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EVALUATION OF CHANGES IN GEOLOGICAL INDICATORS IN DRAINED LOWLAND PEAT DEPOSITS IN RIVNE REGION

Purpose. Determination of the economic expediency of using the resources of lowland peat deposits in Rivne region after prolonged drainage, taking into account the geological uncertainty of peat properties that have changed over time.

Methodology. A comprehensive methodology was applied, combining empirical and theoretical methods of scientific research. To determine geological uncertainty, the method of statistical processing, analysis and generalization of changes in qualitative and quantitative indicators of peat deposits, processing of field measurement data and laboratory research were used. When assessing risks: the method of discounting cash flows – for the cost assessment of drained peat deposits of the lowland type; the method of rational ranges of sensitivity analysis – for the sensitivity analysis of the impact of individual variation factors of geological risk components on profitability indicators; the method of risk accounting – for determining the optimal discount rate taking into account the total geological risk for the cost assessment of reserves of drained peat deposits of the lowland type.

Findings. It has been established that changes in the qualitative characteristics of lowland peat in drained deposits lead to variability of reserves and significant modification of their qualitative characteristics, which was previously not fully taken into account when assessing the prospects for using peat from such deposits.

Originality. For the first time, the relationship between changes in the qualitative properties of peat in drained lowland deposits (ash content, degree of decomposition, density and thickness of the peat deposit) and their impact on the state of reserves, the redistribution of raw material output for various industries, as well as the economic expediency of development, has been substantiated.

Practical value. Ensuring a reliable assessment of the economic feasibility of using peat from drained lowland deposits after prolonged drainage, taking into account the cumulative geological risk of changes in peat properties.

Keywords: *peat, drained deposits, geological and economic evaluation, sensitivity analysis, economic expediency*

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Introduction. Peat remains a unique natural resource with multi-sectoral application, thanks to the combination of biologically active substances, moisture-accumulating capacity, porous structure and relatively low ash content.

Peat is a mineral of national importance and belongs to category B in terms of industrial and economic value. This means that this raw material is extracted in limited volumes, taking into account that the cost price ensures the economic expediency of extraction. At the same time, the development of this resource faces problems of environmental impact, a small number of explored reserves or restrictions on development, and new deposits have not been fully explored. Along with this, for the further development of industry, the need to use this mineral will increase and it is necessary to create a balance between the limited resources and the demand for them.

The priority of the Mineral Resources Base Development Programme (MRB) until 2030 is aimed at ensuring high-level scientific support at all stages and types of geological exploration work. In addition, it is planned to develop modern methods that meet the requirements of European Union documents and advanced international standards. This approach will significantly increase the efficiency and quality of research. The direction of expansion of the MRB in this matter is determined by the prospecting and exploration of deposits planned in the Development Programme.

In connection with the concept of development of the Ukrainian MRB in relation to peat, it is advisable to consider the use of resources of drained peat deposits.

A systematic approach to attracting peat resources from drained deposits can only be developed on the basis of risk analysis. Moreover, these risks are largely determined not only by modern economic and legal factors, but also by old shortcomings of the applied peat deposit exploration methodology.

Literature review. Interest in peat resources synthesizes diverse research and publications by domestic researchers, including: fundamental works on peat bogs and soils by Konishchuk, V. V., Gaskevych, V. G., [1, 2], research on the state and use of peat resources by Gneushev, V. O., [3], Remezova, O. O., Yaroshovets, K. A., [4], Snezhkin, Yu. F., Strikha, A. A. [5, 6], Yakovenko, M. B., Khokha, Yu. V. [7, 8], scientific works and research under the auspices of the National Academy of Agrarian Sciences of Ukraine. Abroad, this topic is mostly studied at the level of international groups and centres [9, 10], as well as individual researchers [11, 12].

Key areas of research on the identification and assessment of subsoil use risks are presented in the relevant works: Orynchak, O. M. [13, 14], risks in international and domestic mineral resources assessment sys-

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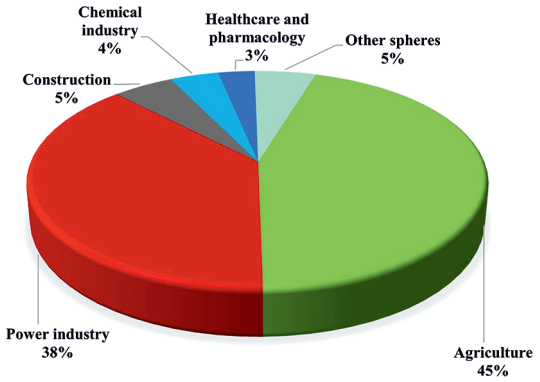

Fig. 1. Sectoral distribution of global peat consumption 2020–2025 [9–12]

tems – Kurylo, M. M., Vyzhva, S. A. [15, 16], geological risks – Maiboroda, E. I. [17, 18].

A significant amount of research on risks in the mining industry and subsoil use is carried out by numerous international organizations and professional firms such as Deloitte, E&Yg, World Economic Forum, and others.

The modern structure of world consumption reflects both historically formed directions (energy, agriculture) and new demand vectors caused by the development of environmentally friendly technologies. At the same time, the structure of consumption is differentiated both by geographical and economic and political criteria (Fig. 1).

Agriculture (45 %) and energy (38 %) dominate the total volume, accounting for almost 83 % of peat consumption.

Since the beginning of the 2000s, there has been a trend of decreasing the role of peat in heat and power generation, while its consumption in the agricultural sector, biotechnology and the production of functional materials is increasing.

For Ukraine, the use of peat as a raw material for the fuel and energy sector is determined to be about 81 % and up to 19 % in agriculture.

Topicality. The topicality of the study is due to two factors: the need to identify and systematize significant changes that have occurred in the qualitative characteristics and quantitative parameters of peat over the period that has elapsed since drainage, as well as the need to take into account the risks of subsoil use, which are a direct consequence of the above-mentioned changes and represent a complex set of problems that depends on the degree of transformation that has occurred with the drained peat deposits.

Purpose. To determine the economic expediency of using the resources of lowland peat deposits in Rivne region after prolonged drainage, taking into account the geological uncertainty of peat properties that have changed over time.

Methods. To conduct research on five lowland peat deposits in Rivne region, peat deposits were sampled through 0.5 meters, over the entire thickness of the mineral. To determine geological uncertainty, the method of statistical processing, analysis and generalization of changes in qualitative and quantitative indicators of peat deposits was used. When assessing risks, the method of discounting cash flows, the method of rational ranges of sensitivity analysis, as well as the method of taking risks into account were used.

Findings. Modern peat deposits of Ukraine are young soil-geological formations, the age of which does not exceed 8–10 thousand years, and their formation coincides with the beginning of the Holocene, the emergence and formation are timed to the retreat of the Dnieper glaciation.

The stadiality of the formation of peat deposits, characterized by the accumulation of specific types of peat, directly depends on the conditions of water and mineral nutrition, the composition of the vegetation cover and their evolution. Therefore, there is significant variability in the stratigraphic structure of natural peat deposits.

The stratigraphic classification of peat deposits combines all types of their structure into four types: upper, mixed, transitional, lowland. The basis for dividing deposits into types is the predominance of one or another type of peat in the structure of the deposits and the sequence of alternation of types vertically.

Based on the noted patterns and the diversity of natural conditions, the Institute of Botany of the NAS of Ukraine has identified five regional peat areas characteristic of the territory of Ukraine (Fig. 2). Wetland and peat formation in Ukraine are determined within the facies boundaries of peat-bog areas:

1. Polissia – bogginess 6.3 %, peat formation – 4.3 %.
2. Little Polissia – bogginess 5.3 %, peat formation – 4.4 %.
3. Forest-steppe – bogginess 1.5 %, peat formation – 1.0 %.
4. Steppe – bogginess up to 0.1 %.
5. Carpathians and Transcarpathia – bogginess 0.46 %, peat formation – 0.38 % [19].

The extent of peat deposits is expressed by the peat formation level of the territory, which determines the relative size of the area of the region occupied by peat. These indicators represent the ratio of the total area of peat deposits in the zero limit to the area of the entire region. The most peaty territories are in Rivne and Volyn regions, where almost every tenth square kilometre of the territory is peaty.

The main part of peat reserves in Ukraine (86.7 %, which corresponds to deposits with reserves of over 100,000 thousand tons) is concentrated in the Central and North-Western regions of the country (Fig. 3). Such a high concentration is due to a combination of a number of interrelated factors. First, the relief of these re-

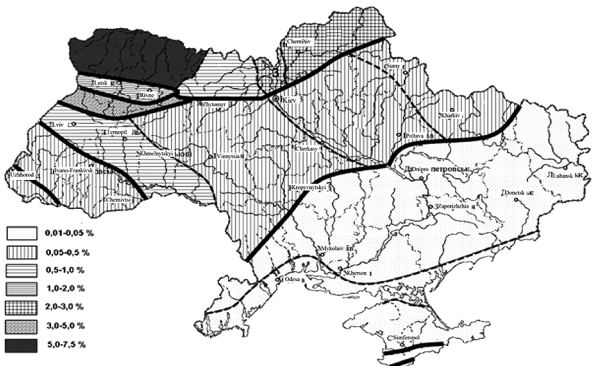

Fig. 2. Peat formation level of the territory of Ukraine (according to Konishchuk, V. V., 2013)

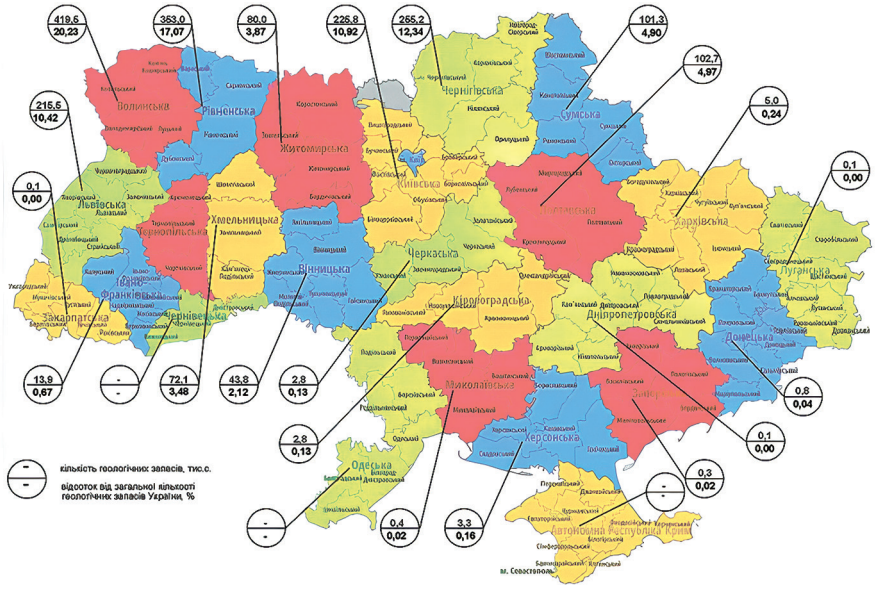

Fig. 3. Distribution of geological peat reserves according to State Balance data

gions, characterized by a predominance of lowlands and flat plains, impedes water flow and contributes to the waterlogging of significant areas. Second, historically, climatic conditions have created favourable conditions for the development of swamp vegetation and the processes of decomposition of organic material.

Thirdly, the geological structure, which includes the general flatness of the surface of the Quaternary deposits with a slight slope of the territory from south to north, which affected the direction of the main water arteries, which enhance the effect of waterlogging.

The state balance of peat reserves of Ukraine takes into account, by the degree of industrial development, 34.1 % of off-balance peat reserves of drained deposits. At the same time, from 12 to 22 % of the balance reserves of drained deposits by region are taken into account as reserves. The potential of peat reserves in drained deposits should be considered as very promising, since the absence of costs for preliminary drainage work significantly reduces the cost of extraction and shortens the time for the start of industrial development of the deposit, making it economically more attractive. This, in turn, increases the investment attractiveness of such projects in the conditions of economic recovery and ensuring the energy needs of the regions.

The objects of the study were lowland deposits of Rivne region drained in the 1970s.

According to the tectonic zoning of Ukraine, the entire territory of Rivne region is the southwestern part of the East European Platform, located within the tectonic structures – the Ukrainian Shield, the Volyn-Podilsky Plate and the Galicia-Volyn Basin.

According to its zonal position, the territory of Rivne region is located within three peat regions. The larger, northern, part of it belongs to the Polissia peat region, the West-Polissia peat area. The South-Western side is located in the Little Polissia peat region, and the middle part (Rivne city district) is located in the forest-steppe peat area, the Volyn forest-steppe peat region.

With a total area of 20.1 thousand sq. km, the area of peat deposits within the industrial depth of deposits is 1.33 thousand sq. km or 6.3 % of the total.

Peat as a mineral constitutes 29.1 % of the total minerals in the mineral resource base of Rivne region.

The explored peat reserves in the region are 65 %. This is the second indicator among regions with explored reserves of over 100,000 thousand tons. Taking into account the forecast resources, which are 34.5 %, the region has a significant, already confirmed and potential amount of minerals.

The level of exploration of reserves in category A + B is 62.7 %. This rate indicates a high accuracy in determining the quantity and quality of peat reserves, which in turn becomes a reliable resource base for planning the development of deposits and allows you to quickly move to the stage of development of the deposit, without incurring additional costs for geological exploration work. This also confirms the economic expediency of mineral extraction under current market conditions.

The main type of peat deposits in Rivne region are deposits of lowland origin, which make up 62.8 % of the geological reserves of explored peat deposits, including by categories: balance – 60.9 %, off-balance – 65.2 % (Fig. 4).

Drained peat deposits of lowland type (calculation + declaration) account for 26.2 % of the area, 29.9 % of geological reserves, including 22.2 % of balance reserves and 39.3 % of off-balance reserves by category. By ash content, geological reserves of drained lowland peat deposits (calculation + declaration) are suitable:

1. 31.6 % – for chemical use and thermal processing including 15.5 % of balance reserves, 54.9 % of off-balance reserves.
2. 44.3 % – for fuel including 55.8 % of balance reserves, 27.6 % of off-balance reserves.
3. 23.6 % – for organic fertilizer including 27.9 % of balance stocks, 17.5 % of off-balance stocks.
4. 0.5 % – suitability not determined.

As drained deposits of lowland genesis, 5 deposits of Dubno district were investigated: Urochyshche Dvoryshche (a special permit for the use of subsoil for the purpose of mining was granted for the development of the deposit in 2023), Verba, Vydranka, Ptycha and Semidubske. Peat reserves of the indicated deposits are

Fig. 4. Distribution of peat reserves in Rivne region by genesis, 2025. On the left – balance reserves, on the right – off-balance reserves

accounted for by the state balance of minerals. They are represented by lowland types of peat, suitable for use as fuel and fertilizer.

At the research sites, peat deposits were sampled at 0.5 meters intervals, over the entire thickness of the mineral. Qualitative indicators of peat properties were determined based on the results of sample studies in laboratories.

A study of peat properties along a number of cross-sections within peat deposits showed that over the past 40 years, after the deposits were drained, changes occurred at almost all sampling points (Table 1).

Moisture. The change in peat moisture after prolonged drying is a key factor determining its properties. In all the studied deposits, the changes in the moisture content of peat layers to the groundwater level are more pronounced than the indicated level in relation to the previous stages of exploration.

The decrease in peat moisture significantly increased its density, which, in turn, created increased pressure on the lower layers. The resulting compaction led to a change in the structure of the peat deposit, a decrease in porosity and, as a result, to a slowdown in the processes of aeration and water infiltration.

Layer thickness. After drainage, peat compaction occurred and, as a consequence, a decrease in the thickness of the peat deposit. At the same time, practice shows that peat, having pronounced creep properties, continues to compact. The decrease in the thickness of the peat layer is the result of the combined action of several factors:

- a decrease in the groundwater level led to a decrease in the water content in the peat. Water supported the "skeleton" of peat, and its loss led to compression, compaction and a decrease in the porosity of the layer;

- when using the areas of drained deposits for agricultural needs, pressure was exerted on the upper drained peat layer using appropriate equipment.

Ash content. Changes in ash content by layer are directly related to the existing level of groundwater. Taking into account that the main component of lowland peat is sedge and reed plants, the following factors additionally influenced the increase in ash content:

- drying of the peatland leads to a decrease in the level of groundwater and a significant increase in oxygen access to the upper layers of peat. This creates favourable conditions for aerobic microorganisms;

- plowing, loosening and other types of soil cultivation enhance aeration of peat and mix the upper layers, accelerating the decomposition of organic matter;

- regular application of mineral fertilizers, since most of the fertilizers remain in the soil, not being completely absorbed by plants, and turn into ash after burning;

- wind erosion removes light organic peat particles from the open surface of arable land, leaving behind heavier mineral components;

- favourable conditions for aerobic microorganisms contribute to the active decomposition of hard-to-decompose peat components, such as cellulose, lignin and humic acids. In the process of decomposition of organic matter, mineral elements are released, which remain in the ash after peat combustion;

- increased aeration and microbiological activity lead to the formation of easily soluble mineral compounds. These compounds are washed out from the upper layers of peat down the profile.

Degree of decomposition. Changes in the degree of decomposition of the layers of the layer are similar to changes in ash content due to both the botanical composition and the location of the groundwater level. The strongest increase in the degree of decomposition is observed in peat layers located above the groundwater level, less in the middle layers below the groundwater level, and insignificant or absent in the lower layers. These changes were also influenced by the following factors:

- the activity of aerobic microorganisms in the process of decomposition of peat organic matter. The layers became more aerated after drainage;

- mechanical impact on the soil, when conducting agricultural activities, improves aeration, and the application of fertilizers provides additional nutrients for microorganisms;

- anaerobic conditions prevail at depth and decomposition occurs more slowly.

Yield of air-dry peat from 1 m^3. In general, there is a tendency to increase the yield of air-dry peat, which is based on an increase in ash content and shrinkage of the deposit thickness.

The indicators of the relationship between changes in the properties of the studied deposits (Table 1) have low divergence and characterize the uniformity of the processes occurring in the deposit during the period of its stay in a drained state.

Domestic legislation in the field of subsoil use provides for the granting of a special permit for the use of subsoil for the purpose of extraction by selling at auction (electronic auction). The initial sale price of a special permit is determined according to the relevant methodology (Methodology for determining the initial sale

Table 1

Indicators of changes in the properties of the investigated deposits in 2024 compared to 1984

Deposits	Properties			
	Moisture, %	Ash content, %	Degree of decomposition, %	Yield of air-dry peat t/m^3
Urochyshche Dvoryshche	–4.8	23.3	15.5	13.4
Verba	–2.8	16.3	11.6	8.1
Vydranka	–4.6	19.7	12.0	11.7
Ptycha	–5.0	23.3	14.8	13.1
Semidubske	–2.9	15.6	10.8	6.3

price at auction of a special permit for the right to use subsoil from 2020). The object of calculation is the volume of mineral reserves (resources) of a deposit or subsoil area, which are approved (tested) in the established manner by the State Commission or accounted for by the state balance of mineral reserves.

Acquisition of a permit at an auction creates a complex of risks for potential subsoil users due to the formation of a package of documents for the lot based on the data specified in the fund materials [20].

According to the current legislation in the field of subsoil use, the use of geological objects in terms of mineral extraction is determined by the fact of geological and economic assessment of reserves. For peat raw materials, this procedure determines industrial reserves, then, depending on the direction of use, conditions for raw materials and expected technical and economic indicators of industrial development of the deposit are established. According to the results of the geological and economic assessment of the specified reserves, the subsoil user has the opportunity to plan for financing the development of the deposit or the construction of a peat processing enterprise.

The primary basis of this process is the quality properties and quantitative parameters of the mineral and, as a consequence, the economic assessment of industrial development and further use of raw materials in the relevant industries.

In domestic practice, a basic concept has generally been formed that is used for geological and economic assessment of reserves of mineral deposits.

The basic approach to the financial valuation of deposits is to use the discounted cash flow method. Its advantage is that it allows you to bring all the valuation parameters of a mining enterprise to comparable, uniform indicators – net present value (NPV), return on investment (ROI) and internal rate of return (IRR).

The NPV calculation involves the annual net cash flow indicator. The basic component of this indicator is formed by the income from the sale of raw materials or products made from it, and varies depending on a number of factors.

For drained lowland peat deposits, geological quality indicators can significantly affect the use of extracted raw materials or products made from them in various industries, which is reflected in the annual net cash flow and, therefore, in its discounted value.

By using the method of rational ranges of sensitivity analysis, the level of sensitivity of individual variation factors to the final economic indicator of net discounted cash flow – net DCV, as well as the ROI and IRR indicators was established.

The following variation factors are considered:

- model 1 – change in the amount of peat reserves;
- model 2 – change in the production capacity of the production;
- model 3 – redistribution of the output of the amount of raw materials for further use;
- model 4 – change in the discount rate.

For these indicators of the studied deposits, the range of change of the indicator-factor was determined, and the sensitivity of the criterion for the net discounted cash flow was determined in this interval (Table 2, Figs. 5, 6).

Sensitivity analysis of individual variation factors (change in the number of reserves, production capacity of the enterprise, redistribution of the output of the amount of raw materials from the deposit for further use, change in the discount rate when fixing other indicators) determined the least resistance to the redistribution of the output of the amount of raw materials from the deposit for further use, change in production capacity and discount rate (Figs. 5–6).

The set of processed statistical data and graphical dependences of the obtained indicators (Table 1) allowed us to substantiate the coefficients of variation of physical indicators of peat and establish cause-and-effect relationships between the nature of changes in the properties of peat deposits.

Geological uncertainty, characterized by incompleteness and unreliability of data on qualitative (ash content, degree of decomposition) and quantitative (layer thickness, reserves) indicators of peat of drained deposits, is a key factor determining geological risk.

For these deposits, based on the coefficients of variation of the research results, a reliable estimate of the total geological risk was calculated (Table 3).

Qualitative (moisture content, ash content, degree of decomposition) and quantitative indicators (peat yield at 40 % moisture content and layer thickness) were taken for the calculation.

In conditions of geological uncertainty, the key task is to take into account the risks that affect the economic expediency of development. The basic method of integrating risks into the financial model is to adjust the discount rate when determining the net present value (NPV) and internal rate of return (IRR).

The calculation of the discount rate (Table 4) taking into account geological risk reflects the degree of influence of the change of geological quality indicators on the expediency of development, taking into account sensitivity factors.

Accordingly, the determined optimal discount rates, taking into account the total geological risk, were used to calculate the net DCV indicator for the studied deposits (Fig. 7).

Conclusions.

1.Geological quality indicators of peat properties after prolonged drainage should be considered as dynamic and non-stationary. Changes in ash content, degree of decomposition, density and thickness of peat layer lead to variability of reserves and their qualitative characteristics.

Table 2

Results of sensitivity analysis of variation factors, the Urochyshche Dvoryshche deposit

Model	Model type	Changes in model type	Net discounted cash flow			ROI	IRR, %
			thousand hryvnias	changes			
				thousand hryvnias	%		
Model 1	Basic		10,338.6	–2,304.7	–22.3	1.82	46.6
	Basic	–10 %	8,033.9			1.61	39.5
		–15 %	6,937.4	–3,401.2	–32.9	1.55	37.6
		–20 %	5,799.9	–4,538.7	–43.9	1.46	36.8
		–25 %	4,526.5	–5,812.1	–56.2	1.36	33.0
Model 2	Basic	30.0 thousand tons	10,338.6	349.6	3.4	1.82	46.6
	Basic	35.0 thousand tons	10,688.2			1.85	52.1
		25.0 thousand tons	5,659.8	–4,678.8	–45.3	1.45	32.1
		20.0 thousand tons	4,430.8	–5,907.8	–57.1	1.35	25.9
		15.0 thousand tons	–416.9	–10,755.5	–104.0	0.97	14.6
Model 3	Basic	fertiliser 46.2 % fuel 53.8 %	10,338.6	2,168.5	21.0	1.82	46.6
	Basic	±10 % fertiliser 36.2 %, fuel 63.8 %	12,507.1			1.99	55.5
		±10 % fertiliser 56.2 %, fuel 43.8 %	3,410.8	–6,927.8	–67.0	1.27	27.2
		±15 % fertiliser 61.2 %, fuel 38.8 %	1,069.4	– 9,269.2	–89.7	1.08	19.3
		±20 % fertiliser 66.2 %, fuel 33.8 %	–1,542.4	–11,881.0	–114.9	0.88	9.8
	Modern	fertiliser 45.2 % fuel (lump fuel) 30.1 % fuel (pressed pellets) 24.7 %	294.6	–10,044.0	–97.2	1.02	16.5

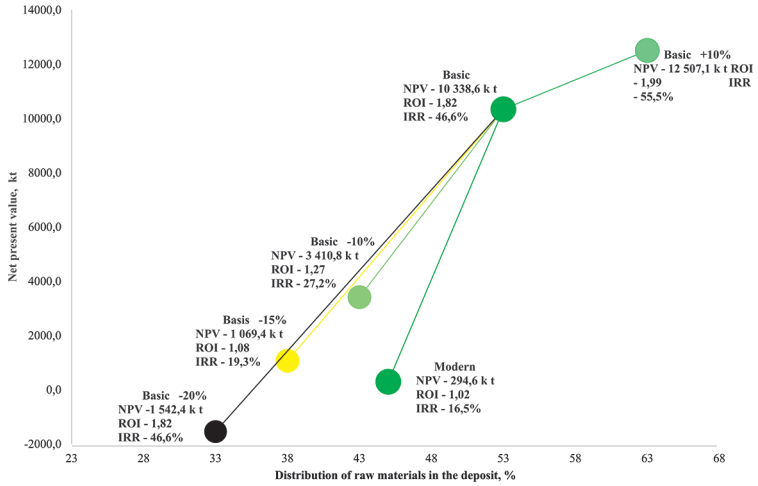

Fig. 5. Diagram of the result of the sensitivity analysis of the factor for redistribution of the output of the amount of raw materials for further use, the Urochyshche Dvoryshche deposit

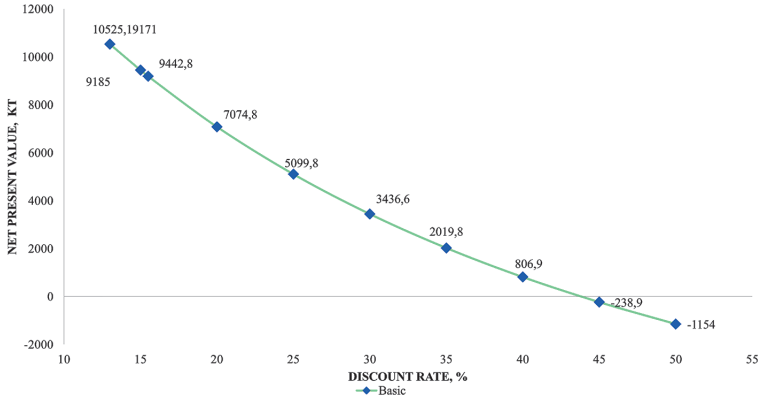

Fig. 6. Graph of the result of the sensitivity analysis of the discount rate change factor, the Urochyshche Dvoryshche deposit

Table 3

Geological risk probability determination

Deposit	Parameters	Coefficients of variation, %							Probable estimation,%
		Qualitative indicators				Quantitative indicators			
		Moisture content	Ash content	Degree of decomposition	By indicator	Yield of peat	Layer thickness	By indicator	Cumulative risk
Urochyshche Dvoryshche	min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	max	8.6	57.3	21.7	29	23.5	16.3	20	25
	medium-sized	6.8	13.2	3.3	8	5.3	11.6	11.6	8
Verba	min	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0
	max	8.3	24.6	20.5	18	19.6	16	18	18
	medium-sized	6.4	4.5	6.5	6	4	4	4	5
Vydranka	min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	max	7.4	23.8	7.6	13	17.3	16.3	17	15
	medium-sized	8.1	3.71	2.18	5	4	7	6	5
Ptycha	min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	max	5.9	19.4	13.6	13	15.5	12.8	14	14
	medium-sized	4.5	5.1	4.6	5	3.5	5	4	4
Semidubske	min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	max	9.6	14.8	10	10	18.8	18.2	19	14
	medium-sized	6.5	5.7	5	6	3.5	8.3	7	6

Table 4

Optimal discount rate determination

Deposit	Parameters	Modern, %	Cumulative risk, %	Discount rate, %
Urochyshche Dvoryshche	min	0	0	0
	max	15.5	25	40.5
	medium-sized	15.5	8	23.5
Verba	min	0	0	0.0
	max	15.5	18	33.5
	medium-sized	15.5	5	20.5
Vydranka	min	0	0	0
	max	15.5	15	30.5
	medium-sized	15.5	5	20.5
Ptycha	min	0	0	0
	max	15.5	14	29.5
	medium-sized	15.5	4	19.5
Semidubske	min	0	0	0
	max	15.5	14	29.5
	medium-sized	15.5	6	21.5

These factors significantly modify the quantity and quality of reserves, and their accounting affects the unpredictable redistribution of raw materials within the deposit and economic indicators of production reliability. Geological risk as a consequence of changes in the qualitative characteristics of drained peat deposits of lowland genesis demonstrates a significant impact on the valuation of reserves and their determination as industrial ones.

2. As a result of the application of the sensitivity analysis method of the indicators of net DCV, ROI and IRR, it was established that they are not resistant to factors subject to the influenced by changes in geological quality indicators. The variability of the redistribution of raw materials by quality within the deposit is the basis in all calculated models.

3. As a total geological risk, the coefficients of variation of qualitative and quantitative components were taken into account. The estimated net DCV indicators of the studied deposits have positive values. At a discount rate of 40+ % for two deposits, there is a significant decrease in the value of reserves and further loss of their industrial value.

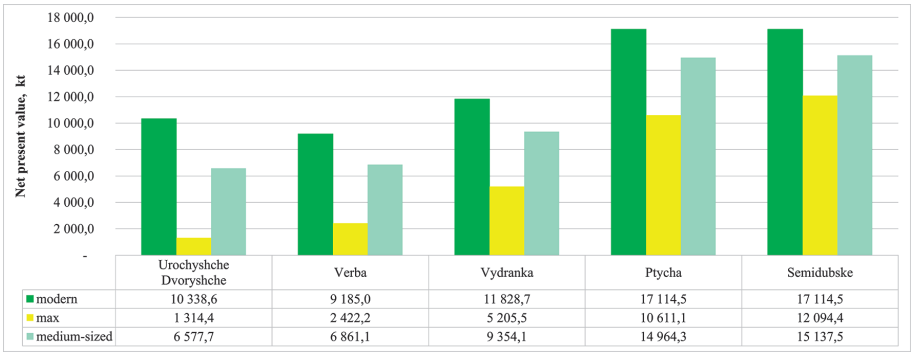

Fig. 7. The value of the net DCV according to the optimal discount rates

4. Using the method of adjusting the discount rate taking into account the cumulative geological risk, the optimal discount rates without losing the industrial value of reserves for the explored deposits were determined: Urochyshche Dvoryshche – 23.5 %, Verba – 20.5 %, Vydranka – 20.5 %, Ptycha – 19.5 %, Semidubske – 21.5 %.

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Оцінка змін геологічних показників на осушених родовищах торфу низинного типу Рівненської області

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Мета. Визначення економічної доцільності використання ресурсів родовищ торфу низовинного типу Рівненської області після тривалого осушення з урахуванням геологічної невизначеності властивостей торфу, що зазнали змін у часі.

Методика. Застосована комплексна методика, що об'єднує емпіричний і теоретичний методи наукових досліджень. Для визначення геологічної невизначеності застосовано метод статистичної обробки, аналізу й узагальнення змін якісних і кількісних показників покладів торфу, обробка даних польових вимірів і лабораторних досліджень. При оцінці ризиків: метод дисконтування грошових потоків – для вартісної оцінки осушених родовищ торфу низовинного типу; метод раціональних діапазонів аналізу чутливості – для аналізу чутливості впливу окремих варіаційних факторів складових геологічного ризику на показники прибутковості; метод урахування ризиків – для визначення оптимальної ставки дисконтування з урахуванням сукупного геологічного ризику для вартісної оцінки запасів осушених родовищ торфу низовинного типу.

Результати. Встановлено, що зміни якісних характеристик торфу низовинного типу на осушених родовищах призводять до варіативності запасів і суттєвої модифікації їхніх якісних характеристик, що раніше не враховувалося в повній мірі під час оцінки перспективності використання торфу таких родовищ.

Наукова новизна. Уперше обґрунтовано взаємозв'язок між змінами якісних властивостей торфу на осушених родовищах низовинного типу (зольність, ступінь розкладання, щільність і потужність торф'яного покладу) та їхнім впливом на стан запасів, перерозподіл виходу кількості сировини для різних галузей, а також на економічну доцільність розробки.

Практична значимість. Забезпечення достовірної оцінки економічної доцільності використання торфу осушених родовищ низовинного типу після тривалого осушення з урахуванням сукупного геологічного ризику змін властивостей торфу.

Ключові слова: *торф, осушені родовища, геолого-економічна оцінка, аналіз чутливості, економічна доцільність*