

NATURE CONSERVATION AND RESOURCE CHARACTERISTIC OF PEAT RESERVES IN UKRAINE

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Оцінено запаси торфу в Україні. Наведено результати оцінки сировинної бази торфу. Обґрунтовано нерівномірність розподілу торфових ресурсів у розрізі областей України. Здійснено класифікацію покладів торфу. Ресурси торфу обчислено за промисловим значенням, ступенем розвіданості, групами освоєності. Визначено ступінь заторфованості території областей. Висвітлено і проаналізовано площі осушуваних торфових земель в областях.

Ключові слова: торф, торфове родовище, видобуток, ресурси, ділянки.

In the world, peat reserves amount to about 500 Gt, including all diluted – more than 235 Gt. On Earth, peatlands occupy about 2% of land, but they are distributed extremely unevenly: in Eurasia – 1.8%, in Africa – 1.2%, in North America – 0.9, in South America – 7.0, in Australia – 0.1%. The peatlands occupy 12.550 sq. km of Poland, which is 4.1% of the country's surface. In Europe peat are on average 20% of the total area. Among them: 30% – agro land, fields, meadows, 18% – forest peatlands, and 6% – the selective reserves of peat, 40% in a natural state, protected, 6% – other. Peat formation and mire formation of peat-bog regions in Ukraine are chronologically correlated [1, 2].

Ukraine is characterized by high anthropogenic transformation of natural landscapes. For the last century, the most powerful of all factors influencing natural complexes was drainage reclamation. 12 Gm² of peat and swamps were drained. A transformed landscape system was created as the result. Ukraine's peat resources amount to 2.17 Gt, balance reserves – 934 Mt [3, 4].

On the territory of Ukraine, 2.488 peat deposits with a total area of 5830 Mm², with reserves of air-dry peat of conventional (40%)

humidity of 2165.9 Mt are detected, explored and taken into account. According to the general geological accounting, its reserves come to 2.17 Gt. From the total area of the peat fund of Ukraine, which is equal to 5830 Mm², currently 4837 Mm² are explored [5].

The purpose of the work is to evaluate and analyze the raw material base of peat in Ukraine.

MATERIALS AND METHODS

The analysis of the current state of peat deposits in Ukraine was carried out on the basis of data of the State Information Geological Fund of Ukraine and in accordance with «Methodological guidelines for the distribution of peat deposits and plots by degree of industrial development» [6], approved by the State Agricultural Enterprise «Torfogeologiya» (Peat Geology) and coordinated with the Ministry of Geology of the UkrSSR in 1989. Since the first years of independence of Ukraine, a wider study of peat deposits has begun: through the reclamation organizations, in order to determine the possibility of using peat formation as agricultural lands, for the purpose of preliminary assessment and extraction of peat deposits for organization or development of peat production in the central and eastern regions, which have a sharp need for local fuel.

RESULTS AND DISCUSSIONS

Peat deposits occur in almost all regions of Ukraine, except southern and coastal areas. The most common peat deposits are in the oblasts of: Rivne, Volyn', Chernihiv, Zhytomyr, Kyiv, Lviv. The concentration of the peat formation on the territory of the Rivne and Volyn' oblasts reaches 6.5%, and it does not exceed 1.9% of the whole territory in Ternopil', Khmelnytsky, Vinnytsya, Cherkassy, Poltava, Sumy and Kharkiv. Even more rarely, peat deposits occur in the Mykolayiv, Zaporizhzhya, Dnipropetrovsk, Transcarpathian, Ivano-Frankivsk oblasts, where the degree of peat formation does not exceed 0.1%.

The irregularity in the distribution of peat resources by regions is determined by the heterogeneity of climatic, soil, geological and other factors that determine the processes of peat formation and peat accumulation.

Ukrainian peat resources are calculated:

- for industrial purposes;
- by degree of exploration;
- by groups of industrial development of stocks.

Distribution of peat reserves by industrial value. They consist of stocks of categories A (reserves, which are explored in detail, providing full identification of the mode of occurrence, shape and structure of peat deposits, quality and technological properties), B (the reserves explored and studied in detail, providing clarification of the main features of the conditions of deposition, the shape and nature of the structure of peat deposits, the quality and the basic technological properties), C1 (the reserves explored and studied in detail, which provides clarification of the mode of occurrence, shape and structure of peat deposits, quality and technological properties), C2 (inventories, previously estimated; number of peat deposits was determined on single samples) and predicted resources of categories P1 (prospective resources) and P2 (projected resources). In accordance with the classification of reserves of deposits and predicted resources of solid minerals, reserves of peat found and explored on their industrial values and divided into two groups: balance and off balance.

The balance sheet includes the stocks of peat, the use of which, in accordance with the established conditions, is economically feasible with existing or mastered by industry techniques and technologies for extraction and processing of raw materials, observing the requirements for rational use of stocks and environmental protection, namely:

- reserves of peat of categories A, B, C1, C2 for developed and unfinished peat deposits, approved in accordance with established procedure as a balance sheet and under economic conditions are suitable for development or actually being developed;
- stocks of the above mentioned categories of peat which have not been approved but comply with current standards and conditions and are suitable for development.

All categories of peat reserves are classified as balance sheet, approved in accordance with the established procedure as off-balance sheet, but at present the use of which is not economically feasible due to small quantity, low power, poor quality, special complexity of operating conditions, or within the limits of polder systems or plots drained from application of drainage, located on the territory of nature reserves or sanctuaries.

Recording of peat deposits by degree of exploration. The extent of distribution of peat deposits is classified by the peat formation of the territory, which determines the relative magnitude of the area occupied by peat. This indicator is the ratio of the total area of peat deposits within the contour of zero power to the area of the entire region. Rivne and Volyn regions have the most peat formation, where a tenth of the area became peaty.

Important indicators are also the area of the peat field, the average depth of the peat deposit, the average amount of peat reserves per 10000 m² of area within the industrial depth of the deposit and the ratio of the area within the zero depth.

Figure 1 shows the distribution of detected and explored reserves of peat in the oblasts at the «0» boundary.

By the degree of exploration, the reserves of peat are divided into explored categories

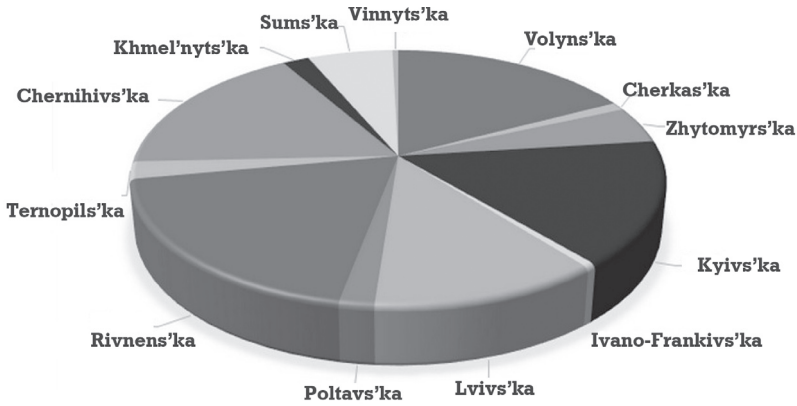


Fig. 1. The area of the peat reserves in the regions of Ukraine, (10000 m²), at the «0» boundary (Source: own elaboration)

A, B, C1 and pre-explored – C2. In addition, in surveyed peat deposits that are not yet explored, or in explored deposits, whose exploration materials have not been preserved, peat reserves are estimated as prognostic categories P1, P2.

Forecast peat resources are calculated in all areas. The summarized calculation data is shown on Figure 2.

Recording of peat deposits by groups of industrial development. In accordance

with the guidelines, which are approved by the State Agricultural Enterprise «Torfogeologiya» (Peat Geology), all deposits and peat areas are divided into 4 groups and 4 subgroups.

I group – the peat fields, which are exploited. This group includes deposits and their areas that are exploited by industry or agricultural enterprises within the area provided for the development of the project for the entire operation activity.

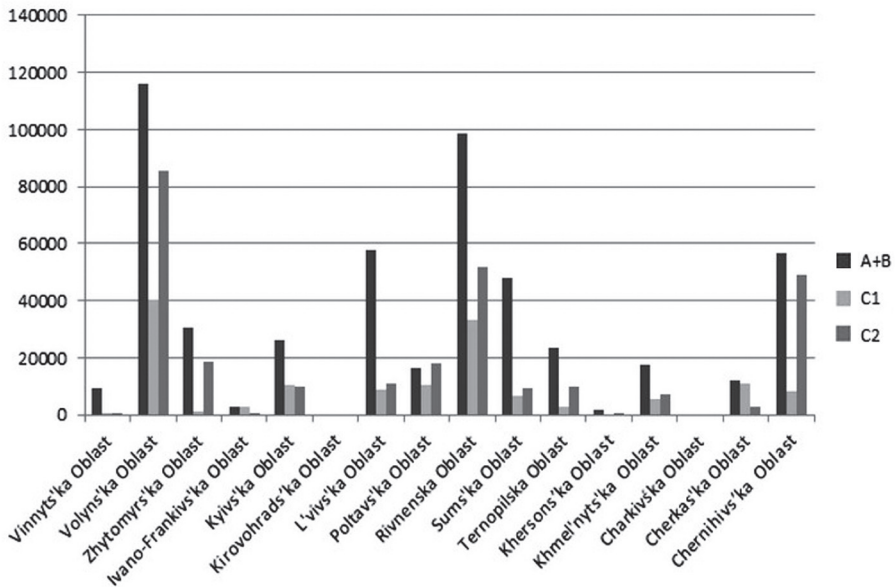


Fig. 2. Balance reserves of peat in the oblasts of Ukraine, Mt (Source: own elaboration)

II group – reserve deposits – in this group the considered peat deposits or areas with reserves of peat A + B categories, with an average depth of deposition of more than 1.5 m, reserved for peat enterprises for allotment instead of the produced areas.

III group – promising for exploration – in this group are taken into account, mainly, deposits or areas with reserves of conditioned peat, studied by categories C1, C2, which have an average depth of more than 1.5 m, most of which are already being developed.

IV group – the rest of peat deposits not included in the first three groups. These deposits are divided into the following subgroups:

IV-a Subgroup of deposits stored in the natural state that are located on the territory of nature reserves, sanctuaries and other objects of nature protection.

IV-b Subgroup of deposits drained for wooded and agricultural lands, the liquidation of which is economically inexpedient. Balance reserves of these deposits are classified as off-balance-sheet items not on the quality of raw materials, but under operating terms and for socio-environmental reasons.

IV-c Subgroup of peat deposits and areas has reserves of unconditioned ash peat (more

than 35%, and in the presence of CaCO_3 – more than 10%).

IV-d Subgroup of shallow peat deposits and areas with an average depth of peat deposits of less than 1.5 m, which are not used for agricultural land.

If we consider drained peat deposits and areas of Ukraine, then these are deposits or plots drained and occupied by agricultural land [7]. Not all drained and farmed areas are taken into account in the balance sheet, but mainly deposits and plots drained using drainage, or deposits that are included in large drainage systems, the extraction of peat on which in the future is virtually eliminated.

Today the total area of drained deposits and plots in Ukraine is within the zero depth of 162.0 thousand hectares, within the industrial depth – 1058 Mm², geological reserves – 419.6 Mt, the amount of deposits is 395 [8, 9].

Due to the low-probability of the involvement of these deposits in development, the balance of peat reserves of drained deposits is transferred to off-balance sheet.

Most of the drained deposits are located in the oblasts (Figure 3): Rivne – 128, Volyn' – 80; L'viv – 39; Chernihiv – 37; Zhytomyr – 30; Khmelnytsky – 15; Kyiv – 16; Sumy – 14.

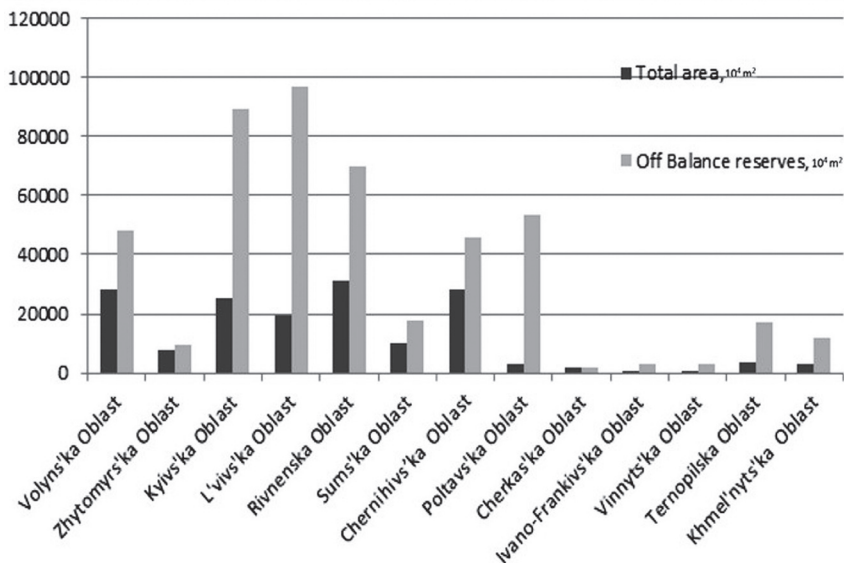


Fig. 3. Areas of drained peatlands of Ukraine, 10000 m² (Source: own elaboration)

Table 1

The distribution of peat deposits of Ukraine by groups

The group of peat deposits	number of peat deposits	Area, 104 m ²		The geological reserves of peat, Mt
		at the «0» boundary	in border of industrial depth	
1	2	3	4	5
Explored peat deposits with an area at the border of industrial depth of more than 105 m ²	1561	774849	538645	1845291
Surveyed peat deposits with estimated resources area of over 105 m ²	557	121675	81426	261736
Flooded, built-up and contaminated by Chernobyl Nuclear Power Station	114	23332	16324	53759
Wetlands, previously registered as a predictive peat deposits	121	8318	–	9616
The ratio of the area of peatlands to the total area of land registered as a predictive deposit	64	3813	–	3941
Mineral marsh formation, previously registered as a predictive peat deposits	39	2705	–	1758
Peat deposits, for which peat resources have not been confirmed	86	7886	–	–
List of peat bogs h – 0,3–1,0 m	40	2757	1393	3234
The mined-out peatlands	6630	54695	35723	114914

Depending on geological-economic condition of the peat resources of Ukraine certain groups of deposits are considered.

CONCLUSIONS

As a result of our analysis and evaluation of peat resources it has been established that the peat fund of Ukraine currently accounts 2.488 peat deposits with a total area within the industrial depth of 583.0 Mm², with total geological reserves of 2165.9 Mt of peat, 936.7 Mt of which – balance sheet, 908.6 Mt – off balance.

The study of balance reserves of peat, explored peat deposits is as follows:

By the category:

A – 510.4 Mt – 54.5%

B – 7.7 Mt – 0.8%

C1 – 142.4 Mt – 15.2%

C2 – 276.2 Mt – 29.5%

Total balance sheet of peat reserves in Ukraine is 936.7 Mt.

The peat resources of Ukraine are taken into account in separate groups of deposits depending on the geological and economic state.

The explored reserves consist mainly of deposits of lowland peat type –96% and the share of top, transitional and mixed types of peat is only 4% of all peat stocks. In absolute terms, the stock of top and transitional types of peat is 72.4 Mt. In practice, the stocks of top and transitional types of peat in quality are all balance, but most of these reserves are located in protected areas of hydrogeological sanctuary and for this reason are classified as off-balance.

The country's peat resources are used very intensively and in connection with the privatization of land, it is necessary to predict the further intensification of the usage of peat

deposits for the development of collective farming, the priority ransom for individuals and farms, the peat production increase for fertilizers, for the production of insulating plates, litters, etc.

The general principle should be the extraction and usage of peat only for fertilizer and as a litter for cattle. The authorities should

gradually, within 5–8 years, prohibit the extraction of peat for fuel, except for the forced extraction of it for domestic fuel by the local population in the absence or impossibility of providing other types of fuel, and only with special permits.

An important role for agriculture is the increased use of peat for growing crops.

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