bloch), stone moroko (*Pseudorasbora parva* Temminck & Schlegel), spined loach (*Cobitis taenia s.* Lato), European perch (*Perca fluviatilis* L.) and others that is a strong indicator of degradation of the lotic hydrobiotope through active silting and pollution processes (in this sector, wastewaters from Soroca town and wastes from the canning

factory are discharged directly in the Dniester river). However, indigenous rheophilic species prevail in the ichthyocenosis structure, namely: chub (*Squalius cephalus* L.), common barbel (*Barbus barbus* L.), common dace (*Leuciscus leuciscus* L.) and common nase (*Chondrostoma nasus* L.) [36].

Thus, the great diversity and significant abundance of ichthyofauna of this habitat has a more artificial character, largely determined by the cohabitation of indigenous fish species at the limit of tolerance in conditions of biological progress of intervenient and allogenic eurytopic taxons, which have significantly benefited from active destructive processes of pollution, slitting and eutrophication.

Rare animal species. The Dniester river also serves as biotope for rare animal species included in the Red Book of the Republic of Moldova. The rare mammal species are: Daubenton's bat (*Myotis daubentonii* Kuhl) (VU), pond bat (*Myotis dasycneme* Boie) (EN), Kuhl's pipistrelle (*Pipistrellus kuhlii* Kuhl) (VU), Mediterranean water shrew (*Neomys anomalus* Cabr.) (EN), common otter (*Lutra lutra* L.) (VU), ermine (*Mustela erminea L.*) (VU); bird species: mute swan (*Cygnus olor* Gmel.) (VU), whooper swan (*Cygnus cugnus* L.) (VU); reptile species: European pond turtle (*Emys orbicularis* L.) (EN); amphibians: tree frog (*Hyla arborea* L.) (VU), common toad (*Bufo bufo* L.) (VU), smooth newt (*Triturus vulgaris* L.) (VU) and great crested newt (*Triturus cristatus L.*) (VU). [10]; fish species: sterlet (*Acipenser ruthenus* L.) (VU), bleak (*Alburnoides bipunctatus* Bloch) (VU), Black Sea roach (*Rutilus frisii Nordm.*) (VU), Romanian barbel (*Barbus petenyi* Heckel) (VU), tench (*Tinca tinca* L.) (VU), burbot (*Lota lota* L.) (VU), common zingel (*Zingel zingel* L.) (VU), Danube streber (*Zingel streber* Siebold) (VU), Alpine bullhead (*Cottus poecilopus* Heckel) (VU).

- Sterlet (*Acipenser ruthenus* L.)

- Common zingel (*Zingel zingel* L.)

64 Semi-natural tall-herb humid meadows

6430 Floodplain meadows communities with meadowsweet (*Filipendula ulmaria* L.) and marsh cranesbill (*Geranium palustre* L.)

General overview. These are phytocenoses with palustrial vegetation, specific to wet, marshy areas of floodplain meadows of small and large rivers, such as the valleys of the Prut and Dniester rivers [53]. The substrate is specific to floodplain meadows with sandy-clay and sometimes limestone alluvial deposits, with wet and gley soils [6, 64]. They can be found on marshy areas, on surfaces ranging from 0,10 ha to up to 5 ha.

The meadowsweet (*Filipendula ulmaria* L.) is the edificatory and dominant species that, usually creates the first layer of vegetation in mixtures with marsh cranesbill (*Geranium palustre* L.) that is a codominant species. This type of habitat can be found at the confluence of phytocenosis of lesser bulrush (*Typha angustifolia* L.) and common reed (*Phragmites australis* Cav.). The meadowsweet (*Filipendula ulmaria* L.) frequently participates in mixtures with graceful cattail (*Typha laxmannii* Lepech.), European water-plantain (*Alisma plantago-aquatica* L.), flowering rush (*Butomus umbellatus* L.), European bugleweed (*Lycopus europaeus* L.), creeping spikerush (*Eleocharis palustris* L.), common silverweed (*Potentilla anserina* L.), marsh pepper (*Polygonum hydropiper L.*). The following species predominate in the floristic composition: fennel pondweed (*Potamogeton pectinatus* L.), perfoliate pondweed (*Potamogeton perfoliatus* L.), common duckweed (*Lemna minor* L.).

The following species can be found near watersides: sea clubrush (*Bolboschoenus maritimus* L.) *Palla*), flowering rush (*Butomus umbellatus* L.), European bugleweed (*Lycopus europaeus* L.), purple loosestrife (*Lythrum salicaria* L.), common valerian (*Valeriana officinalis* L.), hoary willowherb (*Epilobium parviflorum* Schreb.). The inferior layer is dominated by marsh cranesbill (*Geranium palustre* L.), the species grouping varies depending on soil humidity. Palustrial species grouping can be found on swamp soils: horse mint (*Mentha longifolia* L.), wood club-rush (*Scirpus sylvaticus* L.), marsh horsetail (*Equisetum palustre* L.), yellow marsh-marigold (*Caltha palustris* L.).

Besides the edificatory species, the following species common to the phytocenosis form the floristic composition: tufted hair-grass (*Deschampsia cespitosa* L.), touch-me-not (*Impatiens noli-tangere* L.), creeping bentgrass (*Agrostis stolonifera* L.), marsh horsetail (*Equisetum palustre* L.), yellow loosestrife (*Lysimachia vulgaris* L.).

Adverse changes in floodplain meadows communities can be observed as a result of draining, straightening and deepening of the riverbed and of other anthropogenic processes. All these activities have led to the ruderalization of river valleys and loss of characteristic species, that have been replaced by the following species: stinging nettle (*Urtica dioica* L.), shepherd's purse (*Capsella bursa-pastoris* L.), herb Sophia (*Descurainia sophia* L.), musk thistle (*Carduus thoermeri* Weinm.) [23, 46, 53].

• Meadow communities with meadowsweet (*Filipendula ulmaria* L.) and marsh cranesbill (*Geranium palustre* L.)

Plant communities. These are phytocenosis common to humid areas, which plant communities include the meadowsweet (*Filipendula ulmaria* L.) and Marsh Cranesbill (*Geranium palustre* L.) as main edificatory species. The habitat is represented by the following plant communities: *Filipendulo–Geranietum palustris* W. Koch 1926 and *Filipendulion ulmariae* Segal 1966 [12, 16, 23, 25].

Rare plant species. The yellow marsh-marigold (*Caltha palustris* L.), a rare species that according to the IUCN (2001) and the Red Book of the Republic of Moldova (III ed.) is an endangered species, was encountered in this habitat (EN) [10, 27, 43, 52, 55, 76].

Fauna. Floodplain meadows communities with meadowsweet (*Filipendula ulmaria*) and marsh cranesbill (*Geranium palustre*) are populated by hygrophilous and semiaquatic mammals: muskrat (*Ondatra zibethicus* L.), water vole (*Arvicola terrestris* L.), common shrew (*Sorex araneus* L.), Eurasian pygmy shrew (*Sorex minutus* L.), eurytopic species: noctule (*Nyctalus noctula* Schreber), pipistrelle (*Pipistrellus*

pipistrellus Schreber), soprano pipistrelle (*Pipistrellus pygmaeus* Leach) [38, 40]. The birds are represented by pond, limicolous, meadow and grassland species. Species common to this area are as follows: common little bittern (*Ixobrychus minutus* L.), black-crowned night herons (*Nycticorax nycticorax* L.), little egret (*Egretta garzetta* L.), common mallard (*Anas platyrhynchos* L.), garganey (*A. querquedula* L.), Eurasian marsh harrier (*Circus aeruginosus* L.), Eurasian goshawk (*Accipiter gentilis* L.), (*A. nisus* L.), common kestrel (*Falco tinnunculus* L.), European water rail (*Rallus aquaticus* L.), corn crake (*Crex crex* L.), Northern lapwing (*Vanellus vanellus L*), some species of warblers (*Acrocephalus arundinaceus* L., *A. scirpaceus* Herm., *A. palustris* Bechstein) [5, 37, 39, 71]. Herpetofauna representatives living in this area are: grass snake (*Natrix natrix* L.), dice snake (*N. tessellata* Laur.), green toad (*Bufo viridis* Laur.) etc. [38, 80]. The entomofauna is represented by hygrophilous species (Yellow May dun (*Heptagenia sulphurea* Mull.), mayfly (*Ephemera vulgata* L.), dragonflies, coleoptera (great diving beetle (*Dytiscus marginalis* L.), beetle (*Gyrinus marinus* Gull.) etc.

Rare animal species. Floodplain meadow is a main habitat for some species protected nationally and internationally. The following rare species are living here: mammals - Mediterranean water shrew (*Neomys anomalus* Cabrera) (EN), Daubenton's bat (*Myotis daubentonii* Kuhl) (VU), pond bat (*Myotis dasycneme* Boie) (EN), gray big-eared bat (*Plecotus austriacus* Fischer) (VU), Nathusius' pipistrelle (*Pipistrellus nathusii* Keyserling et Blasius) (EN), ermine (*Mustela erminea* L.) (VU), common otter (*Lutra lutra* L.) (VU), wildcat (*Felis silvestris* Schrb.) (VU); birds: common squacco heron (*Ardeola ralloides Scop.*) (EN), purple heron (*Ardea purpurea* L.) (VU), Eurasian bittern (*Botaurus stellaris* L.) (VU), black-winged stilt (*Himantopus himantopus* L.) (VU), hen harrier (*Circus cyaneus* L.) (CR), lesser spotted eagle (*Aquila pomarina* Brehm.) (CR), red-footed falcon (*Falco vespertinus* L.) (VU), black kite (*Milvus migrans* Boddaert) (VU), spotted crake (*Porzana porzana* L.) (VU), Baillon's crake (*P. pusilla* Pall.) (VU); reptiles: European pond turtle (*Emys orbicularis* L.) (EN), tree frog (*Hyla arborea* L.) (VU), common spadefoot toad (*Pelobates fuscus* Laur.) (CR); insects: willow-herb hawkmoth (*Proserpinus proserpina* Pall.) (CR), scarlet tiger moth (*Callimorpha dominula* L.) (CR), purple emperor (*Apatura iris* L.) (VU). [10].

• Common squacco heron
(*Ardeola ralloides* Scop.)

• Pond bat
(*Myotis dasycneme* Boie)

• European pond turtle
(*Emys orbicularis* L.)

• Common spadefoot toad
(*Pelobates fuscus* Laur.)

82 Rocky slopes with saxicolous plants

8210 Xerophilous Sarmatic communities on calcareous slopes with white maidenhair (*Asplenium ruta-muraria* L.) and (*Schivereckia podolica* Bess)

General overview. This habitat is found on calcareous slopes of the Dniester riverbed and its tributaries, on steep slopes, in cracks of slopes and stony steppes [53]. It consists of petrophilous phytocenosis with a limited biogeographic area due to local environmental conditions. The substrate is generally calcareous, with carbonate and stony soils [6, 64]. The vegetation structure is dominated by xerophilous and calcified steppe species growing on calcareous lands and cracks in slopes.

White maidenhair (*Asplenium ruta -muraria* L.) is the edificatory and dominant species, frequently associated in groups with suter (*Sedum maximum* L.), pale madwort (*Alyssum calycinum* L.), maidenhair spleenwort (*Asplenium trichomanes* L.), wood bluegrass (*Poa nemoralis* L.), brittle bladder-fern (*Cystopteris fragilis* L.), common polypody (*Polypodium vulgare* L.), sand rock-cress (*Cardaminopsis arenosa* L.).

This type of habitat is also preferred by many species common to xerophilous steppes. Thus, beside petrophilous plants, the following species have been reported: goldmoss stonecrop (*Sedum acre* L.), *Potentila arenaria* Borkh., brittle bladder-fern (*Cystopteris fragilis* L.), Moldovan thymus (*Thymus moldavicus* Klok. Et Schost.). The following species grow on soil-covered slopes with less stones: *Artemisia austriaca* Jacq., Volga fescue (*Festuca valesiaca* Gaudin.),

• Communities of White Maidenhair (*Asplenium ruta -muraria* L.) and *Schivereckia podolica* Bess. on calcareous slopes

plains blue-stem (*Bothriochloa ischaemum* L.), spurge (*Euphorbia seguieriana* Neek.), basil thyme (*Acinos arvensis* (Lam.) Dandy), sandworts (*Arenaria serpillifolia* L.), mouse-ear hawkweed (*Hieracium pilosella* L.). On steep slopes, the floristic composition gradually tails away to solitary species. The soft slopes and southern slopes, with poorly developed soils are populated by the following species: *Thymus marschallianus* Willd., mountain ironwort (*Sideritis montana* L.), dwarf everlast (*Helichrysum arenarium Moench.*), basil thyme (*Acinos arvensis* (*Lam.*) *Dandy*), *Centaurea arenaria* Bieb., wall germander (*Teucrium chamaedrys* L.), spurge (*Euphorbia seguieriana Neek.*), tall hawkweed (*Hieracium piloselloides Vill.*), sickle-leaved hare's-ear (*Bupleurum falcatum* L.), stinking hawksbeard (*Crepis rhoeadifolia Bieb.*) [23, 41, 46, 51, 53, 75].

Plant communities. The habitat with white maidenhair (*Asplenium ruta-muraria* L.) and *Schivereckia podolica* Bess., more developed on calcareous steppificated slopes is characterized by the community of *Asplenio – Schivereckietum* Mititelu et al. 1971, specific to petrophilous areas [12, 23, 25].

Rare plant species. The following rare species, as classified by the IUCN (2001) rarity criteria and the Red Book of the Republic of Moldova (III ed.), characteristic of phytocenosis on petrophilous steppe within the habitat of white maidenhair (*Asplenium ruta-muraria* L.) and *Schivereckia podolica* Bess. have been identified: *Allium inaequale* Janka (VU), gmelina alise (*Alyssum gmelinii* Jord.) (VU), hoary rockrose (*Helianthemum canum* (L.) Hornem.) (VU), *Genista tetragona* Bess. (VU), *Jurinea stoechadifolia* (Bieb.) DC. (VU), *Poa versicolor* Bess. (VU), *Rosa frutetorum* Bess. (EN), *Rosa pygmaea* Bieb. (EN), Blue-green Moor Grass (*Sesleria heufleriana* Schur) (VU), (*Schivereckia podolica* (Bess.) Andrz. ex DC.) (VU) [9, 10, 26, 27, 43, 52, 55, 76].

• Communities of white maidenhair (*Asplenium ruta-muraria L.*) and *Schivereckia podolica* Bess. on calacarous slopes

• *Allium inaequale* Janka

• Gmelina alise (*Alyssum gmelinii* Jord.)

• Hoary rockrose (*Helianthemum canum* (L.) Hornem.)

• *Genista tetragona* Bess.

• *Jurinea stoechadifolia* (Bieb.) DC.

• *Poa versicolor* Bess.

• Blue-green Moor Grass (*Sesleria heufleriana* Schur)

• *Schivereckia podolica* (Bess.) Andrz. ex DC.

• *Rosa frutetorum* Bess.

• *Rosa pygmaea* Bieb.

The **fauna** includes species characteristic to rock habitats and open biotopes. Cave bat species are common: common pipistrelle (*Pipistrellus pipistrellus* Schr.), serotine bat (*Eptesicus serotinus* Schr.), as well as common vole (*Microtus arvalis* Pall.), wood mouse (*Apodemus sylvaticus* L.), pygmy wood mouse (*A. uralensis* Pall.), beech marten (*Martes foina* Erxl.) [38, 40]. Bird species common to this biotope are as follows: common buzzard (*Buteo buteo* L.), Eurasian hobby (*Falco subbuteo* L.), grey partridge (*Perdix perdix* L.), common hoopoe (*Upupa epops* L.), Eurasian skylark (*Alauda arvensis* L.), tawny pipit (*Anthus campestris* L.), and water dropwort (*Oenanthe oenanthe* L.) [37, 39]. Herpetofauna is represented by sand lizard (*Lacerta agilis* L.).

• White-toothed shrew (*Crocidura leucodon* Herm.)

• Swallowtail (*Papilio machaon* L.)

Rare animal species. Calcareous slopes serve as habitat for many rare and endangered species, included in the Red Book of the Republic of Moldova (III ed.). The species living there are as follows: vertebrates - bicolored white-toothed shrew (*Crocidura leucodon* Herm.) (VU), lesser horseshoe bat (*Rhinolophus hipposideros* Bech.) (EN), lesser mouse-eared bat (*Myotis blythii* Tomes) (VU), Nathusius' pipistrelle (*Pipistrellus nathusii* Keyserling et Blasius) (EN), Ermine (*Mustela erminea* L.) (VU), black kite (*Milvus migrans* Boddaert) (VU), common rock thrush (*Monticola saxatilis* L.) (CR), aesculapean snake (*Zamenis longissimus* Laur.) (VU) [10]. Endangered entomofauna is represented by 3 lepidopterous species: Nogel's hairstreak (*Tomares nogelii* Her.) (CR), swallowtail (*Papilio machaon* L.) (VU) and lesser clouded yellow (*Colias chrysotheme* Esper) (VU).

91 Temperate deciduous forests

91I0 * Pedunculate oak forests (*Quercus robur* L.) with cherry (*Cerasus avium* L.) and Tatarian maple (*Acer tataricum* L.)

General overview. The phytocenoses are specific to forests from the northern, central or some southern parts of Moldova, known also as oak groves with cherry. The pedunculate oak (*Quercus robur* L.) is the main edificatory species, along with other blending species, and in many types of forests is monodominant. It grows on highlands, on plateaus along the Dniester and Prut river valleys in northern districts, but also can be found on steep and rocky slopes. [53]. The substrate consists of rocks formed from deposits of clay and argil, loess, with grey-forest chernozem, and occasionally of deep, heavy and even calcified soils. [6, 64].

Vegetation. The pedunculate oak (*Quercus robur* L.) participates in the formation of the superior layering together with forest-forming species, such as: sessile oak (*Quercus petraea*), European ash (*Fraxinus excelsior* L.), Norway maple (*Acer platanoides* L.), cherry (*Cerasus avium* L.) and Tatarian maple (*Acer tataricum* L.). In many sectors of the forest, the pedunculate oak (*Quercus robur* L.), has a stable and monodominant frequency, forming forest massif with the cherry (*Cerasus avium* L.) and the Tatarian maple (*Acer tataricum* L.) in the stand stratum. The middle layering includes species differentiated as structure and composition, many arboreal species being

• Pedunculate oak forests (*Quercus robur L.*) with cherry (*Cerasus avium L.*) and Tatarian maple (*Acer tataricum L.*)

dominant: European crab apple (*Malus sylvestris* Mill.), European wild pear (*Pyrus piraster* L.), field maple (*Acer campestre* L.), European aspen (*Populus tremula* L.), and European hornbeam (*Carpinus betulus* L.).

The under-arboreal layer consists of the following species: blackthorn (*Prunus spinosa* L.), single-seeded hawthorn (*Crataegus monogyna* Jacq.), European spindletree (*Euonymus europaea* L.), *Rhamnus tinctoria* Waldst. et Kit., wayfaring-tree (*Viburnum lantana* L.), *Swida sanguinea* L., black elderberry (*Sambucus nigra* L.), dog rose (*Rosa canina* L.), glossy buckthorn (*Frangula alnus* Mill.).

Specimens of secular oak trees, especially pedunculate oaks trees (*Quercus robur L.*) grow in this type of forest. The herbaceous layer, in grassy glades and edges of wood constitutes 90-100%, and under the canopy cover it varies between 10 and 30%. The synusia of the following perennial group of plants, such as black false hellebore (*Veratrum nigrum* L.), orchardgrass (*Dactylis glomerata* L.), lungwort (*Pulmonaria mollis* Wulf. Ex Hornem), wood avens (*Geum urbanum* L.), wild strawberry (*Fragaria vesca* L.), early dog-violet (*Viola reichenbachiana* Jord.ex Boreau), cow parsley (*Anthriscus sylvestris* L.) predominate during the vegetation period. The characteristic species are accompanied by field bindweed (*Convolvulus arvensis* L.), slender false brome (*Brachypodium sylvaticum* Huds.), European stoneseed (*Lithospermum officinale* L.), (*Hypericum elegans* Steph.), lily of the valley (*Convallaria majalis* L.), wood avens (*Geum urbanum* L.), gill-over-the-ground (*Glechoma hirsuta* Waldst. Et Kit.), *Festuca rupicola* Heuff., tuberous Jerusalem sage (*Phlomis tuberosa* L.), white swallow-wort (*Vincetoxicum hirundinaria* Medik.), sweet violet (*Viola hirta* L.), motherwort (*Leonurus cardiaca* L.) [23, 46, 53].

Plant communities. The main phytocenosis specific to the pedunculate oak woods (*Quercus robur* L.) with cherry (*Cerasus avium* L.) and Tatarian maple (Acer tataricum L.) is: *Querceto-Lithospermetum cotinosum* (Borza, 1936); *Aceri tatarico-Quercetum petraeae-roboris* (Soó1951) em. Zolyomi 1957 [12, 23, 25].

Rare plant species. Species ranging over limited areas, thus becoming rare, play a key role in the composition of pedunculate oak woods (*Quercus robur* L.) with cherry (*Cerasus avium* L.) and Tatarian maple (Acer tataricum L.). Species included in the third edition of the Red Book of the Republic of Moldova and conforming to the IUCN (2001) rarity criteria grow sporadically in these phytocenosis: common lady-fern (*Athyrium filix-femina* (L.) Roth.) (VU), white helleborine (*Cephalanthera*

damasonium (Mill.) Druce) (VU), burning bush (*Dictamnus gymnostylis* Stev.) (EN), broad-leaved sermountain broad-leaved sermountain (*Laserpitium latifolium* L.) CR), common woodrush (*Luzula multiflora* (Ehrh.) Lej.) (VU), hard shield-fern (*Polystichum aculeatum* (L.) Roth.) (EN) [10, 27, 43, 52, 55, 76, 84].

• Lady fern (*Athyrium filix-femina* (L.)

• Hard shield-fern (*Polystichum aculeatum* (L.) Roth.)

• Burning bush (*Dictamnus gymnostylis* Stev.)

• Broad-leaved sermountain (*Laserpitium latifolium* L.)

• Common woodrush (*Luzula multiflora* (Ehrh.) Lej.)

• White helleborine (*Cephalanthera damasonium* (Mill.) Druce)

Fauna. Animals species characteristic for forest ecosystems have been identified in pedunculate oak forest (*Quercus robur*) with cherry (*Cerasus avium*) and Tatarian maple (*Acer tataricum*), namely: white-brasted hedgehog (*Erinaceus concolor* Martin), European mole (*Talpa europaea* L.), about 15 species of rodents, red fox (*Vulpes*

vulpes L.), wild boar (*Sus scrofa* L.), roe deer (*Capreolus capreolus* L.), common cuckoo (*Cuculus canorus* L.), Eurasian blackbird (*Turdus merula* L.), Eurasian magpie (*Pica pica* L.), common species of woodpeckers, European green lizard (*Lacerta viridis* Laur.), grass snake (*Natrix natrix* L.) [5, 37-40, 70, 80], a large variety of insects [20].

Rare animal species. This type of forest is considered as one of the main habitats for rare and threatened animal species on the territory of the Republic of Moldova. The following endangered species of mammals have been identified: lesser horseshoe bat (*Rhinolophus hipposideros* Bech.) (EN), wild cat (*Felis silvestris* Schr.) (VU), European pine marten (*Martes martes* L.) (VU); birds: middle spotted woodpecker (*Dendrocopos medius* L.) (VU), European pied flycatcher (*Ficedula hypoleuca* Pall.) (VU); reptiles: smooth snake (*Coronella austriaca Laurenti*) (EN), European adder (*Vipera berus* L.) (EN); amphibians: great crested newt (*Triturus cristatus* Laurenti) (VU), smooth newt (*Triturus vulgaris* L.) (VU), fire-bellied toad (*Bombina bombina* L.) (VU), common toad (*Bufo bufo* Laurenti) (VU), common frog (*Rana temporaria* L.) (VU), agile frog (*Rana dalmatina* Bon.) (VU) [10]; insects: blue ground beetle (*Carabus intricatus* L.) (VU), ground beetle (*Carabus ullrichi* Germ.) (VU), rhinoceros beetle (*Oryctes nasicornis* L.) (VU), stag beetle (*Lucanus cervus* L.) (VU), *Morimus asper funereus* Muls. (EN), *Protaetia aeruginosa* L. (VU), giant peacock moth (*Saturnia pyri* Den. et Sch.) (VU), oak hawk-moth (*Marumba quercus* Den. et Sch.) (VU), small emperor moth (*Saturnia* (*Eudia*) *pavonia* L.) (CR), death's-head hawkmoth (*Acherontia atropos* L.) (VU), Fenton's wood white (*Leptidea morsei* Fenton) (VU), *Coenonympha hero* L (CR), mammoth wasp (*Megascolia maculata* Drury) (VU).

• European pine marten (*Martes martes* L.)

• European adder (*Vipera berus* L.)

91 Temperate deciduous forests

91Y0 Mesic slope forest with pedunculate oak (*Quercus robur* L.), durmast oak (*Quercus petraea* L. ex Liebl.) and European hornbeam (*Carpinus betulus* L.)

General overview. The phytocenoses of pedunculate oak (*Quercus robur* L.) *with* durmast oak (*Quercus petraea* L. ex Liebl.) and European hornbeam (*Carpinus betulus* L.) are common to central and northern part of Moldova, Dniester Plateau and its tributaries, in shady valleys and wet depressions, within slope forests and calcareous massifs. The substrate under these forests consists of grey forest soils and wet, stony and carbonate soils type [6, 53, 64].

Plants. The pedunculate oak (*Quercus robur* L.) as edificatory and dominant species, is predominantly mixed with durmast oak (*Quercus petraea* L. ex Liebl.), European hornbeam (*Carpinus betulus* L.), European ash (*Fraxinus excelsior* L.) and *Ulmus carpinifolia* Rupp. ex Suckow [53].

• Pedunculate oak forests (Quercus robur L.) with durmast oak (*Quercus petraea* L. ex Liebl.) and European hornbeam (*Carpinus betulus L.*)

The habitat is characterised by abundance of many mesophilous species that, together with the pedunculate oak form well-rounded and shady massifs, with tree height between 20-30 m. In the superior layer, the edificatory species is accompanied by European ash (*Fraxinus excelsior* L.), *Acer pseudoplatanoides* L., Norway maple (*Acer platanoides* L.), little leaf linden (*Tilia cordata* Mill.), *Ulmus carpinifolia* Rupp. ex Suckow, cherry (*Cerasus avium* L.). The solitary specimens of European hornbeam (*Carpinus betulus* L.), field maple field maple (*Acer campestre* L.), wild service tree (*Sorbus torminalis* L.), European crab apple (*Malus sylvestris* Mill.), European wild pear (*Pyrus piraster* L.), and Tatarian maple (*Acer tataricum* L.) predominate in the middle layer. The shrub

layer, frequently found in grassy glades and open woods, consist of European cornel (*Cornus mas* L.), *Euonymus verrucosa* Scop., European spindletree (*Euonymus europaea* L.), *Swida sanguinea* L., wayfaring-tree (*Viburnum lantana* L.), *Crataegus curvisepala* Lindm., *Staphylea pinnata* L., common hazel (*Corylus avellana* L.).

During the vegetation, synusia of perennial and ephemerous plants is present in the herbaceous layer. The floristic composition of the herbaceous layer is particularly rich in grassy glades, edges of wood and under the canopy cover of trees and shrubs, its consistency ranging between 0.1-0.2. It consists of the following species: goldmoss stonecrop (*Sedum acre* L.), Hen and Chicks (*Sempervivum ruthenicum* Schnittsp. Et C.B.Lehm.), rue-leaved saxifrage (*Saxifraga tridactylites* L.), yellowtuft (*Alyssum murale* Waldst. et Kit), *Dentaria glandulosa* Waldst.et Kit., alpine squill (*Scilla bifolia* L.), *Carex brevicollis* DC., ground elder (*Aegopodium podagraria* L.), European ivy (*Hedera helix* L.), *Isopyrum thalictroides* L., European scopolia (*Scopolia carniolica* Jacq.), *Corydalis cava* L., narrow-leaved helleborine (*Cephalanthera longifolia* L.), lesser celandine (*Ficaria verna* Huds.), *Gagea pusilla* F.W.Schmidt., red velvet (*Euphorbia amygdaloides* L.), black pea (*Lathyrus niger* L.) [23, 46, 53].

Plant communities. The phytocenoses of pedunculate oak (*Quercus robur* L.), durmast oak (*Quercus petraea* L. ex Liebl.) and European hornbeam (*Carpinus betulus* L.) forests are representative and grow massively along the Dniester valley. Pedunculate oak (*Quercus robur* L.) and durmast oak (*Quercus petraea* L. ex Liebl.) edificators are represented by the following communities: *Querco-robori-Carpinetum* Soo et Pocs (1931) 1957 and *Carpino-Quercetum petraeae* Borza 1941 [12, 23, 25].

Rare plant species. On limited area, forests of pedunculate oak (*Quercus robur* L.) durmast oak (*Quercus petraea* L. ex Liebl.) and European hornbeam (*Carpinus betulus* L.) give shelter to a rich variety of rare species (20 species) under rarity criteria of IUCN (2001) and the Red Book of the Republic of Moldova (III edition): *Aconitum eulophum* Rchb. (VU), *Aconitum lasiostomum* Rchb. et Bess. (EN), *Carex rhizina* Blytt et Lindb. (CR), *Cotoneaster melanocarpus* Fisch. ex Blytt (EN), spinulose wood fern (*Dryopteris carthusiana* (Vill.) H.P. Fuchs) (EN), male fern (*Dryopteris filix-mas* (L.) Schott) (VU), *Euonymus nanus* Bieb. (VU), *Fritillaria montana* Hoppe (VU), common snowdrop (*Galanthus nivalis* L.) (VU), western oakfern western oakfern (*Gymnocarpium dryopteris* (L.) *Newm.*) (EN), limestone oak fern (*Gymnocarpium robertianum* (Hoffm.) Newm.) (EN), *Hepatica nobilis* Mill. (VU), pale St. John's-wort (*Hypericum montanum*

L.) (EN), black broom (*Lembotropis nigricans* (L.) Griseb.) (EN), May lily (*Maianthemum bifolium* (L.) F.W. Schmidt) (EN), *Melittis sarmatica* Klok. (CR), *Ornithogalum flavescens* Lam. (EN), American hart's-tongue fern (Phyllitis scolopendrium (L.) Newm.) (EN), common polypody (*Polypodium vulgare* L.) (VU), European scopolia (*Scopolia carniolica* Jacq.) (VU) [10, 27, 43, 52, 55, 76, 84].

• *Aconitum eulophum* Rchb.

• *Aconitum lasiostomum* Rchb. et Bess.

• *Carex rhizina* Blytt et Lindb.

• *Cotoneaster melanocarpus* Fisch. ex Blytt

• Spinulose wood fern (*Dryopteris carthusiana* (Vill.) H.P. Fuchs)

• Male fern (*Dryopterisfilix-mas* (L.) Schott)

• *Euonymus nanus* Bieb.

• *Fritillaria montana* Hoppe

• Black Broom (*Lembotropis nigricans* (L.) Griseb.)

• Western oakfern (*Gymnocarpium dryopteris* (L.) Newm.)

• Limestone oak fern (*Gymnocarpium robertianum* (Hoffm.) Newm.)

• *Hepatica nobilis* Mill.

• Pale St. John's-wort (*Hypericum montanum* L.)

• Common snowdrop (*Galanthus nivalis* L.)

• May lily (*Maianthemum bifolium* (L.) F.W. Schmidt)

• *Melittis sarmatica* Klok.

• *Ornithogalum flavescens* Lam.

• American hart's-tongue fern (*Phyllitis scolopendrium* (L.) Newm.)

• Common polypody (*Polypodium vulgare* L.)

• European scopolia (*Scopolia carniolica* Jacq.)

Fauna. Vertebrate fauna is quite rich, species common to slope habitats being registered in this biotope. The common species are as follows: white-breasted hedgehog (*Erinaceus concolor* Martin), European mole (*Talpa europaea* L.), common shrew (*Sorex araneus* L.), wood mouse (*Apodemus sylvaticus* L.), bank vole (*Myodes glareolus* Schr.), red fox (*Vulpes vulpes* L.), beech marten (*Martes foina Erxleben*), wild boar (*Sus scrofa* L.), roe deer (*Capreolus capreolus* L.), common cuckoo (*Cuculus canorus* L.), Eurasian blackbird (*Turdus merula* L.), song thrush (*Turdus philomelos Brehm*), blackcap (*Sylvia atricapilla* L.), slow worm (*Anguis fragilis* L.), European green lizard (*Lacerta viridis* Laur.), grass snake (*Natrix natrix L.*) etc. [5, 37-40, 48, 70, 71].

Rare animal species. Rare animal species are as follows: mammals: lesser horseshoe bat (*Rhinolophus hipposideros* Bechshtein) (EN), lesser mouse-eared bat (*Myotis blythii* Tomes) (VU), Nathusius' pipistrelle (*Pipistrellus nathusii* Keys. et Blas.) (EN), Daubenton's bat (*Myotis daubentonii* Kuhl) (VU), European pine marten (*Martes martes* L.) (VU); birds: stock dove (*Columba oenas* L.) (CR), middle spotted woodpecker (*Dendrocopos medius* L.) (VU), Montagu's harrier (*Circus pygargus* L.) (CR), booted eagle (*Hieraaetus pennatus* Gm.) (CR), black kite (*Milvus migrans* Bodd.) (VU); reptiles: Aesculapean snake (*Zamenis longissimus* Laur.) (EN), common European adder (*Vipera verus* L.) (EN); amphibians**:** smooth newt (*Triturus vulgaris* L.) (VU), great crested newt (*Triturus cristatus* Laurenti) (VU), common spadefoot toad (*Pelobates fuscus* Laur.) (CR), common toad (*Bufo bufo* Laur.) (VU), agile frog (*Rana dalmatina* Bon.) (VU) [10, 49, 70, 71]; of insects, several species of coleoptera have been reported: *Calosoma sycophanta* L. (VU), blue ground beetle (*Carabus intricatus* L.) (VU), ground beetle (*Carabus ullrichi* Germ.) (VU), rhinoceros beetle (*Oryctes nasicornis* L.) (VU), stag beetle (*Lucanus cervus* L.) (VU), great capricorn beetle (*Cerambyx cerdo* L.) (CR), *Morimus asper funereus* Muls. (EN), *Protaetia aeruginosa* L. (VU). At a certain stage of development, they feed on the semi-compound or decomposed wood material, being considered as saproxylic species [10, 29, 62]. Lepidopterous and hymenopterous species characteristic of this biotope, which total number is reduced have been reported: giant peacock moth (*Saturnia pyri* Den. et Sch.) (VU), oak hawk-moth (*Marumba quercus* Den. et Sch.) (VU), Mammoth wasp (*Megascolia maculata* Drury) (VU). The edges of wood or sunny grassy glades serve as habitat for several endangered species: Tau emperor (*Aglia tau* L.) (CR), small emperor moth (*Saturnia* (*Eudia*) *pavonia* L.) (CR), death's-head hawkmoth (*Acherontia atropos* L.) (VU), Fenton's wood white (*Leptidea morsei* Fenton) (*VU*), Jersey tiger (*Euplagia quadripunctaria* Poda) (VU).

• *Morimus asper funereus*

• Common toad (*Bufo bufo* Laur.)

92 Mediterranean deciduous forests

92A0 Floodplain forests of white willow (*Salix alba* L.) and European dewberry (*Rubus caesius* L.)

General overview. River valleys biotopes are wetlands, with ground waters close to the surface, and the phytocenosis shall cope with frequent floods and the substrate of alluvial, sandy and marshy deposits [6, 53, 64]. The groves occupy the upper sides of the meadow, accompanying the waterflows of the Dniester and Prut rivers and their tributaries. The substrate of white willow (*Salix alba* L.) - European dewberry (*Rubus caesius* L.) forests is very poorly developed, with little humus due to alluvial sandy-argil deposits and certain unstable zonal conditions. [53].

In white willow (*Salix alba* L.) - European dewberry (*Rubus caesius* L.) forests, the ground waters are close to the surface, at the 0.5-1.5 m depth, the consistency is 0.5 – 0.8 and often mixed with other species common to wetlands. In recent times, the Manitoba maple (*Acer negundo L.*) has emerged as an invasive species, drying up the white willow (*Salix alba* L.) and stocking with ruderal mesoxerophytic and xerophytic species. In more hidden and shady places the hops (*Humulus lupulus* L.) can be foud [23, 46, 53].

The white willow (*Salix alba* L.) is the dominant and edificatory species. It forms the superior layer of vegetation with codominant species: crack willow (*Salix fragilis* L.), black poplar (*Populus nigra* L.), white poplar (*Populus alba* L.), white mulberry (*Morus alba* L.), European white elm (*Ulmus laevis* Pall.).

• Forests of white willow (*Salix alba* L.) and European dewberry (*Rubus caesius* L.)

The shrub layer consists of species growing in small groups or solitary: European spindletree (*Euonymus europaea* L.), European privet (*Ligustrum vulgare* L.), black elderberry (*Sambucus nigra* L.), *Swida sanguinea* L., guelder rose

(*Viburnum opulus* L.); the following species grow more abundantly: single-seeded hawthorn (*Crataegus monogyna* Jacq.), dog rose (*Rosa canina* L.), almond willow (*Salix triandra* L.), basket willow (*Salix viminalis* L.), European dewberry (*Rubus caesius* L.).

Floristic composition is poor due to floods, and in moister sectors, the groves border on palustrial vegetation. The herbaceous layer is dominated by creeping bentgrass (*Agrostis stolonifera*), creeping buttercup (*Ranunculus repens* L.), stickywilly (*Galium apparine* L.), European birthwort (*Aristolochia clematitis* L.), creeping cinquefoil (*Potentilla reptans* L.), cow parsley (*Anthriscus sylvestris* L.), and stinging nettle (*Urtica dioica* L.).

Plant communities. In areas with high humidity, clearly dominated by forests with white willow (*Salix alba* L.) and European dewberry (*Rubus caesius* L.), the following communities are present: *Salicetum albae* Issler 1924 s.l. (Syn.: *Salicetum albae-fragilis* R.Tüxen 1937); *Salix alba-Rubus caesius* Doniță et Dihoru 1961 and *Rubo-Salicetum albae* Doniță et al. 1966 [12, 23, 25].

Rare plant species. The European alder (*Alnus glutinosa* (L.) Gaertn.), with endangered species status (EN) according to IUCN (2001) rarity criteria and the Red Book of the Republic of Moldova (III ed.) was identified within the habitat. It prefers wetlands and can grow up to 25m height [10, 27, 43, 52, 55, 76, 84]. It is an important species due to its roots, which penetrate deep into the soil protecting it against erosion and the symbiosis with nitrogen-fixing bacteria.

• European alder (*Alnus glutinosa* (L.) Gaertn.)

Fauna. The fauna of floodplain forests of white willow (*Salix alba* L.) and European dewberry (*Rubus caesius* L.) is represented by common mole (*Talpa europea* L.), common shrew (*Sorex araneus* L.), water vole (*Arvicola terrestris* L.), yellow-necked mouse (*Apodemus flavicollis* Melch.), red fox (*Vulpes vulpes* L.), wild boar (*Sus scrofa* L.), roe deer (*Capreolus capreolus* L.), grass snake (*Natrix natrix* L.), dyce snake (*Natrix tesselata* Laur.), European green lizard (*Lacerta viridis* Laur.), slow worm (*Anguis fragilis* L.), marsh frog (*Rana ridibunda* Pall) etc. [38, 80].

92 species of birds are nesting in this biotope, and 48 species are registered during migration [5] that are mostly pond and forest species: great cormorant

(*Phalacrocorax carbo* L.), little egret (*Egretta garzetta* L.), grey heron (*Ardea cinerea* L.), common mallard (*Anas platyrhynchos* L.), Eurasian goshawk (*Accipiter gentilis* L.), common buzzard (*Buteo buteo* L.), common kestrel (*Falco tinnunculus* L.), common wood pigeon (*Columba palumbus* L.), European turtle dove (*Streptopelia turtur* L.), scops owl (*Otus scops* L.), little owl (*Athene noctua Scop.*), long-eared owl (*Asio otus* L.), common kingfisher (*Alcedo atthis* L.), common hoopoe (*Upupa epops* L.), grey-headed woodpecker (*Picus canus Gm.*), woodlark (*Lullula arborea* L.), thrush nightingale (*Luscinia luscinia* L.), common redstart (*Phoenicurus phoenicurus* L.), Eurasian blackbird (*Turdus merula* L.) etc. [37, 39].

• White stork (*Ciconia ciconia* L.)

Rare animal species. The floodplain meadow forests of white willow serve as main habitat for species with different rarity status, according to the Red Book of the Republic of Moldova (III ed.). The mammal species are: Mediterranean water shrew (*Neomys anomalus* Cabr.) (EN), common otter (*Lutra lutra L.*) (VU), wildcat (*Felis silvestris* Schreber.) (VU); birds: white stork (*Ciconia ciconia* L.) (VU), booted eagle (*Hieraaetus pennatus* Gm.) (CR), black kite (*Milvus migrans* Bodd.) (VU), stock dove (*Columba oenas* L.) (CR); reptiles: European pond turtle (*Emys orbicularis* L.) (EN), Aesculapean snake (*Zamenis longissimus* Laur.) (EN), smooth snake (*Coronella austriaca* Laur.) (EN); amphibians: smooth newt (*Triturus vulgaris* L.) (VU), fire-bellied toad (*Bombina bombina* L.) (VU), common spadefoot toad (*Pelobates fuscus* Laur.) (CR); insects: stag beetle (*Lucanus cervus* L.) (VU), rhinoceros beetle (*Oryctes nasicornis* L.) (VU), ground beetle (*Carabus ullrichi* Germ.) (VU), Mammoth wasp (*Megascolia maculata* Drury) (VU), violet carpenter bee (*Xylocopa violacea* Gerst.) (EN), giant peacock moth (*Saturnia pyri* Den. et Sch.) (VU), swallowtail (*Papilio machaon* L.) (VU), Reverdin's blue (*Plebejus argyrognomon* Bergstr.) (VU). [10].

• Stag beetle (*Lucanus cervus* L.)

HABITATS OF RARE PLANT AND ANIMAL SPECIES IN STEFAN VODA DISTRICT, REPUBLIC OF MOLDOVA

31 Standing water bodies

3150 (Floodplain meadow communities with floating fern (*Salvinia natans* (L.) All.), European water clover (*Marsilea quadrifolia* L.) and water fern (*Azolla filiculoides* Lam.)

General overview. Aquatic phytocenoses are mainly found in the basins of Dniester and Prut valleys, in lakes and riverbeds and in marshy or regularly flooded areas during the rise in water level, in shallow lakes, of 20 – 50 cm depth [53]. The soils are of the alluvial and marshy deposits [6, 64]. In many cases, spring floods and water withdrawals from the Dniester flow form this type of habitat.

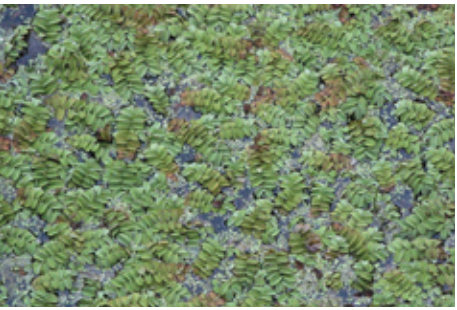
The vegetation grows abundantly in some secluded and spotted sectors, in open sites and old riverbeds. The habitat is quite varied in the vegetation structure, as some species develop in the underwater stratum, while others migrate to the surface of the water during flowering. The phytocenosis consists of 2 layers of vegetation that intertwine: above the water, also called natant and underwater or submerged. In Stefan-Voda district, the habitat is built by natant hygrophilous species: floating fern (*Salvinia natans* (L.) All.), swollen duckweed (*Lemna gibba* L.), spotless watermeal (*Wolffia arrhiza* L.) and water fern (*Azolla filiculoides* Lam.).

There are many solitary species or small groups in the surface layer, consisting of: common reed (*Phragmites australis* Cav.), common bladderwort (*Utricularia vulgaris* L.), common duckmeat (*Spirodela polyrhiza* L.), European frogbit (*Hydrocharis morsus-ranae* L.), common duckweed (Lemna minor L.), flowering rush (Butomus umbellatus L.), branched burreed (*Sparganium erectum* L.). Compact groups of floating fern (*Salvinia natans* (L.) All.) cover from 5% to 10% of water surface. In the submerged layer, the dominant species are accompanied by coontail *Ceratophyllum demersum* L.), Eurasian watermilfoil (*Myriophyllum spicatum* L.), fennel pondweed (*Potamogeton pectinatus* L.), curly-leaf pondweed (*Potamogeton crispus* L.). Other species are found sporadically: lesser bulrush (*Typha angustifolia* L.), arrowhead (*Sagittaria sagittifolia* L.), and European water plantain (*Alisma plantago-aquatica* L.).

The habitat is threatened with disappearance because of the invasion of common reed (*Phragmites australis* Cav.) and lesser bulrush (*Typha angustifolia* L.), the draining of lakes and frequent floods. [23, 46, 53]

Plant communities. The habitat gives shelter to different aquatic communities of natant and submerse species, in the form of small or solitary groups in shallow lakes. The most representative communities are: *Lemno minoris–Salvinietum natantis* Slavnic 1965, *Spirodelo-Salvinietum natantis* Slavnic 1956 em. Müller et Görs 1960 and *Marsileaetum quadrifoliae* (*natantis*) Burescu 2003 [12, 16, 23, 25].

Rare plant species. The habitat is home to aquatic species with protection status under IUCN (2001) rarity criteria and Red Book of the Republic of Moldova (III ed.): floating fern (*Salvinia natans* (L.) *All*L.) (EN). The presence of European water clover (*Marsilea quadrifolia* L.) (CR) was not reported in Stefan-Voda district [9, 10, 43, 52, 55, 76].



• Floating fern (*Salvinia natans* (L.)All.)

Fauna. The banks of aquatic basins are populated by hygrophilous and semiaquatic mammal species: muskrat (*Ondatra zibethicus* L.), water vole (*Arvicola terrestris* L.), common shrew (*Sorex araneus* L.), and Eurasian pygmy shrew (*Sorex minutus* L.). The following species of carnivores live bulrushes and floodplains: Raccoon dog (*Nyctereutes procyonoides* Gray), Asiatic jackal (*Canis aureus* L.).

Standing freshwater basins are overflown by several common species of bats: noctule (*Nyctalus noctula* Schreber), pipistrelle (*Pipistrellus pipistrellus Schreber*), and soprano pipistrelle (*Pipistrellus pygmaeus* Leach) [38, 40]. The birds are represented by semiaquatic and ponds species. 110 bird species are nesting on this territory, 13 species are summer guests, two species are winter guests, 58 species are known as migratory species [4, 5]. The following species of birds are common: great crested grebe (*Podiceps cristatus* L.), great cormorant (*Phalacrocorax carbo* L.), common little bittern (*Ixobrychus minutus* L.), little egret (*Egretta garzetta* L.), common mallard (*Anas platyrhynchos* L.), garganey (*A. querquedula* L.), Eurasian marsh harrier (*Circus aerugi-*

nosus L.), Eurasian goshawk (*Accipiter gentilis* L.), common kestrel (*Falco tinnunculus* L.), Eurasian coot (*Fulica atra* L.) [37]. Herpetofauna is represented by grass snake (*Natrix natrix* L.), dice snake (*N. tessellata* Laur.), green toad (*Bufo viridis* Laur.) etc. [38, 80], and the entomofauna is represented by hygrophilous and semiaquatic species [3, 42].

Rare animal species. Floodplain meadows also provide habitat for rare animal species, included in the Red Book of the Republic of Moldova (III ed.), namely mammals: Mediterranean water shrew (*Neomys anomalus* Cabrera) (EN), Daubenton's bat (*Myotis daubentonii* Kuhl) (VU), pond bat (*Myotis dasycneme* Boie) (EN), gray big-eared bat (*Plecotus austriacus* Fischer) (VU), Nathusius' pipistrelle (*Pipistrellus nathusii* Keyserling et Blasius) (EN), Ermine (*Mustela erminea* L.) (VU), common otter (*Lutra lutra* L.) (VU), European wildcat (*Felis silvestris* Schreber) (VU); birds: pygmy cormorant (*Phalacrocorax pygmeus* Pall.) (CR), purple heron (*Ardea purpurea* L.) (VU), common egret (*Casmerodius alba* L.) (EN), white stork (*Ciconia ciconia* L.) (VU), mute swan (*Cygnus olor* Gmel.) (VU), hen harrier (*Circus cyaneus* L.) (CR), red-footed falcon (*Falco vespertinus* L.) (VU), spotted crake (*Porzana porzana* L.); reptiles: European pond turtle (*Emys orbicularis* L.) (EN); amphibians: tree frog (*Hyla arborea* L.) (VU), common spadefoot toad (*Pelobates fuscus* Laur.) (CR); insects: Emperor Dragonfly (*Anax imperator* Leach) (VU), Goblet-marked damselfly (*Erythromma lindenii* Selys) (CR), yellow-spotted whiteface (*Leucorrhinia pectoralis* Charp.) (CR), *Carabus clathratus* L. (EN). [10, 72].

• Common egret (*Casmerodius alba* L.)

• Swans, cormorants

31 Standing water bodies

3160 Floodplain meadow communities with European white water lily (*Nymphaea alba* L.), water chestnut (*Trapa natans* L.), *Nuphar lutea* L. and broad-leaved pondweed (*Potamogeton natans* L.).

General overview. The phytocenoses are spread in lakes and water basins in the southern part of the country, as well as in areas with standing and smooth-flowing waters, near marshy areas, regularly flooded throughout the year, along the banks of aquatic basins, near the valleys of Dniester tributary, Prut River and its tributaries [53]. The soils are sandy and argillaceous with alluvial deposits [6, 63].

The habitat is preferred by communities of hygrophilous species. Besides edificatory species that form the natant stratum, it consists of: European white water lily (*Nymphaea alba* L.), water chestnut (*Trapa natans* L.), *Nuphar lutea* L. and broad-leaved pondweed (*Potamogeton natans* L.); the area is reach in species and types of vegetation that are safe in the Talmaza ponds and Lower Dniester valley in the Stefan Voda district. The specific hydrological regime of the meadow and the human factor lead to the loss of dominant species that are often replaced by species with reduced conservative value. Near lakes, during the summer season, the population of European white water lily (*Nymphaea alba* L.) and water chestnut (*Trapa natans* L.) can cover 70-80% of the lake surface in average. The population of European white water lily (*Nymphaea alba* L.) varies regularly following the development phenophases due to temperature, massive flooding and local climate. Often, it becomes unstable from the structure and density point of view due to floods, overflows and drainages.

Two layers predominate in the vegetation structure. The superior layering is poorly developed, consisting of the following species: branched burreed (*Sparganium erectum* L.), yellow floating-heart (*Nymphoides peltata* S.G.Gmel.), broad-leaved pondweed (*Potamogeton natans* L.) and (*Potamogeton nodosus* Poir.), common duckweed (*Lemna minor* L.), flowering rush (*Butomus umbellatus* L.), bulrush (*Scirpus lacustris* L.). Solitary specimens like: common reed (*Phragmites australis* Cav.), lesser bulrush (*Typha angustifolia* L.), marsh pepper (*Polygonum hydropiper* L.), European frogbit (*Hydrocharis morsus-ranae* L.), common bladderwort (*Utricularia vulgaris* L.) can be found.

The inferior layer is more spotted as structure and consists of the following species: coontail (*Ceratophyllum demersum* L.), common duckweed (*Lemna trisulca* L.), perfoliate pondweed (*Potamogeton perfoliatus* L.), Shining Pondweed (*Potamogeton lucens* L.), Eurasian watermilfoil (*Myriophyllum spicatum* L.).

There are threatening signs for this habitat, as the wet areas are subject to anthropic pressures and other damaging factors that diminish the populational effects and lead to their loss.

In the floristic composition, the following species frequently appear in the submerged stratum along with the edificatory species: whorl-leaf watermilfoil (*Myriophyllum verticillatum* L.), Canadian pondweed (*Elodea canadensis* Mich.), coontail (*Ceratophyllum demersum* L.), curly-leaf pondweed (*Potamogeton crispus* L.), fennel pondweed (*Potamogeton pectinatus* L.), yellow floating-heart (*Nymphoides peltata* S.G.Gmel.), common duckweed (*Lemna minor* L.), spotless watermeal (*Wolffia arrhiza* L.), common duckmeat (*Spirodela polyrhiza* L.). [23, 46, 53]

• European white water lily (*Nymphaea alba* L.)

Plant communities: From dominant communities, the following species are observed within the habitat: *Myriophyllo verticillati – Nupharetum luteae* W. Koch 1926, *Nymphae etumalbae* Vollmar 1947, *Nymphoide tumpeltatae* (Allorge 1922) Bellot 1951, *Trapetum natantis* V. Karpati 1963, *Potametum natantis* Soo 1923, *Potametum natantis* Soy 1927 [12, 16, 23, 25].

Rare plant species. Of endangered species, the following hygrophilous species can be found: European white water lily (*Nymphaea alba* L.) (EN), bulrush (*Scirpus triqueter* L.) (VU) and water chestnut (*Trapa natans* L.) (CR) [10, 43, 52, 55, 76]. This type of habitat is exposed to several damaging factors that lead to the loss of rare species, respectively it is necessary to protect and conserve them at the national level.

• bulrush (*Scirpus triqueter* L.)

• Water chestnut (*Trapa natans* L.)

Fauna is represented by aquatic, semi-aquatic, pond and hygrophilous species. The common mammal species are represented by muskrat (*Ondatra zibethicus* L.), Eurasian water vole (*Arvicola terestris* L.), birds: great crested grebe (*Podiceps cristatus* L.), common little bittern (*Ixobrychus minutus* L.), black-crowned night herons (Nycticorax nycticorax L.), common mallard (*Anas platyrhynchos* L.), common species of reptiles and amphibians: grass snake (*Natrix natrix* L.), dice snake (*N. tessellata* Laur.), marsh frog (*Rana ridibunda* Pall.), green toad (*Bufo viridis* Laur.) [5, 37-40, 57, 73, 74].

Rare animal species. There are several species of animals included in the Red Book of the Republic of Moldova (III ed.) in this biotope. The following mammal species that settle near water or hunt near have been observed: Mediterranean water shrew (*Neomys anomalus* Cabr.) (EN), common otter (*Lutra lutra* L.) (VU), ermine (*Mustela erminea* L.) (VU), grey long-eared bat (*Plecotus austriacus* Fisch.) (VU), Kuhl's pipistrelle (*Pipistrellus kuhlii* Kuhl) (VU), Daubenton's bat (*Myotis daubentonii* Kuhl) (VU). Many rare species of birds can be found in this biotop: white stork (*Ciconia ciconia* L.) (VU), spotted crake (*Porzana porzana* L.) (VU), little crake (*Porzana parva* Scop.) (VU), Eurasian spoonbill (*Platalea leucordia* L.) (CR), common shelduck (*Tadorna tadorna* L.) (VU), purple heron (*Ardea purpurea* L.) (VU), Eurasian bittern (*Botaurus stellaris* L.) (VU). The following rare species of herpetofauna are found: European pond turtle (*Emys orbicularis* L.) (EN), tree frog (*Hyla arborea* L.) (VU) [10]. Some species of dragonflies protected at the national and international level have been identified near water basins: emperor dragonfly (*Anax imperator* Leach) (VU), Goblet-marked damselfly (*Erythromma lindenii* Selys) (CR), yellow-spotted whiteface (*Leucorrhinia pectoralis* Charp.) (CR) and the hygrophilous species of (*Carabus clathratus* L.) (EN).

• European Pond Turtle (*Emys orbicularis* L.)

32 Running water

3280 Mediterranean perennial rivers with riverine white willow (*Salix alba* L.) and White poplar (*Populus alba* L.) forested curtains

General overview. In the lower course, the Dniester River is a typical flatland watercourse, with a wide and low floodplain, unstable and very meandering, poorly ramificated riverbed, 34 – 270 m width, and 5-7 m and even 10 -13 m depth in some sectors; near the mouth of the river the depth decreases to 2-4 m. The riverbed is sandy and sloppy, with argillaceous and sandy steep banks. The width of the river before the bifurcation of the Turunciuc arm is of 50-100 m, of maximum 600 m in front of the Beleaevka village. The depth of the river is of 1.6 – 8 m, and in some sectors it is of up to 10-12 m depth (near Purcari village). The riverbed is not uniform, sandy and argillaceous or sandy and sloppy. The banks of the river are steep, of 3-6m height, argillaceous-sandy, with a grass cover, shrubs and solitary trees, occasionally with bullrush [11].

• Dniester riverbed at Palanca

• Floodplain meadow of the Lower Dniester (Olanesti village)

The annual water flow of the water is of 140-160 m^3/s (2011-2015). The temperature of the water in spring and autumns ranges between 8-21 °C and in summer it is between 24-28 °C, the transparency of water is of 25-150 cm and more often it is of 50-70 cm [11].

The water salt content of 330-460 mg/l, in over 50% of cases is below 400 mg/l. The content of dissolved oxygen is of 8-12 mg/l, pH 7-8, content of suspended particles 40 – 100 mg/l, sulphates – 69,1 mg/l, chlorides, calcium 30-60 mg/l, phenols – 0,002-0.006 mg/l, phosphorus 0,05-0.10 mg/l, petroleum products – 0,02-0,04 mg/l. The content of mineral nitrogen (about 1,48 mg/l) and organic nitrogen (about 1,98 mg/l) is within acceptable limits [67-69, 77, 86].

Fauna. The banks of Dniester river are populated by hygrophilous and semiaquatic mammals: muskrat (*Ondatra zibethicus* L.), water vole (*Arvicola terrestris* L.), common shrew (*Sorex araneus* L.), Eurasian pygmy shrew (*Sorex minutus* L.), and common species of bats can be observed flying above the water surface: noctule (*Nyctalus noctula* Schreber), pipistrelle (*Pipistrellus pipistrellus* Schreber) [3, 38, 48]. In bullrushes and floodplain areas there are invasive carnivore species: Raccoon dog (*Nyctereutes procyonoides* Gray), Asiatic jackal (*Canis aureus* L.). The birds are mainly represented by semiaquatic species: great crested grebe (*Podiceps cristatus* L.), great cormorant

(*Phalacrocorax carbo* L.), mallard (*Anas platyrhynchos* L.), garganey (*A. querquedula* L.), gadwall (Anas strepera L.), Eurasian teal (*Anas crecca* L.) etc. [5, 37]. The following common species of herpetofauna have been identified: grass snake (*Natrix natrix* L.), dice snake (*N. tessellata* Laur.), green toad (*Bufo viridis* Laur.) [38, 80].

The following molluscs have been observed: zebra mussel (*Dreissena polymorpha Pallas*), river nerite (*Theodoxus fluviatilis Linnaeus*), Lister's river snail (*Viviparus contectus Millet*), river snails (*Viviparus viviparus Linne*), great pond snail (*Lymnaea stagnalis Linnaeus*) [79].

The greatest diversity of the ichthyofauna of the Dniester River, within the boundaries of the Republic of Moldova, is found in the south end, near Palanca village and includes representatives of various ecological groups of fish: by reproductive criterion: migratory, semi-migratory, potamodromous and sedentary species; by salinity gradient - mesohaline, euryhaline and freshwater species, by origin: allogenic, intervenient and indigenous species; by hydrobiotopic affinity – pond, riverbed, liman and sea species.

Of intervenient group of fish species, besides the representative species of gobies: (*Neogobius fluviatilis* Pallas, *Babka gymnotrachelus* Kessler, *Neogobius melanostomus* Pallas, *Proterorhinus semilunaris* Heckel, *Ponticola kessleri* Guenther) and black-striped pipefish (*Syngnathus abaster* Risso), there is a sudden increase in ecological indicators for Black and Caspian Sea sprat (*Clupeonella cultriventris* Nordmann), great pond snail (*Atherina boyeri Risso*) and three-spined stickleback (*Gasterosteus aculeatus* L.) in spring, and high quantitative values are maintained for great pond snail (*Atherina boyeri Risso*), Freshwater Tubenose Goby (*Proterorhinus semilunaris* Heckel) and racer goby (*Babka gymnotrachelus* Kessler) in autumns.

From the allogenic group of species, the following become quite abundant and frequent in capture: Prussian carp (*Carassius gibelio* Bloch), pumpkinseed (*Lepomis gibbosus* L.) and stone moroko (*Pseudorasbora parva* Temminck & Schlegel), and of the group of indigenous species: bleak (*Alburnus alburnus* L.), European bitterling (*Rhodeus amarus* Bloch), spined loach (*Cobitis taenia* s. Lato), common roach (*Rutilus rutilus* L.), European perch (*Perca fluviatilis* L.) and white bream virus (*Blicca bjoerkna* L.). It is encouraging that in the summer 2016, the significant increase in the catch

• Whooper Swan (*Cygnus cygnus* L.)

of juvenile indigenous species was reported, such as: Northern pike (*Esox lucius L.*), *Aspius aspius* L. and bream (*Abramis brama* L.), [7].

Rare animal species. The Dniester River is also a biotope for many rare animal species, included in the Red Book of the Republic of Moldova. The following mammal species with rarity status are: Mediterranean water shrew (*Neomys anomalus* Cabr.) (EN), common otter (*Lutra lutra* L.) (VU), Daubenton's bat (*Myotis daubentonii* Kuhl) (VU), pond bat (*Myotis dasycneme* Boie) (EN); of birds: mute swan (*Cygnus olor* Gmel.) (VU), whooper swan (*Cygnus cugnus* L.) (VU); of reptiles: European pond turtle (*Emys orbicularis* L.) (EN); of amphibians: tree frog (*Hyla arborea* L.) (VU) [10]; of fishes: European sturgeon (*Huso huso* L.) (CR), Russian sturgeon (*Acipenser gueldenstaedtii* Brandt et Ratzeburg) (CR), Adriatic sturgeon (*Acipenser stellatus* Pall.) (EN), Sterlet (*Acipenser ruthenus* L.) (VU), (*Umbra krameri* Walb.) (EN), European Eel (*Anguilla anguilla* L.) (CR), Crucian carp (*Carassius carassius* L.) (CR), Black Sea roach (*Rutilus frisii* Nordm.) (VU), Ide (*Leuciscus idus* L.) (VU), sichel (*Pelecus cultratus* L.) (VU), tench (*Tinca tinca* L.) (VU), Volga Pikeperch (*Sander volgensis* Gmelin) (EN), common zingel (*Zingel zingel* L.) (VU), *Caspiosoma caspium* Kessler (EN). The following are species with different rarity status observed in this area and that demonstrate a satisfactory

frequency and abundancy: Dnieper chub (*Petroleuciscus borysthenicus* Kessler) (VU) – endemic Pontic species, included in the Red Book, III ed. and which conservation and protection status is of major importance.

The following representatives of endangered crustaceans species were reported: *Paramysis baeri bispinosa* Martynov (EN), and among molluscs: *Hypanis colorata* Eichwald (EN), *Hypanis laeviuscula fragilis* Milasch (CR), *Hypanis pontica* Eichwald (EN).

• Dnieper chub (*Petroleuciscus borysthenicus* Kessler)

• Ide (*Leuciscus idus* L.)

• Sichel (*Pelecus cultratus* L.)

• Tench (*Tinca tinca* L.)

62 Semi-natural xerarch meadows and communities

6250 Ponto-panonic grasslands of Volga fescue (*Festuca valesiaca* Gaudin).

General overview. It is spread in areas with steppe vegetation, where the (Volga fescue (*Festuca valesiaca* Gaudin)) predominates, edificatory and dominant species, along with other species of the Poaceae family [53]. This habitat is mostly spread in Bugeac steppe, where xerophyte communities are dominant. In general, the habitat can be found on erroded hills, loessial soils, steppe glades and edges of woods with pubescent oak, on steep slopes with dry soils and steppe plants of different exposition [6, 64].

Fallow Poaceae species predominate in the vegetation structure and form the types of communities specific to the habitat. The Volga fescue (*Festuca valesiaca* Gaudin) has the greatest degree of wilderness, that in grassland composition is accompanied by (*Stipa capillata* R.Br.), needle grass (*Stipa lessingiana* Trin. et Rupr.), Lady's Bedstraw (*Galium verum* L.), *Centaurea trinervia* Steph., annual meadow grass (Poa angustifolia

• Grasslands of Volga fescue (*Festuca valesiaca* Gaudin.)

L.), plains blue-stem (*Bothriochloa ischaemum* L.), *Phlomis pungens* Willd., *Euphorbia stepposa* Zoz., *Salvia nemorosa* L., *Salvia nutans* L., *Salvia austriaca* Jacq., *Artemisia austriaca* Jacq., *Phleum phleoides* L., *Asparagus officinalis* L., *Astragalus onobrychis* L., *Astragalus ponticus* Pall., *Coronilla varia* L., *Achillea setacea* Waldst. et Kit., *Thalictrum minus* L., *Marrubium peregrinum* L., *Hypericum perforatum* L., *Allium rotundum* L., stiff hedgenettle (*Stachys recta* L.). In many sectors, the Volga fescue (*Festuca valesiaca Gaudin.*) competes for space with many species of the *Poa*, *Artemisia*, and *Botrichloa* genera, with shrubbery with which they form communities, participating in the bare-fallowing of land. Several species of *Asparagus* and *Salvia* genera dominated in the superior vegetation layer, and in the inferior layer there are about 90% of species that form the herbaceous layering: *Medicago minima* L., *Thymus marschallianus* Willd., sandworts *Arenaria serpillifolia* L., *Teucrium polium* L., *Potentila arenaria* Borkh., *Trifolium arvense* L., *Centaurea arenaria* Bieb., *Inula ensifolia* L., *Taraxacum serotinum* Waldst. et Kit. [23, 46, 53]. Phytocenosis built up by Volga fescue (*Festuca valesiaca* Gaudin.), together with other xerophyte species, is also an indicator of degradation on arid and sunny lands.

Plant communities. The habitat is characterised by constant domination of *Festuca valesiaca* in specific communities, such as: *Taraxaco serotinae – Festucetum valesiacae* (Burduja et al., 1956, Răvăruţ et al., 1956) Sârbu et al., 1999, *Poa angustifoliae – Festucetum valesiacae* (Zinocker in Mucina et Kolbek, 1993), *Medicagini–Festucetum valesiacae moldavicum poëtosum angustifoliae* Bârcă,1975 [12, 16, 23, 25].

Rare plant species. The rare species with different protection status under IUCN (2001) criteria and the Red Book of the Republic of Moldova (III ed.) are represented by bindweed (*Convolvulus lineatus* L.) (EN), redstem filaree (*Erodium ciconium* (L.) L`Her.) (CR), *Gagea ucrainica* Klok. (EN), tifon bur clover (*Medicago rigidula* (L.) All.) (CR), *Ornithogalum oreoides* Zahar. (EN), *Pimpinella titanophila* Woronow (EN), Pennsylvania cinquefoil (*Potentilla astracanica* Jacq.) (EN), *Scorzonera mollis* Bieb. (VU), tuberous valerian (*Valeriana tuberosa* L.) (CR) [10, 43, 52, 55, 76].

Fauna: The following are the terrestrial vertebrates, specific to this habitat: European mole (*Talpa europaea* L.), lesse white-toothed shrew (*Crocidura suaveolens* Pall.), *Nannospalax leucodon* Nord., common vole (*Microtus arvalis* Pall.), East-

• Bindweed (*Convolvulus lineatus* L.)

• Redstem filaree (*Erodium ciconium* (L.) L`Her.)

• *Gagea ucrainica* Klok.

• Tuberous Valerian (*Valeriana tuberosa* L.)

• *Ornithogalum oreoides* Zahar.

• *Pimpinella titanophila* Woronow

• Pennsylvania cinquefoil (*Potentilla astracanica* Jacq.)

• *Scorzonera mollis* Bieb.

• Tifon bur clover (*Medicago rigidula* (L.) All.)

European vole (*Microtus rossiaemeridionalis* Ognev), stripped filed mouse (*Apodemus agrarius* Pallas), wood mouse (*A. sylvaticus* L.), red fox (*Vulpes vulpes* L.). The steppe and flatland birds predominate in this habitat: crested lark (*Galerida cristata* Scop.) and white wagtail (*Motacilla alba* L.). Herpetofauna is represented by sand lizard (*Lacerta agilis* Laur.), grass snake (*Natrix natrix L.*) and green toad (*Bufo viridis* Laur.) [37, 38, 49]. Xerophyte insect species prevail, namely: *Gryllus desertus* Pall., *Iphiclides podalirius* L., species of Hymenoptera, Coleoptera and Orthoptera, etc [2, 20].

Rare animal species. The following rare animal species, included in the Red book of the Republic of Moldova (III ed.) have been identified in this biotope: bicolored white-toothed shrew (*Crocidura leucodon* Herm.) (VU), Kuhl's pipistrelle (*Pipistrellus kuhlii* Kuhl) (VU), gray big-eared bat (*Plecotus austriacus Fischer*) (VU), *Elaphe quatorlineata* Lacepede (CR), *Hyla arborea* L. (VU), Swallowtail (*Papilio machaon* L.) (VU), *Zerynthia polyxena* Den. et Sch. (VU), *Bombus argillaceus* Scop. (VU) [10].

• Swallowtail (*Papilio machaon* L.)

• four-lined snake (*Elaphe quatorlineata* Lacepede)

62 Semi-natural xerarch meadows and communities

*6290** Western Pontic grasslands with *Stipa ucrainica* Ikonn. and *Stipa dasyphilla* Lindem.

• Grasslands of *Stipa ucrainica* Ikonn.

• Grasslands of *Stipa dasyphilla* Lindem.

General overview. The phytocenoses are built by *Stipa ucrainica* Ikonn. and *Stipa dasyphilla* Lindem., spread on hills and steppe grasslands, in grassy glades and edges of pubescent oak woods. Sometimes they can be found on stony and calcareous steppe substrate near *Robinia pseudocacia* L. plantations and on sandy and clay soils, and generally, in steppe and wooded steppe areas, on loessial soils in the southern part of the country [6, 53, 64].

It is a typical steppe habitat with predominant Ponto – Sarmatic xerophilous edificatory species like: *Stipa ucrainica* Ikonn., *Stipa capillata* R.Br., *Stipa pennata* L., *Stipa pulcherrima* C.Koch., *Stipa tirsa* Stev., *Stipa dasyphilla* Lindem., *Salvia austriaca* Jacq., *Jurinea mollissima* Klok., *Onobrychis viciifolia* Scop.. These types form the superior layer in the vegetation structure, with 1-5% coverage in many steppe sectors of Stefan-Voda.

The following codominant species dominated in the medium layering: Volga fescue (*Festuca valesiaca* Gaudin.), *Festuca rupicola* Heuff., *Agropyron pectinatum* (Bieb.) Beauv., *Adonis vernalis* L., *Potentilla impolita* Wahlenb., stiff hedgenettle Stachys recta L., *Veronica austriaca* L., *Astragalus austriacus* Jacq., *Trifolium arvense* L., *Trifolium pratense* L.,

Inula ensifolia L., *Phleum phleoides* L.. In the inferior vegetation layer, more frequent are: black medick (*Medicago lupulina* L.), *Medicago sativa*, sandworts (*Arenaria serpillifolia* L.), *Medicago minima* L., white clover (Trifolium repens L.), *Teucrium polium* L., wall germander (*Teucrium chamaedrys* L.), *Fragaria viridis* Duch.. In the composition of this type of habitat wooded steppe specific vegetation is reported: single-seeded hawthorn (*Crataegus monogyna* Jacq.), dog rose (*Rosa canina* L.), European privet (*Ligustrum vulgare* L.) [23, 46, 53].

Plant communities: The dominant habitat of *Stipa ucrainica* Ikonn. and *Stipa dasyphilla* Lindem. is characterised by the following grouping of plants: *Stipetum lessingianae* Soó (1927 n.n.) 1947, *Stipetum pulcherrimae* Soó 1942, *Stipetum caillatae* (Hueck 1931) Krausch 1961, *Astragalo ponticae–Stipetum ucrainicae* (Dihoru 1969, 1970) Sanda, Popescu 1999 (Syn.: *Stipo* (*ucrainicae*)*–Festucetum valesiacae* Dihoru 1970 [12, 16, 23, 25].

Rare plant species. The following species of plants included in the Red Book of the Republic of Moldova (III ed.) and that are under IUCN (2001) rarity criteria have been identified: *Achillea ochroleuca* Ehrh. (CR), *Adonis wolgensis* Stev. (VU), *Bellevalia sarmatica* (Georgi) Woronow (VU), *Dianthus polymorphus* Bieb. (CR), *Eremogone biebersteinii* (Schlecht.) Holub (CR), *Stipa tirsa* Stev. (EN), *Stipa dasyphylla* (Lindem.) Trautv. (EN) [10, 43, 52, 55, 76].

• *Achillea ochroleuca* Ehrh.

• *Adonis wolgensis* Stev.

• *Eremogone biebersteinii* (Schlecht.) Holub

• *Stipa tirsa* Stev.

• *Dianthus polymorphus* Bieb.

• Stipa dasyphylla Lindem.

Fauna: Animal species common to this biotope are European mole (*Talpa europaea* L.), serotine bat (*Eptesicus serotinus Schr.*), lesser mole-rat (*Nannospalax leucodon* Nord.), common vole (*Microtus arvalis* Pall.), stripped field mouse (*Apodemus agrarius* Pallas), red fox (Vulpes vulpes L.), common buzzard (*Buteo buteo* L.), crested lark (*Galerida cristata* Scop.L.), white wagtail (*Motacilla alba* L.), Eurasian skylark (*Alauda arvensis* L.); sand lizard (Lacerta agilis Laur.), grass snake (*Natrix natrix* L.), etc. [5, 37, 38].

Rare animal species. Several species with different rarity status, common to steppe area have been also identified, namely: Kuhl's pipistrelle (*Pipistrellus kuhlii* Kuhl) (VU), gray big-eared bat (*Plecotus austriacus* Fischer) (VU), (*Elaphe quatorlineata* Lacepede) (CR), Swallowtail (*Papilio machaon* L.) (VU), (*Zerynthia polyxena* Den. et Sch.) (VU) [10].

• *Bellevalia sarmatica* Woronow

• *Zerynthia polyxena*

• Kuhl's pipistrelle
(*Pipistrellus kuhlii* Kuhl)

91 Temperate deciduous forests

9160 Pedunculate oak forests (*Quercus robur* L.) with European hornbeam (*Carpinus betulus* L.) and (*Carex brizoides* L.)

• Pedunculate oak forests (*Quercus robur* L.) with European hornbeam (*Carpinus betulus* L.) and (*Carex brizoides* L.)

General overview. The phytocenoses of pedunculate oak forests (*Quercus robur* L.) with European hornbeam (*Carpinus betulus* L.) and *Carex brizoides* L. are common to Dniester Plateau forests, low and mid latitude depressions of up to 200 m, Codrii area, forest steppe and mesophyle forests. They can be also found in forests with wet alluvial and grey soils. [6, 53, 64].

The pedunculate oak (*Quercus robur* L.) is the edificatory and dominant species in the vegetation composition, and in the superior layering it is associated with the Norway maple (*Acer platanoides* L.), European ash (*Fraxinus excelsior* L.), *Ulmus carpinifolia* Rupp. ex Suckow, cherry (*Cerasus avium* L.), little leaf linden (*Tilia cordata* Mill.). In areas with consistency higher than 0.7-1.0, the pedunculate oak (*Quercus robur* L.) can form monodominant stands with solitary specimens of European hornbeam (*Carpinus betulus* L.) and Norway maple (Acer platanoides L.).

The European hornbeam (*Carpinus*

betulus L.) mixed with field maple (*Acer campestre* L.), European wild pear (*Pyrus piraster* L.), dog rose (*Rosa canina* L.), blackthorn (*Prunus spinosa* L.), guelder rose (*Viburnum opulus* L.), common hazel (*Corylus avellana* L.), European cornel (*Cornus mas* L.), European privet (*Ligustrum vulgare* L.), *Swida sanguinea* L., *Crataegus curvisepala* Lindm., *Euonymus verrucosa* Scop. plays a key role in the formation of the undershrub layer. The consistency in the shrub layer ranges between 0.2 – 0.5.

The herbaceous layer is represented by *Carex brizoides* L. that participates with other species in the formation of the herbaceous cover, when the degree of stand closure is reduced. During vegetation period, synusia of ephemere plants predominate, and the coverage of the herbaceous layer does not exceed 50-70%. Along with the dominant species, allied species also participate directly in the phytocenosis, namely: tufted hair-grass (*Deschampsia cespitosa* L.), creeping bentgrass (*Agrostis stolonifera* L.), ground elder (*Aegopodium podagraria* L.), lesser celandine (*Ficaria verna Huds.*), sweet (*Gagea pusilla* F.W.Schmidt.), *Allium ursinum* L., *Tulipa biebersteiniana* Schult. Et Schult.fil., red velvet (*Euphorbia amygdaloides* L.), *Mercurialis perennis* L., orchardgrass (*Dactylis glomerata* L.). The following species are also present in the floristic composition: *Ajuga reptans* L., *Festuca gigantea* L., *Glechoma hederacea* L., European privet (*Ligustrum vulgare* L.), *Pulmonaria officinalis* L., European dewberry (*Rubus caesius* L.), *Scrophularia nodosa* L., early dog-violet (*Viola reichenbachiana* Jord. *ex* Boreau), *Stellaria holostea* L. [23, 46, 53].

Plant communities. The habitat consisting of pedunculate oak forests (*Quercus robur* L.) with European hornbeam (*Carpinus betulus* L.) and C*arex brizoides* L. represents different and consistent forest ecosystems within forest communities. The communities specific to the habitat are as follows: *Querco robori-Carpinetum* Soó et Pocs (1931) 1957, *Carici brizoidi –Quercetum roboris* Rațiu et al. 1977, *Carpino betuli–Quercetum robori-pedunculiflorae* Doniță & Popescu ass. Nova [12, 23, 25].

Rare plant species. In phytocenosis of pedunculate oak forests (*Quercus robur* L.) with European hornbeam (*Carpinus betulus* L.) and *Carex brizoides* L. from Stefan-Voda district, grow the following endangered species: *Euonymus nanus* Bieb. (VU) and May lily (*Maianthemum bifolium* (L.) F.W. Schmidt) (CR) [10, 43, 52, 55, 76, 84].

Fauna. In pedunculate oak (*Quercus robur*) forests with hornbeam (*Carpinus*

• (*Euonymus nanus* Bieb.)

• May lily (*Maianthemum bifolium* (L.) F.W. Schmidt)

betulus) and *Carex brizoides* more than 50 mammal species, about 160 bird species and 13 reptile and amphibian species have been reported [5]. Among the forest bat and rodent species can be mentioned: European mole (*Talpa europaea* L.), red fox (*Vulpes vulpes* L.), badger (*Meles meles* L.), wild boar (*Sus scrofa* L.), roe deer (*Capreolus capreolus* L.), Eurasian goshawk (*Accipiter gentilis* L.), common buzzard (*Buteo buteo* L.); common species of woodpeckers and forest Passeriformes: common wood pigeon (*Columba palumbus* L.), European turtle dove (*Streptopelia turtur* L.), common cuckoo (*Cuculus canorus* L.), green lizard (*Lacerta viridis* L.), grass snake (*Natrix natrix L.*) etc. [37-40].

Rare animal species. This type of forests is home to a large number of protected species, included in the Red Book of the Republic of Moldova (III ed.), namely mammals: whiskered bat (*Myotis mystacinus* Kuhl) (VU), Nathusius' pipistrelle (*Pipistrellus nathusii* Keys. et Blas.) (EN), ermine (*Mustela erminea* L.) (VU), wildcat (*Felis silvestris* L.) (VU); birds: (*Coracias garrulus* L.) (VU), middle spotted woodpecker (*Dendrocopos medius* L.) (VU), lesser spotted eagle (*Aquila pomarina* Brehm) (CR), black kite (*Milvus migrans* Bodd.) (VU); reptiles: smooth snake (*Coronella austriaca* Laur.) (EN); amphibians: common spadefoot toad (*Pelobates fuscus*

Laur.) (CR), common toad (*Bufo bufo* L.) (VU), agile frog (*Rana dalmatina Bon.*) (VU) [10]; insects: stag beetle (*Lucanus cervus* L.) (VU), ground beetle (*Carabus ullrichi* Germ.) (VU), rhinoceros beetle (*Oryctes nasicornis* L.) (VU), giant peacock moth (*Saturnia pyri* Den. et Sch.) (VU), Swallowtail (*Papilio machaon* L.) (VU), *Apatura metis* Bergstr. (VU), Mammoth wasp (*Megascolia maculata* Drury) (VU) [20].

• Black kite (*Milvus migrans*)

• Stag beetle (*Lucanus cervus*)

• Wildcat (*Felis silvestris*)

91 Temperate deciduous forests

91H0 Pubescent oak forests (*Quercus pubescens* Willd.)

• Pubescent oak forest (*Quercus pubescens* Willd.)

General overview. The phytocenoses built by pubescent oak (*Quercus pubescens* Willd.) or subarid pubescent oak (*Quercus pubescens* Willd.) forests, mixed with other forest species, grow mostly in the southern part of the Republic of Moldova. Overall, pubescent oak forests (*Quercus pubescens* Willd.) are xerophile stations, occupying the central and southern part of the country, with 100 – 200 m height.

The soils are of eutrophic Chernozem forest type, from superficial to deep skeletal soil, water-deficient in summer [6, 53, 64]. This habitat also includes grassy glades and edges of wood with xerophilous floristic composition, determined by arid climate from the south of the Republic.

In the plant composition, the pubescent oak (*Quercus pubescens* Willd.) plays a dominant role in the superior layer, forming forest massive, with a coverage ranging between 80 and 100%. The following species mixed with the main species enter the arboreal layer: Norway maple (*Acer platanoides* L.), *Cerasus mahaleb* L., European wild pear (*Pyrus piraster* L.), *Fraxinus ornus* L., field maple field maple (*Acer campestre* L.), European hornbeam (*Carpinus betulus* L.). Sporadic specimens of pedunculate oak forests (*Quercus robur* L.), European ash (*Fraxinus*

excelsior L.), (*Ulmus carpinifolia* Rupp. ex Suckow), European wild pear (*Pyrus piraster* L.), Tatarian maple (*Acer tataricum* L.).

The shrub layer is composed of compact and solitary groups: European cornel (*Cornus mas* L.), Tatarian maple (*Acer tataricum* L.), common hazel (*Corylus avellana* L.), European privet (*Ligustrum vulgare* L.), single-seeded hawthorn (*Crataegus monogyna* Jacq.), Blackthorn (*Prunus spinosa* L.), *Rhamnus cathartica* L., wayfaring-tree (*Viburnum lantana* L.), dog rose (*Rosa canina* L.), and on edges of woods and grassy glades grow: (*Amygdalus nana* L.), *Cerasus fruticosa* Pall..

The herbaceous layer consists of the following characteristic species: *Clinopodium vulgare* L., *Adonis vernalis* L., *Allium rotundum* L., *Astragalus glycyphyllos* L., orchardgrass *Dactylis glomerata* L., *Festuca rupicola* Heuff., Volga fescue (*Festuca valesiaca* Gaudin.), F*ragaria viridis* Duch., lady's bedstraw (*Galium verum* L.), *Linum austriacum* L., annual meadow grass (*Poa angustifolia* L.), stiff hedgenettle (*Stachys recta* L.), dyer's plumeless saw-wort (*Serratula tinctoria* L.), Common Mullein (*Verbascum phlomoides* L.), *Vincetoxicum hirundinaria* Medik..

In some southern areas, there are low productive and sometimes even degraded forests. Their consistency varies between 0.3 and 0.7, and in some places there are frequent open glades with steppe vegetation [23, 46, 53].

Plant communities. Representative for pubescent oak forests (*Quercus pubescens* Willd.) are xerophilous communities that dominate constantly and abundantly, blending with: *Cotino-Quercetum pubescentis* Soó (1931) 1932, *Paeonio peregrinae-Quercetum pubescentis* (Sârbu 1982) Sanda et Popescu 1999 (Syn.: *Lathyro collini-Quercetum pubescentis paeonietosum peregrinae* Sârbu 1982) [12, 23, 25].

Rare plant species. Within pubescent oak (*Quercus pubescens* Willd.) forests there are species with different level of protection, under IUCN (2001) rarity criteria and the Red Book of the Republic of Moldova (III ed.) such as *Chrysopogon gryllus* (L.) Trin. (VU), *Crambe Tataria* Sebeok (EN), *Delphinium fissum* Waldst. et Kit. (CR), *Nepeta parviflora* Bieb. (VU), *Pulsatilla grandis* Wend. (EN), *Pyrus elaeagnifolia* Pall.) (CR) [10, 43, 52, 55, 76, 84].

Fauna. This is a peculiar and varied biotope with preserved pubescent oak areas, populated by different species of animals characteristic for forest ecosystems:

• *Chrysopogon gryllus* (L.) Trin.

• *Crambe tataria* Sebeok

• *Pulsatilla grandis* Wend.

• *Nepeta parviflora* Bieb.

• *Delphinium fissum* Waldst. et Kit.

• *Pyrus elaeagnifolia* Pall.

white-breasted hedgehog (*Erinaceus cocolor* Martin), European mole (*Talpa europaea* L.), yellow-necked mouse (*Apodemus flavicollis* Pallas), wood mouse (*A. sylvaticus* L.), European polecat (*Mustela putorius* L.), badger (*Meles meles* L.), red fox (*Vulpes vulpes* L.), wild boar (*Sus scrofa* L.), roe deer (*Capreolus capreolus* L.), Northern goshawk (*Accipiter gentilis*), common kestrel (*Falco tinnunculus* L.), European turtle dove (*Streptopelia turtur* L.), common cuckoo (*Cuculus canorus* L.), common hoopoe (*Upupa epops* L.), grey-headed woodpecker (*Picus canus* Gmelin.), European green

lizard (*Lacerta viridis* Laur.), grass snake (*Natrix natrix* L.), pool frog (*Rana lessonae Camerano*) etc. [5, 37-40].

Rare animal species. This type of forest is a biotope for some animal species, included in the Red Book of the Republic of Moldova (III ed.). The following species have been identified: mammals: Nathusius' pipistrelle (*Pipistrellus nathusii* Keysering et Blasius) (EN), European wildcat (*Felis silvestris* Schreber) (VU), ermine (*Mustela erminea* L.) (VU); birds: booted eagle (*Hieraaetus pennatus* Gm.) (CR), black kite (*Milvus migrans* Bod.) (VU), European roller (*Coracias garrulus* L.) (VU), middle spotted woodpecker (*Dendrocopos medius* L.) (VU); reptiles: smooth snake (*Coronella austriaca* Laur.) (EN) [10].

The secular trees served as habitat for rare and endangered Coleoptera: rhinoceros beetle (*Oryctes nasicornis* L.) (VU), stag beetle (*Lucanus cervus* L.) (VU), ground beetle (*Carabus ullrichi Germ.*) (VU), which maggots feed on the decaying wood. In light glades or edges of wood rare lepidopteran and hymenopteran species can be found: oak hawk-moth (*Marumba quercus* Den. et Sch.) (VU), giant peacock moth (*Saturnia pyri* Den. et Sch.) (VU), Jersey tiger (*Euplagia quadripunctaria* Poda) (VU), Mammoth wasp (*Megascolia maculata* Drury) (VU) [20, 72].

• (*Oryctes nasicornis*)

• Giant peacock moth (*Saturnia pyri*)

91 Temperate deciduous forests

*91I0** Pedunculate oak forests (*Quercus robur* L.) with cherry (*Cerasus avium* L.) and Tatarian maple (*Acer tataricum* L.)

• Pedunculate oak forests (*Quercus robur* L.) with cherry (*Cerasus avium* L.) and Tatarian maple (*Acer tataricum* L.)

General overview. There are xeromorphic phytocenoses of forests built by pedunculate oak (*Quercus robur* L.) spread out on northern, central and partly Southern part of Moldovan Plateau. Pedunculate oak forests (*Quercus robur* L.) also called „oak with cherry" groves, are often accompanied by allied species of cherry (*Cerasus avium* L.) and European hornbeam (*Carpinus betulus* L.) in the superior layer of vegetation and Tatarian maple (*Acer tataricum* L.) and *Cotinus coggigria* Scop. in the middle layer [53]. The soils are chernoziom clayey - argillaceous and loessial type, deep, water-deficient in summer [6, 64].

In the superior layer, along with the dominant species, the following species can be found: durmast oak (*Quercus petraea* L. ex Liebl.), pubescent oak (*Quercus pubescens* Willd.), European ash (*Fraxinus excelsior* L.), littleleaf linden (*Tilia cordata* Mill.), silver linden (*Tilia tomentosa* Moench.), field elm (*Ulmus carpinifolia* Rupp. ex Suckow), European white elm (*Ulmus laevis* Pall.). In general, monodominant stands of pedunculate oak predominate in habitats with pedunculate

oak forests (*Quercus robur* L.), while blending species: cherry (*Cerasus avium* L.), European hornbeam (*Carpinus betulus* L.) and Tatarian maple (*Acer tataricum* L.) are encountered with a medium or sporadic frequency.

In the shrub layer predominate: European wild pear (*Pyrus piraster* L.), hawthorn (*Crataegus curvisepala* Lindm.), *Rhamnus tinctoria* Waldst. et Kit., European spindle-tree (*Euonymus europaea* L.), European crab apple (*Malus sylvestris* Mill.), Blackthorn (*Prunus spinosa* L.), wayfaring-tree (*Viburnum lantana* L.), (*Swida sanguinea* L.), black elderberry (*Sambucus nigra* L.), dog rose (*Rosa canina* L), glossy buckthorn (*Frangula alnus* Mill.).

In the herbaceous layer, present in glades, grassy glades or under the canopy of dominate trees, the following species predominate: lungwort (*Pulmonaria mollis* Wulf. Ex Hornem), black false hellebore (*Veratrum nigrum* L.), orchardgrass (*Dactylis glomerata* L.), wood avens (*Geum urbanum* L.), wild strawberry (*Fragaria vesca* L.), *Vincetoxicum hirundinaria* Medik., *Brachypodium sylvaticum* Huds., *Carex michelii* Host., *Convallaria majalis* L., *Festuca rupicola* Heuff., *Melica altissima* L., *Phlomis tuberosa* L., *Viola hirta* L.. Herbaceous cover in glades and edges of wood constitutes 90-100%. During the vegetation, synusia of perenial species predominate with abundancy in vernal and estival seasons [23, 46, 53].

Plant communities. Pedunculate oak forests (*Quercus robur* L.) with cherry (*Cerasus avium* L.) and Tatarian maple (*Acer tataricum* L.) are represented by the following communities: *Querceto-Lithospermetum cotinosum* (Borza, 1936) and *Aceri tatarico-Quercetum roboris* (Zolyomi 1957) [12, 23, 25].

Rare plant species. Within pedunculate oak forests (*Quercus robur* L.) with cherry (*Cerasus avium* L.) and Tatarian maple (*Acer tataricum* L.) of Stefan-Voda district only one species included in the Red Book of the Republic of Moldova (III ed.) under IUCN (2001) rarity criteria has been identified: *Gymnospermium odessanum* (DC.) Takht.) (CR) [10, 43, 52, 55, 76].

• *Gymnospermium odessanum* (DC.) Takht.

Fauna. In the pedunculate oak forests (*Quercus robur*) with (*Cerasum avium*) and Tatarian maple (*Acer tataricum*) several species of animals characteristic of this type of biotope have been identified: white-breasted hedgehog (Erinaceus concolor Martin), European mole (*Talpa europaea* L.), red fox (*Vulpes vulpes* L.), least weasel (*Mustela nivalis* L.), wild boar (*Sus scrofa* L.), roe deer (*Capreolus capreolus* L.), common cuckoo (*Cuculus canorus* L.), Eurasian blackbird (*Turdus merula* L.), lesser spotted woodpecker (*Dendrocopos minor* L.), collared flycatcher (*Ficedula albicollis* Temminck), Eurasian magpie (*Pica pica* L.), European green lizard (*Lacerta viridis* Laur.), grass snake (*Natrix natrix L.*) etc. [5, 37, 38].

• Middle spotted woodpecker (*Dendrocopos medius*)

• Bicolored shrew (*Crocidura leucodon*)

Rare animal species. This biotope represents one of the habitats preferred by some endangered species of animals. Mammals: bicolored shrew (*Crocidura leucodon* Hermann) (VU), Kuhl's pipistrelle (*Pipistrellus kuhlii* Kuhl) (VU), European wildcat (*Felis silvestris* Schreber) (VU); birds red-footed falcon (*Falco vespertinus* L.) (VU), European roller (*Coracias garrulus* L.) (VU), middle spotted woodpecker (*Dendrocopos medius* L.) (VU); reptiles: smooth snake (*Coronella austriaca* Laur.) (EN); insects: (*Oryctes nasicornis* L) (VU), stag beetle (*Lucanus cervus* L.) (VU), ground beetle (*Carabus ullrichi* Germ.) (VU), (*Morimus asper funereus* Muls.) (EN), giant peacock moth (*Saturnia pyri* Den. et Sch.) (VU), Jersey tiger (*Euplagia quadripunctaria* Poda) (VU), Mammoth wasp (*Megascolia maculata* Drury) (VU) [10].

92 Mediterranean deciduous forests

92A0 Floodplain forests of white poplar (White poplar (*Populus alba* L).) with European dewberry (*Rubus caesius* L.)

General overview. These are phytocenoses characteristic of floodplain forests (water meadows), located on more elevated places compared with the meadows, where the edificatory species of white poplar (*Populus alba* L.) mixed with the European dewberry (*Rubus caesius* L.) are found, and come in contact with the phytocenosis of black poplar (*Populus nigra* L.). The moist habitats of white poplar (*Populus alba L.*) with European dewberry (*Rubus caesius* L.) mixed with (*Salix alba* L.), are spread along the Dniester and Prut rivers as compact and solitary strip, and also near lakes and small rivers, where groundwater is close to the surface [53]. Alluvial soils characteristic of meadows is poor developed, sandy and argillaceous with reduced degree of humus [6, 64].

• Forest with white poplar (White poplar (*Populus alba L*).) and European dewberry (*Rubus caesius L.*)

In this habitat, in the superior layer the white poplar (*Populus alba* L.) is a monodominant and edificatory species, of 20-25 m height, it is associated with different blending species: white willow (*Salix alba* L.), pedunculate oak (*Quercus robur* L.), European ash (*Fraxinus excelsior* L.), crack willow (*Salix fragilis* L.), European white elm (*Ulmus laevis* Pall.), grey poplar (*Populus canescens* Ait.), black poplar (*Populus nigra* L.). In forests dominated by white poplar (*Populus alba* L.), pedunculate oak (*Quercus robur* L.) and European ash (*Fraxinus excelsior* L.) are sporadically found.

The shrub layer is poorly developed, and in some areas with frequent floods, it is not present. In the composition of shrubs, the accompanying species are the following: field maple (*Acer campestre* L.), common hazel (*Corylus avellana* L.), European privet (*Ligustrum vulgare* L.), guelder rose (*Viburnum opulus* L.), black elderberry (*Sambucus nigra* L.), *Swida sanguinea* L., European dewberry (*Rubus caesius* L.), European spindletree (*Euonymus europaea* L.). Here and there, in the undershrub layer, the following species can be found: white mulberry (*Morus alba* L.), *Morus nigra* L., glossy buckthorn (*Frangula alnus* Mill.). The consistency of white poplar (*Populus alba* L.) stands in blending varies between 0.5 and 0.8.

In the herbaceous layer, the European dewberry (*Rubus caesius* L.) develops well, allied with the following species: *Elytrigia repens* L., ground elder (*Aegopodium podagraria* L.), *Calamagrostis epigeios* L., creeping buttercup (*Ranunculus repens* L.), creeping cinquefoil (*Potentilla reptans* L.), *Glechoma hederacea* L., cow parsley (*Anthriscus sylvestris* L.), stinging nettle (*Urtica dioica* L.), hops (*Humulus lupulus* L.), *Solanum dulcamara* L., *Calystegia sepium* R.Br. [12, 23, 46, 53].

Plant communities. The water meadows of white poplar (*Populus alba* L.) are specific to forests of white poplar (*Populus alba* L.) with European dewberry (*Rubus caesius* L.) and have been observed in the following communities**:** *Salici-Populetum* Meijer-Drees 1936, *Populetum albae* (Br. – Bl. 1931 p.p.) Borza 1937 and *Salicetum albae-fragilis* Issler 1926 em. Soy 1957 [12, 23, 25].

• Wild grape (*Vitis sylvestris* C.C. Gmel.) (EN)

Rare plant species. In water meadows of white poplar (*Populus alba* L.) with European dewberry (*Rubus caesius* L.), of rare species included in the Red Book of the Republic of Moldova (III ed.) under rarity criteria of the IUCN (2001), only wild grape (*Vitis sylvestris* C.C. Gmel.) (EN) was reported. [1, 10, 43, 52, 55, 76, 84].

Fauna. Mammal species characteristic of fauna of floodplain forests of *Populus alba* with *Rubus caesius* are as follows: white-breasted hedgehog (*Erinaceus concolor* Martin), common shrew (*Sorex araneus* L.), pygmy shrew (*S. minutus* L.), lesser noctule (*Nyctalus leisleri* Kuhl.), pipistrelle (*Pipistrellus pipistrellus* Schreber), soprano pipistrelle (*Pipistrellus pygmaeus* Leach), muskrat (*Ondatra zibethicus* L.), water vole (*Arvicola terrestris* L.), wood mouse (*Apodemus sylvaticus* L.), stripped field mouse (*Apodemus agrarius* Pall.), bank vole (*Clethrionomys glareolus* Schr.), least weasel (*Mustela nivalis* L.), red fox (*Vulpes vulpes* L.), wild boar (*Sus scrofa* L.), roe deer (*Capreolus capreolus* L.) [38, 48, 80]. In this biotope, 53 species of birds nestle, of which 16 species are summer guests and 13 are known as migratory species [5]. Pond species predominate, namely: great crested grebe (*Podiceps cristatus* L.), great cormorant (*Phalacrocorax carbo* L.), common little bittern (*Ixobrychus minutus* L.), mallard (*Anas platyrhynchos* L.), garganey (*A. querquedula* L.), Eurasian marsh harrier (*Circus aeruginosus* L.), Eurasian coot (*Fulica atra* L.), warbler species (*Acrocephalus schoenobaeus* L., *A. arundinaceus* L., *A. scirpaceus* Herm.) etc. [37]. The following common species of herpetofauna have been identified: grass snake (*Natrix natrix* L.), dyce snake (*N.tessellata* Laur.), green toad (*Bufo viridis* Laur.) [80]. The entomofauna is represented by a large variety of species, with the predominance of mezophile and hygrophilous species [20].

Rare animal species. The following rare animals included in the Red Book of the Republic of Moldova (III ed.) have been reported in this type of habitat: mammals - common otter (*Lutra lutra* L.) (VU), ermine (*Mustela erminea* L.) (VU), European wildcat (*Felis silvestris* Schreber) (VU); birds: purple heron (*Ardea purpurea* L.) (VU), black stork (*Ciconia nigra* L.) (CR), spotted crake (*Porzana porzana* L.) (VU), black kite (*Milvus migrans* Bodd.) (VU); herpetofauna: European pond turtle (*Emys orbicularis* L.) (EN), tree frog (*Hyla arborea* L.) (VU), common spadefoot toad (*Pelobates fuscus* Laur.) (CR); insects: stag beetle (*Lucanus cervus* L.) (VU), rhinoceros beetle (*Oryctes nasicornis* L.) (VU), ground beetle (*Carabus ullrichi* Germ.) (VU), Mammoth wasp (*Megascolia maculata* Drury) (VU), violet carpenter bee (*Xylocopa violacea* Gerst.) (EN), giant peacock moth (*Saturnia pyri* Den. et Sch.). The sunny grassy glades and edges of wood serve as habitat for lepidopterous species with rarity status: Swallowtail (*Papilio machaon* L.) (VU), Reverdin's blue (*Plebejus argyrognomon* Bergstr.) (VU) [10].

• White stork
(*Ciconia ciconia*)

• Bicolored shrew
(*Crocidura leucodon*)

• Giant peacock moth,
maggot (*Saturnia pyri*)

• Giant peacock moth, adult
(*Saturnia pyri*)

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