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Peatlands in Belarus

N. Bambalov, A. Kozulin & V. Rakovich

Abstract: The peatland formation and peat accumulation factors combination was not the same in the different Belarus regions, therefore the peatland sizes, peat deposits, peat stocks of various types and the territories general swamping are essentially different. Peatlands occupied 2,939.000 ha or 14.2 % of the total area of Belarus. The Belorussian experts classify mires depending on the water-mineral nutrition conditions and the growing vegetation. There are three mire types depending on these criteria: low-moor (eutrophic or fen), transitional (mesotrophic or poor fen) and high-moor (oligothrophic or bog). The low type peat deposit area in Belarus is 81.6 % (2,103.800 ha), transitional is 3.4 % (106.200 ha), high one is 15.0 % (333.700 ha).

The necessity of mires and peat deposits protection is stipulated both by vast mires territory in Belarus and by the results of large-scale peat extraction and drainage amelioration, resulting in more than 40% of already drained initial areas and biospheric processes destabilization. Many unique mire landscapes and habitats of a great number of biological diversity species were eliminated.

The functions of Belarusian mires to preserve landscapes and biological diversity, atmospheric air purification from carbon dioxide excess and its saturation with oxygen, and special role of mires to form the climate, hydrological regime and quality of waters on large regions is obligatory as new regard of their assessment in media formatting role.

Key words: peatland, mire, Belarus, rehabilitation, biological diversity.

General information

The Republic of Belarus is located at the Central Europe in the west of the East European (Russian) plain in the Upper Dnieper, Pripyat, Western Dvina and Nieman basins. The extent of the territory from east to west is 650 km, from north to south is 560 km, the area is 207.600 km^2. The republic territory is divided on six administrative regions: Brest, Vitebsk, Gomel, Grodno, Minsk and Mogilyov.

The landscape of Belarus is predominantly flat with some hills rising to 345 m. a.s.l. in central and northwestern areas. The annual precipitation is 500–600 mm, increasing from south to north. There is wide variation in mire formation and peat accumulation across Belarus, due to differences in climate, geology and hydrology. The peatlands of Belarus are important for biodiversity conservation, climate regulation and water regime. Peatlands are used for a wide range of purposes and natural peatlands are often found as islands in the landscape, surrounded by areas with amelioration and peat extraction.

Classification & Distribution of Peatlands

We call mires the overmoistened land lots covered with aquaphilic vegetation where the process of peat formation takes place.

The stimulation of overmoistening conditions, the production of vegetable biomass, the rate of its mineralization, humification and transformation into peat is influenced by two groups of factors: cosmic factors (light, heat) and terrestrial factors (climatic, latitudinal-geographic, geological, geomorphological, hydrological conditions of the country, soil and vegetable cover, people collective activities). As is seen from Photo1 they are not isolated from one another but interact with other factors. For example, the country relief influences such factors of mire and peat formation as the distribution of solar radiation and precipitations on the earth surface, air humidity and water evaporation, hydrographic system, vegetable cover and topsoil.

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Photo 1: Yelnia Peatbog: Numerous lakes add diversity to the monotonous mire landscape. Photo: V. IVANOVSKI.

Photo 2: Yelnia Peatbog: Golden Eagle has built its nest on the edge of the mire. Photo: V. IVANOVSKI.

Photo 3: Yelnia Peatbog hosts the region's largest group of Black Grouse. Photo: A.KOZULIN.

The process of peat formation can be devided into two main stages: the first stage - catching the electromagnetic energy of the sun by mire plants and its transformation into the energy of chemical bonds of the produced organic substance; the second stage - transformation of the died off mire plants into peat.

In natural conditions mires perform different specific functions, namely: accumulative, biological, landscape function, interrotational, gasoregulative, geochemical, hydrological and climatic functions. First four functions are irreplaceable, i.e. they are exclusively characteristic of the mires and none of the other dwelling-places on the land (such as forests, meadows, steppes, agricultural lands) can perform them. All the upper-mentioned functions are biospheric because the mires, being a product of the biosphere evolution and being its integral part, produce notable effect on a number of biospheric processes.

The Belorussian experts classify mires depending on the water-mineral nutrition conditions and the growing vegetation. There are three mire types depending on these criteria: low-moor (evtrophic or fen), transitional (mezotrophic or poor fen) and high-moor (olygothrophic or bog).

Fens (low-moor type) are formed under the rich nutrition conditions (60-400 mg/l of the dissolved mineral salts) by the ground and river waters and by the atmospheric fallout.

Poor fens (transitional type) are formed under the transitional nutrition conditions (40-80 mg/l of the dissolved mineral salts) by the atmospheric waters, surface sewage and partly by the ground waters.

Bogs (raised bogs, high-moor type) are formed under the conditions of nutrition mainly only by the atmospheric waters which contain less than 50 mg/l of the dissolved mineral salts.

Each of three above mentioned mire types is subdivided into three subtypes depending on the vegetal cover structure and root inhabited layer hymidification in percentage: woody (humidity is 84-89 %), wood-swampy (humidity is 89-91 %) and

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swampy (humidity is 91-94 %). Thus, there are nine mire subtypes.

Mire subtypes are subdivided into 6 groups depending on prevailing vegetation: woody, wood-grassy, grassy, grass-mossy and mossy. Only one group (woody) corresponds to the woody subtype; wood-swampy subtype unites two groups – wood-grassy and wood-mossy; swampy subtype includes tree vegetation groups: grassy, grass-mossy and mossy.

The lowest tacsonomic mire vegetation unit is the plant formation, which is characterised by the floristic constancy and by the timing to the certain ecological conditions. The alder plant formations, for example, grow under the root inhabited layer good aeration and ground waters high mineralisation conditions; and fuscum phytocenoses grow on the contrary under the water low mineralisation and substrate increased humidification conditions. There are nearly 40 kinds of mire plant formations (phytocenoses) in Belarus.

The general peatland area on Belarus territory was 2,939.000 hectares or 14.2 % before the beginning of drainage and peat mining (BAMBALOV et al. 1990). However there are large differences in the combination of main peatland forming factors in the different republic areas with the rather small territory sizes. These factors are the climate, geology, geomorphology, hydrography, hydrology, etc. This has caused the significant differences in quantitative and qualitative mire formation and peat accumulation features and the unevenness of peatland distribution on the territory.

The lowest swamping is mostly the characteristic for the most increased and well-broken up relief forms – moraine and end-moraine plains. First of all it is the system of end-moraine formations of Dniepr glaciation Moscow stage, which are incorporated by the general name of Belorussian ridge. There are Vitebskaya, Orshanskaya, Minskaya, Novogrudskaya, Slonimskaya, Volkovysskaya and Grodnenskaya highs, Kopylskaya and Oshmyanskaya ridges.

The areas of wide end-moraine ridges and highs distribution, which are included in the Baltic ridge system, formed as the result of the last Valday glaciation (Sventsyanskaya, Braslavskaya, Osveiskaya, Sennetskaya certainly-moraine ridges, Neshcherdovskaya, Ushachsko-Lepelskaya, Gorodokskaya and Lukomlskaya heights), have the low swamping on the north of the republic in the area of Belorussian Poozerie.

Photo 4: Blooming Cottongrass makes the mire white in spring. Photo: V. RAKOVICH.

There are areas with the low swamping in a southern part of Belarus dated to the certain-moraine formations of Dniepr glaciation epoch: Yurovichskaya and Mozyrskaya moraine ridges, Hoiniksko-Braginskaya moraine high.

The Dniepr basin left bank part (the area of East-Belorussian plain) has the low swamping. The small peatland formation was here in the syffosion and karst genesis hypocrateriform hollows under the conditions of the wide spreading of cover of loams, loesses and chalk rocks surface bedding.

The most swamped part of Belarus territory is the Polesskaya lowland especially its central part – the Pripyat Polessie. The peatland forming processes here occurred as the result of non-climatic factors complex favourable combination. These factors are the relief, geological structure, district hydrological condition. Thus, the availability of the flat and flat-wavy relief on the wide spaces with the insignificant watershed exceeding above the local erosion bases, the availability of the significant water-permeable, mainly sandy covering rocks with the small hydrographical network cut has en-

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Photo 5: The Pripyat river floodplain is important migrating route of Ruff and other water birds. Photo: A.Kozulin.

sured the high soil-ground waters standing with the complicated drain conditions. The complex of listed factors has ensured the peatland formation process wide development in Polesie even with the some atmospheric precipitation deficiency in the vegetation period.

Other, the less spacious Belarus lowlands are considerably swamped. They are Narochansko-Vileiskaya, Verhne-Beresinskaya, Chashnikskaya and Polotskaya lowlands.

The plain territory swamping totally is higher in comparison with the ridges and highs but is lower in comparison with lowlands.

Thus, the peatland formation processes on Belarus territory were closely connected with climate, its features and changes in Holocene. These processes totally were developing with the increasing intensity; that is caused by climate humidification increasing in Holocene.

The other factors have the great influence on the peatland formation and peat accumulation processes on the favourable climate background. First of all these are the geomorphological and hydrogeological factors. The peat layer average depth is 2.5 m in Vitebsk region, 1.4 m in Brest region, that is caused partly by the Belarus south and north geomorphology differences. The peat forming incipient stage was connected mainly with the lake swamping and peatland formation on Vitebsk region territory and on the north of Minsk region, i.e. the deepest hollow swamping and peatland formation, while the peatland overgrowth occurred mainly broadwise in Polesie in the flat and flat-wavy relief conditions. So, the republic territory geomorphological features are accepted as the basis of the republic peatland zoning (Pidoplichko 1961). However we should not exaggerate the geomorphological factor role, because there are many examples in Belarus when the peatland forming processes are shown poorly or are absent in the most favourable geomorphological conditions. The places with the powerful zandr sediments can be such examples on the north and northwest, and also the sand sediments in Beresina, Sozh, Pripyat rivers lower reaches and partly in Pridneprovie.

The favourable geomorphological conditions were realised on Belarus territory in the peatland formation and peat accumulation processes with the hydrological factors, which ensured more or less constant hydromorphia of the negative relief forms. Thus, the availability of waterproof rocks, which underlay close to surface and on the large areas (bottom moraine and land-glacial clays), promoted the intensive peatland forming on the separate areas in Poozerie and Predpolesie zones. The peatland forming on the large areas occurred with such hydrological conditions, including even high watershed spaces, for example Drut and Beresina, Nieman and Ptych, Vilia and Beresina, Western Dvina and Disna, Western Dvina and Obol interfluves. The sandy covering rocks with the ground waters high standing are widely distributed on Polesie lowland unlike this. This has caused to the soil-ground hydromorphia on the spacious areas and to intensive peatland formation with the district flat relief and small biases even when the humidification coefficient is less than one.

Bogs of the republic north and south differ both by the morphology and vegetal cover floristic composition. They have, for instance, the bulge of 5-6 m on the extreme northwest, the hummock-hollow complexes of such bogs are good developed with the prevailing of bog hollows on the hummocks, and bog hollows are very flooded. *Empetrum nigrum*, *Sph. Balticum* are widely distributed

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Fig. 1: Peatland zones in Belarus and distribution of large peatlands.

Key to geomorphological zones:

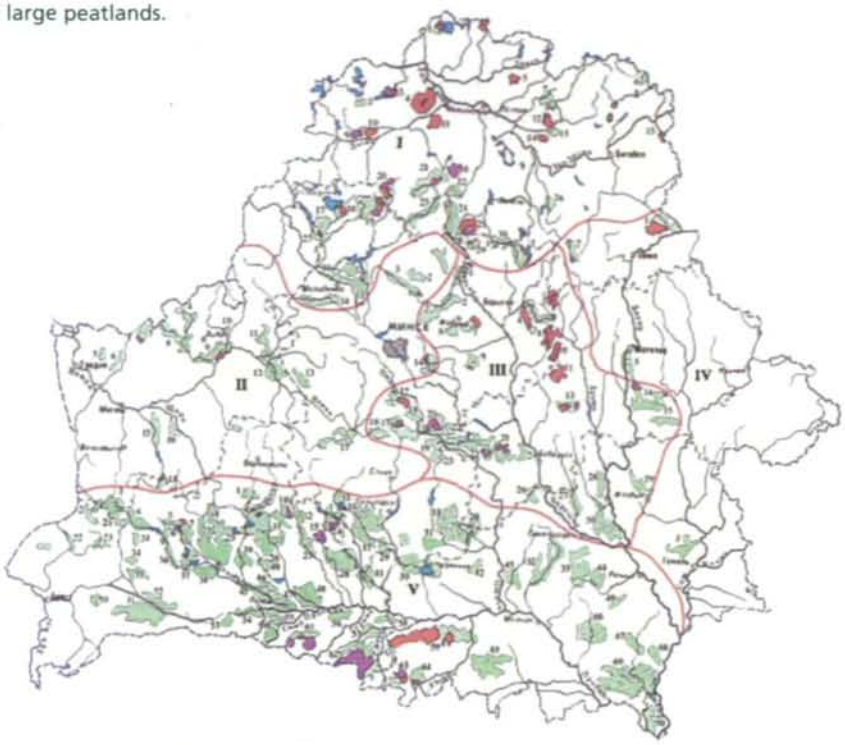
I Hill-lake landscape bog area (Poozerie). Peat deposits often overlie lake deposits. 10.6% of the area is peatland, with an average depth of 2.0 m. Fen peat 54.5%, transitional 7.3% and raised bog peat 38.2 %

II Western end-moraine landscape fen area. Few lakes. 7.7 % of the area is peatland, with an average depth of 1.96 m. Fen peat 94.3%, transitional 3.7% and raised bog peat 2.0 %

III Alluvial plain bog and fen area. 15.6% of the area is peatland, with an average depth of 1.93m. Fen peat 70.3%, transitional 6.2% and raised bog peat 23.5%

IV Small bog and fen area in the loess rocks. Predominantly flat with few lakes. 5.5% of the area is peatland, with an average depth of 1.59 m. Fen peat 85.5%, transitional 3.6% and raised bog peat 10.9 %

V Large Polessie fen area. Sand/clay plain. 18.3 % of the area is peatland, with an average depth of 1.55 m. Fen peat 86.4%, transitional 7.3 % and raised bog peat 6.3 %



Types of peatlands

- high type
- transitional type
- low-land type
- the borders between peat-peatland areas (I,II,III,IV,V)

in this bog vegetal cover, we can meet also *Betula nana*, *Betula humilis*, *Sph. lindbergii*, *Rubus chamaemorus*, i.e. the representatives of flora, which is the characteristic for the Russian Federation Northwest and Baltia. The most of listed species are not met south of Belorussian ridge. The *Empetrum nigrum* extreme border passes only a little bit south of Minsk-Mogilyev line.

The bogs are not very bulging (the bulge is 0.5 – 1.0 m) with the pine forest stand of higher fullness and higher bonitet in the southern part of Belarus. *Sph. magellanicum*, *Sph. Angustifolium* and *Sph. rubellum* which are the widely distributed components of sphagnous cover on the north, prevail in sphagnous cover, they are met extremely seldom on Polesie.

The rather large bogs are still met in Belarus central part. But their bulging is lower then on the north (1.5 – 3.0 m), and the hummock-hollow complex is developed considerably worse. Hummocks are larger than bog hollows on their area, and the bog hollows have the lower flooding. On the republic central part bogs are met also the sites with the original „mosaic" sphagnous cover, when the moss species, which are incident both to hummocks and bog hollows, grow together. It is noticed also that peat deposits totally on the bogs of republic south

Photo 6: *Spring flood in river valley.*
Photo: A. Kozulin.

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Photo 7: Middle Pripyat Floodplain: The Europe's disappearing species, Great Snipe, is still quite common in the flood-plain. Photo: V.Jurko.

are characterised by the higher degree of decomposition We connect all these facts with the climatic condition change from north to south in the humidification reduction side.

Also it is necessary to notice, that the modern climatic differences are not displayed essentially on the republic fens, where soil-ground waters, ground-sewage and floodwaters have the leading role in the water-mineral nutrition.

There are five peat-peatland areas on Belarus territory (Pidoplichko 1961) (Fig. 1).

Photo 8: Duleby Islands Wood and Mire Complex: Crane. Photo: A. Kozulin.

Landscape and Biological Diversity of Wetlands

Due to the botanic data, Belorussian wetland vegetation has the rich floristic structure, which comprise 267 species of flowering plants and ferns, including 37 species of ligneous and frutescent plants, 167 species of herbal, 31 species of sphagnous mosses and 32 species of green mosses.

More than 50 species of valuable medicinal plants, such as valerian, Labrador tea, butterbur, buck-bean, etc, grow on Belorussian peatlands and also the berry plants: cranberry, lingonberry, blueberry, bilberry.

This plant species diversity forms the big quantity of plant formations (reedy, sedgy, mossy, woody, etc) on the peatlands depending on water content, medium acidity and other factors.

The significant part of plants growing on peatlands are the rare and threatened species: they are the raptorial plants *Drosera*, sphagnous mosses *Sphagnum* spec., cotton grass dainty (*Eriophorum angustifolium*), cranberry (*Vaccinatum oxycoccos*), buck-bean trefoil (*Menyanthes trifoliata*). The following vascular plants are in Belarus Red Data Book: *Osmuhda regalis*, *Hydrocotyle vulgaris*, *Valeriana dioica*, *Scabiosa columbaria*, *Gentiana verna*, *Swertia perennis*, *Pinguicula vulgaris*, *Saxifraga hirculus*, *Carex buxbaumii*, *Carex capillaris*, *Betula nana*, *Salix murtilloides*, *Rhododendron luteum*, *Drosera intermedia*, *Rubus chamaemorus*, *Pedicularis sceptrum carolinum*, *Pedicularis sylvatica*, *Senecio fluviatilis*, *Iris sibirica*, *Corallorhiza trifida*, *Listera cordata*, *Listera ovata*, *Carex pauciflora*, *Carex paupercula*, *Viola ulidinosa* and also bryophytes: *Gymnocolea inflata*, *Sphagnum lindbergii*, *Sphagnum molle* and *Cinclidium stygium*.

Bog and poor fen fauna is characterised by the low indexes of animal population species diversity, first of all they are mammals, reptiles and amphibian. The population density indexes of all the animal groups are very low, which is connected with the very low productivity of these peatland ecosystems. However, the peatlands have the great importance for the number of rare species conservation. The condition of bird species great number depends all on the peatland systems condition, because the

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most of their population inhabit just on the peatlands. So, the most of Belorussian population of the following species inhabit on the bogs and poor fens: osprey (*Pandion haliaetus*), short-toed eagle (*Circaetus gallicus*), golden eagle (*Aquilla chrysaetos*), merlin (*Falco columbarius*), black grouse (*Lyrurus tetrix*), willow grouse (*Lagopus lagopus*), golden plover (*Pluvialis apricaria*), wood sandpiper (*Tringa glareola*), greenshank (*Tringa nebularia*), whimbrel (*Numenius phaeopus*).

The following rare species inhabit in peatlands and in the neighbouring swampy forests: *Lanius excubitor*, *Asio flammeus*, *Gavia arctica*, *Larus argentatus*, *Grus grus*, Tengmalm's owl, short-toed eagle, great grey owl, three-toed woodpecker and other protected species. Peatlands are the good hiding-places, which are used constantly or in same seasons.

The opened Polesie fens have the greatest importance for Europe biodiversity conservation. Such fens were widely distributed in the mild Europe not long ago, but they are extant principally in Polesie regions as the result of the draining amelioration. The most of natural fens is situated in Belarus.

The number of inhabited on fens species was reducing synchronously with the fen area reducing. The number of aquatic warbler (*Acrocephalus paludicola*), which is one of such species, has reduced to endangered limits and this species was declared as the globally threatened in Europe. This species areal is discrete now and is represented by the several isolated groups, which are concentrated mainly in Polesie. More than 60 % of known modern world population number, which is 14.000-20.000 ephebic males (and maybe the same number of females), are extant in Belarus, including 34 % in peatland-river Pripyat system and affluxes and 21 % in Yaselda system. This biogeographical region extends on 350 km from northwest to southeast and on 100 km from north to south. The short-eared owl (*Asio flammeus*) and common crane (*Grus grus*) are the other species, whose populations depend on fen condition.

Besides some of mammal species largely depend on fens condition. These are elk, raccoon dog and wolf.

Photo 9: Vast reaches of Zvanets, Europe's largest fen mire. Photo: A. Kozulin.

The most of Belorussian peatlands and mire complexes are located on the way of water-peatland bird migration from Europe and Africa to the north of Russia and back. The virgin Belorussian peatlands give the food and the rest to the migrant birds, part of them stay here to nest. 15 % of black stork (*Ciconia nigra*) European population, 9 % of white stork (*Ciconia ciconia*), 45 % of lesser spotted eagle (*Aquilla pomarina*), 46 % of spotted crake (*Porzana porzana*), 59 % of corncrake (*Crex crex*), 7 % of great snipe (*Callinago media*), 23 % of redshank (*Tringa totanus*), 57 % of aquatic warbler (*Acrocephalus paludicola*), etc nest only on Polesie peatlands.

The most of Belarus peatlands certainly are the European and world value and must be included in the European and World natural heritage.

The works on inventory and on organisation of the official acknowledgement for biodiversity conservation procedures of the territories of international importance have begun only in the last years. There was designed 20 potential territories of international and national importance (Ramsar territories and Key Ornithological Territories (KOT – IBA Bird Life) for the biodiversity conservation as the result of conducting works. The area of these territories is 620.626 ha, it is 2.9 % of the republic area. It is necessary now to ensure the protection national status and to succeed the interna-

Photo 10: The Zvanets mire has the world's largest population of the globally threatened Aquatic Warbler (4.000-7.000 pairs). Photo: A. Kozulin.

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tional acknowledgement of these territories, that will let to increase the effectiveness of the rare species biogeographical populations and biodiversity totally protection.

The most of these territories is represent by the water-wetlands; peatlands and flood plains are prevailing here. Water-wetlands and peatlands are more than a half of area of nine from 20 potential territories (43 %) of international and national importance for biodiversity conservation, flood plane meadows are the same for five territories (24 %), woods – for four territories (18 %).

All the potential territories of international and national importance for biodiversity conservation are subdivided into following groups depending on prevailing biotopes:

- fen big complexes (4 potential territories) with the enclosing forests and ameliorated lands;
- bog big complexes (4 potential territories)) with the enclosing woods and ameliorated lands;
- big and middle river flood plains with the prevailing of flood plain meadows and flood plain forests prevailing (5 potential territories);
- forest, flood plain and lake mosaic complexes (3 potential territories);
- fishery ponds (3 potential territories);
- big forest (1 potential territory).

Peatland Use and the Threats

Most of the peatlands of Belarus have been allocated to one of four Funds according to their intended use, as indicated below. There are plans to add 394.000 ha of peatland to the Nature Protection Fund, but the sites to be added have not yet been identified.

Mires and peat deposits are actively used in the various economy branches: for the peat mining and processing, as the agricultural lands, natural protected areas and for other purposes, what with they are ranged into purposive funds (Tab. 1).

Peat deposits, which are used for nature protecting, scientific and recreation purposes are included in the nature protective fund. Deposits, which are reserved by the government or reservable as the raw material base of sphagnous peat kinds with the low decomposition degree, bituminous peat kinds, and also of peat therapeutic muds, are classified as the reserve fund. All the peat deposits, which are approved as the row material base for industrial peat mining, are included in the developing fund. Peat deposits, which are intended for amelioration and are not included in the nature protective and reserve funds, are included in the land fund. Peat deposits, which use direction is not still defined because of their low researching, are included in the undivided rest.

Since the most of peatland biospheric functions are exhibited in the global and regional scales (RAKOVICH & BAMBALOV 1996), it is natural, that Belorussian wetlands are the powerful environment forming factor not only on Belarus territory. Thus, we can affirm that three aspects are defining Belorussian peatland importance for Europe. These are input in biodiversity conservation, input in atmosphere gas compound improvement and input in the regulation of water regime, natural water quality and climate on the spacious areas. However the wide-ranging economic use creates the threat to peatland function.

peatlands and mire complexes are the very specific and irreplaceable natural ecotopes for biodiversity. Almost all the pant and animal species, which inhabit on peatlands, are the rare and hurtable, because they can inhabit only on the peatlands, and the reducing of peatland area fatally leads to the reducing of the most of the unique species number, and sometimes to their full extinction. Peatlands are extant only as the

Tab. 1: Distribution of Belarussian peatlands between different land-use Funds. * are natural peatlands, 1) will change as extraction is completed and areas are recultivated

Name of Fund	Current area (ha)	Planned area (ha)
Nature Protection Fund	*317.200	711.200
Agricultural Land Fund, including recultivated areas	1,085.100	1,085.100
Developing Fund- areas under peat extraction	101.000	122.400
Reserve Fund - areas reserved for raw materials (e.g. extraction)	30.800	38.900
Peatlands where the use has not yet been defined	*793.800	370.300
Peatlands not included in any Fund (too shallow for extraction)	*523.800	523.800
Extracted peat deposits - not recultivated	87.300	87.3001)
Total (area with peat deposits)	2,939.000	2,939.000

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island sites now as the result of amelioration and peat mining, therefore the most of wetland species inhabit as the local, isolated groups.

Mire and peat deposits degradation goes now under the anthropic factor influence. Almost all the economy activities on peatlands lead to the partly or fully peat use ,mire ecosystems destruction, peatland biospheric functions destabilisation.

One of the threats of anthropic influence on wetland landscapes is the peat industry. Deposit is fully or partly working out, and peatland is excluding out of ecosystem, its functions in nature and the peatland forming processes are breaking or are stopping as the result of peat mining for the fuel or the fertilizer.

The influence of anthropic factor on mires and peat deposits by their amelioration is exhibited especially scaly. Peatland ecosystems are destroying by the amelioration, the drastic relief reconstruction occur because of canalising and other hydrotechnical constructions building. The root inhabited layer aeration regime is changing, organic matter is mineralisation and microclimate is changing as the result of ground water age-old reserves dumping. Peat accumulation process is replacing by the organic mineralisation and peat destruction processes by the peatland drainage. Amelioration changes essentially the water regime both of draining territory and neighbouring sites. Direct wild peatland vegetation destruction and its replacement by the cultivated cultural agrocoenosises occur by the agricultural drained land reclamation, and also peatland animality is changing.

Road-transport building, power lines construction, oil- and pipelines and other communications carrying are the anthropic influence on mires and peat deposits.

Nonstandart flushes from the fishery ponds, spring burning and pollution make the threat to peatland biodiversity in the most of sites.

Radiation and chemical pollution affect negatively on the peatland ecosystems. More than 40.000 km^2 of the republic area are polluted by the radiation emission as the result of the accident on Chernobyl NPS. Forests, meadows and peatlands are 50 % of all polluted areas. Natural plant association pollution feature is that the dropped out radioactive emissions are still in the topest part of soil structure. They are adsorbed by the soil-adsorbing complex and are sedentary, therefore forest, meadow and peatland vegetation have the high radioactivity.

Photo 11: A large share of the mires gets overgrown by forests. Photo: V. Ivanovski.

Photo 12: Fires on the drained territories of peatlands. Photo: V. Rakovich.

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Photo 13: Ecological rehabilitation of Osveya peatland by the secundary swamping. Photo: V. RAKOVICH.

Protection & Rehabilitation of Peatlands

The aims of the most ecologically important peatlands and mire landscapes protection are:

conservation of unique ecotopes for mire and inhabited near the water species of European, regional and local importance;

conservation of peatlands as the environment forming factor, which provides the atmosphere cleaning from the carbon dioxide excess and its oxygen enrichment, water regime and climate maintenance on the large territories.

Peatlands and mire landscapes protection is implementing within tree directions: the first is the protecting of those peatlands and mire landscapes, which are already included in the protected natural territories; the second is organisation of new protected natural territories on the mires and peat deposits by their transformation from the undivided peat fund in the nature protective fund; the third is the renewable of the peatland forming processes and forming of new mires on the anthropic disturbed peatlands. Besides the earlier ameliorated territories can be transferable to reserves and some times to the national parks after the secondary slumping.

The following large especially protected territories are created in Belarus:

The State National Park 'Belovezhskaya Pushcha" is located in Brest region (Kamenets and Pruzhany districts) and Grodno region (Svislochsky district). The general park area is 98.500 ha. 23 peat deposits with the general area of 26.200 ha are included in Pushcha and its protected zone. The main park aim is the biological diversity conservation and the deep research of forest plant formations and their growth logic.

Beresinsky biospheric reserve is created on the watershed between the Dniepr and Western Dvina, it is situated in Minsk region, Borisov district, and in Vitebsk region, Dokshitsy and Lepel districts. The general reserve area is 76.200 ha, 20 peat deposits occupy 38.100 ha. Works on Belorussian Poozerie plant formation researching and conservation are conducting on the reserve peatlands, and also the researching on hydrology, botany, zoology and silvics.

„Pripyatsky" National Park is organised for the research of Polesie lowland hydrologically closed landscape changes. It is situated in Gomel region on the territory of Zhitkovichy, Lelchitsy and Petrikov districts in the Pripyat, Stviga and Ubort interfluve. Park area is 82.400 ha. Peat deposits complex with the general area of 38.600 ha is included in park, the territory of peat deposits is the joint dale, which is extended along the Pripyat river. Park peatlands have the great hydrological importance, because they are the dampness accumulators during the periods of atmospheric precipitation affluence, and they replenish the Pripyat, Stviga and Ubort rivers with water during the rainless time and also regulate the levels of neighbouring territory ground waters.

„Braslav Lakes" National Park is situated in Vitebsk region. Its general area is 69.100 ha, including the protected peatland area of 12.500 ha.

Botanical zakazniks, which have the protected territory status, are created in the republic. Their total area is 142.700 ha, including 2.400 ha of 33 peat deposits. These are mainly the small not deep deposits, on which medicinal and rare t plants grow.

Hydrological zakazniks with the general area of 83.000 ha are created on the peatlands, which fulfil the water protective role.

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The largest are Yelnya, Dikoye, Vygonoschanskoye, etc.

Berry zakazniks are created for the wild berry (cranberry, bilberry, blueberry, lingonberry) conservation. There are 20 zakazniks for cranberry now in the republic with the general area of 26.500 ha, including 23.500 ha of peatlands.

The Red Data Peatland List in made in Belarus, which includes more than 200 objects. Peatlands are included in the Red List due to the following criteria:

- wetlands, appropriate to the international importance criteria: Ramsar sites, which are the specific type of water-mire, which are rare or unique for this biogeographical region;
- mires and peat deposits, which are included in nature reserves and national parks,
- mires and peat deposits, which are included in different zakazniks (hydrological, botanical, cranberry, zoological, etc);
- flood plain peatlands, on which the change of water regime is forbidden;
- mires and peat deposits, which are the parts of lake-mire or flood plain-mire complexes.

The Red Data Peatland List must be essentially edited in perspective because of the necessity of increasing of peatland nature protective fund area more than in 2 times. The anthropic not disturbed peatland area in the nature protective fund must not be less than 711.000 ha, it will let to maintain the stability in the environment. The main source of wetland nature protective fund area adjunction are peat deposits of undivided peat fund rest. Peatlands, which are the ecotopes of biodiversity protected or endangered species, and which are on the ways of visitant water-mire bird migration, peat deposits in the rivers and lakes flood plains, which have the water-protective importance must be included in the nature protective fund from the undivided rest. Peatlands, on which the big medicinal plant populations grow, must also be included here.

Besides, there are many flood plain mire complexes in Belarus, which are the alternate small peatlands, river oxbows, swampy meadows and bushes on the mineral lands, which are periodically flooded by flood plain waters. Also the flood plain mire complexes have the high feeding and protective capacity for the water-mire biodiversity species. They occupy the large spaces, for example in Pripyat flood plain, and play very important role in the maintenance of the most of European populations of visitant bird species, therefore they must be included in the protected natural territories.

The secondary swamping worked-out peat deposits are the another source of mire and mire landscape area increasing (BAMBALOV & RAKOVICH 1996, BAMBALOV et al. 1998). Their ecological rehabilitation, which ensure the reactivation of mire and peat forming processes and also of all peatland biospheric functions, must be the one of their use main directions. It is possible to create the nature protective zones on the rehabilitated peatlands, which will improve the natural environment condition. The experience of more than 25 peatland rehabilitations in different Belarus natural zones with the general area of 30.000 ha has shown that the faultless water-mires are formed on the secondary swamping worked-out peat deposits. The opened shallow reservoirs alternate with the reed, sedges and other wetland vegetation species bushes. The former roads and railway banks, undercordwood bands and dames together with the natural dry dales form the system of numerous islands, treed with the meadow and woodbush vegetation. Channels full with water makes such sites hard-to-reach for men and reliably protect the numerous colonies of mire and water animals: birds, beavers, ondatra, etc. Mire landscapes with the high feeding, protective and environment forming capacity are forming on the secondary swamping worked-out peat deposits.

The secondary swamping earlier ameliorated agricultural lands, which has lost their productivity or drained because of designing mistakes, could be the additional source of wetlands, which fulfil the nature protective functions. The secondary swamping of such territories is implementing for the ecological purposes, for example the secondary swamping is conducting on the area of nearly 600 ha on the part of Diky Nikor peatland, which was ameliorated in 1958 and is

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adjacent to the Belovezhskaya Pushcha National Park. The secondary swamping has begun on the area of 400 ha on the ameliorated object Mstizh-Makovie, which is adjacent to the Beresinsky biospheric reserve.

Zusammenfassung

Moore in Weißrussland – In den Regionen Weißrusslands entstand auf Grund der unterschiedlichen Bedingungen für die Torfbildung eine große Vielfalt an Moortypen verschiedener Größe und Torfmächtigkeit entstanden, die ursprünglich etwa 2,939.000 ha, das sind 14.2 %der Landesfläche, bedeckten.

Die weißrussischen Experten klassifizierten die Moore auf Grund ihrer Wasser- und Nährstoffverhältnisse in Kombination mit der torfbildenden Vegetation. Drei Grundtypen ergaben sich aus diesem Ansatz: eutrophe Niedermoore, meso- und oligotrophe Übergangsmoore und oligotrophe Hochmoore. Der Anteil der Niedermoore beträgt 81,6 % (2,103.800 ha), der der Übergangsmoore 3.4 % (106.200 ha) und der der Hochmoore 15.0 % (333.700 ha).

Die Notwendigkeit, Moore in Weißrussland zu schützen, ergibt sich einerseits aus ihrer Bedeutung für die Landschaft, andererseits aus dem großflächigen Torfabbau und der Drainage der Moore für die Landwirtschaft. Bereits 40 % der ursprünglichen Moorfläche ging auf diese Weise verloren – mit den entsprechenden Folgen für die Stabilität der ökologischen Prozesse. Viele einzigartige Moorlandschaften und Einzelobjekte mit ihrem Beitrag zur Biodiversität wurden vollständig zerstört. Erst in neuerer Zeit wurde man darauf aufmerksam, wie wichtig die Rolle der Moore für die Erhalung der landschaftlichen Diversität, als Kohlenstoffspeicher und damit als Klimaregulatoren aber auch als wichtigste Landschaftselemente zur Regulierung und Reinhaltung des Wassers ist.

References

BAMBALOV N.N., DUBOVETS A.G. & S.G. BELENKY (1990): Peatland Forming Processes on Belorussian Territory. — Problems of Polesie **13**: 75-90 (In Russian).

BAMBALOV N.N. & V.A. RAKOVICH (1996): The Principles of Biospheric Compatible Nature Use on Mires and Peat Deposits. — Natural Resources **1**: 135-139 (In Russian).

BAMBALOV N.N., TANOVITSKY I.G., BELENKY S.G. et al. (1998): The Problems of Polesie Lake-Mire Complexes Ecological Rehabilitation. — Natural Resources **2**: 66-74 (In Russian).

PIDOPLICHKO A.P. (1961): Peat Deposits of Belorussian SSR. — Minsk, (In Russian).

RAKOVICH V.A. & N.N. BAMBALOV (1996): Classification of Peatland Functions in the Nature and Society. — Natural Resources **1**: 119-124 (In Russian).

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