УДК 502:556.5:551.4(476.2)

Т.А. МЕЛЕЖ, А.В. КУРЗОВ

ОСОБЕННОСТИ ПРИРОДЫ БЕЛОРУССКОГО ПОЛЕСЬЯ: ГЕОЛОГИЧЕСКОЕ СТРОЕНИЕ. ГИДРОГЕОЛОГИЯ. ГЕОМОРФОЛОГИЯ

УО «Гомельский государственный университет им. Ф. Скорины»,
г. Гомель, Республика Беларусь,
tatyana.melezh@mail.ru, aleksey.kurzov46@gmail.com

В работе рассмотрены особенности природы Белорусского Полесья: геологическое строение: стратиграфия региона, гидрогеологическое районирование и особенности рельефа, формирование которого неразрывно связано с ледниковыми эпохами. Установлено, что своеобразие природных условий Белорусского Полесья обусловлено особенностями геологического и палеогеографического развития этого природного региона.

T.A. MELEZH, A.V. KURZOV

GEOLOGY, HYDROGEOLOGY AND GEOMORPHOLOGY OF THE POLESIE ON THE TERRITORY OF BELARUS

In this paper, the features of the nature of the Belorussian Polissya are considered: the geological structure: the stratigraphy of the region, the hydrogeological zoning and the features of the relief, the formation of which is inextricably linked with glacial epochs. It is established that the peculiarity of the natural conditions of the Belarusian Polesye is due to the peculiarities of the geological and paleogeographic development of this natural region.

The Belarusian Polesie is a large natural region located in the south part of the Republic of Belarus. Its total square occupies 28 % of the country's territory. The Polesie is notable for its huge forest and swamp area, for its unique variety of climatic, hydrologic, geomorphologic, soil, flora, fauna and landscape features. According to physicogeographical zoning the following regions can be distinguished: the Brest Polesie, Zagorodie, the Mazyr Polesie, the Pripyat Polesie and the Gomel Polesie. The main river is the Pripyat.

The Polesie is a unique region, where the high amount of swamps, trees and vast flood plains have been preserved in their natural state and have high ecological importance.

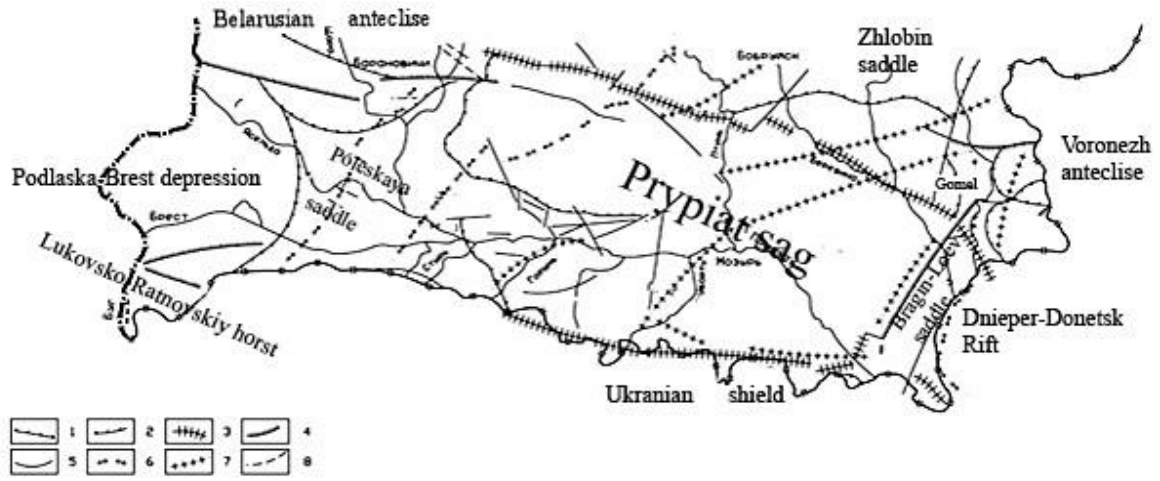
Within the Belarusian Polesie the main geologic structures are: the east part of the Podlaska-Brest Depression, the Poleskaya saddle, the Pripyat sag, the Bragin-Loev saddle. In the north: the Zhlobinsaddle, slopes and spurs of the Belarusian anteclise. In the east: slopes of the Voronezh anteclise. In the south-east: the Dnieper-Donetks Rift. In the south: the Ukrainian shield and the Lukovsko-Ratnovskiy horst as a part of the Volino-Azovskaya plate (picture1).

The structual elements listed above surrounded by faults, less often their geological boundaries are marked off by crystalline basement depth.

The main sctructual elements are distinguished by differentiation of tectonic movement. Due to this fact small-scale structures and fault zones have been formed within them.

The Podlaska-Brest Depression is limited by the Svisloch fault in the north and North-Ratnovskiy fault in the south. Two main groups of local faults are developed: north-east-south-west and sublatitudinal. The depression is divided by them into blocks. The Poleskaya saddle has a weak differentiation of tectonic movements, small amount of structures and fault zones.

The Pripyat sag is separated from the Ukrainian shield by the South-Pripyat fault in the south, in the north by the North-Pripyat fault. Fault network widely spread within the sag.



1 – The biggest structures (aulacogen, anteclise, syneclise), 2 – first–order structures. Sediment cover faults: 3–Super–regional, 4–regional, 5–subregional and local. Basement fault: 6 – Super–regional,7 – regional, 8 – subregional and local

Picture 1 – The Belarusian Polesie tectonic scheme

The second, third and fourth order structures are distinguished in tectonic of the sag.

Maximum amplitude of neotectonic movements is 100–150 meters, local tectonic transfer is up to 50 meters.

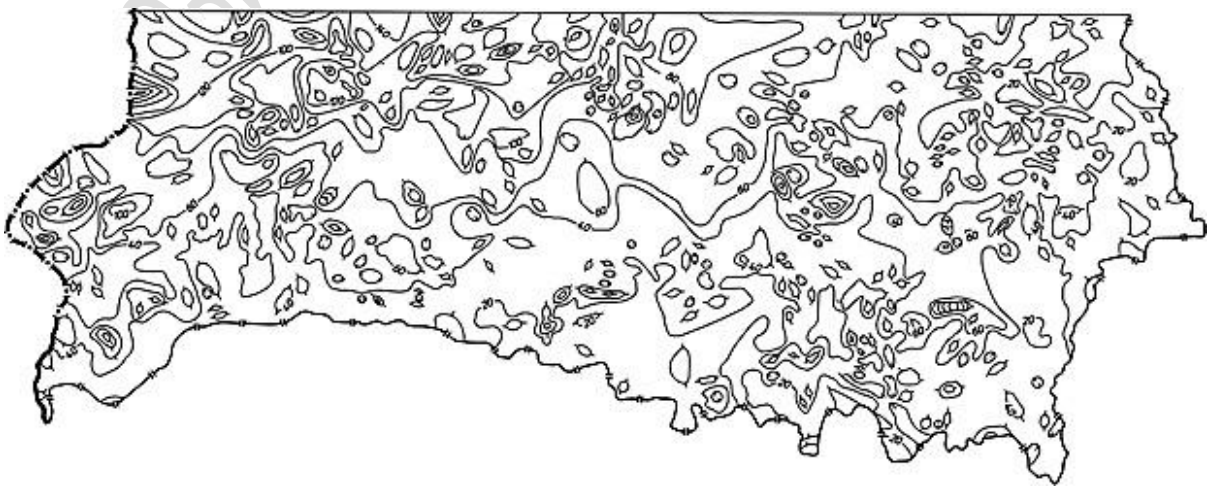
The area is characterized by Archaean to Proterozoic crystalline basement (granite, diorite, gabbro, gneiss) and sedimentary cover: Neoproterozoic sandy-argillaceous sediments, Devonian clay, marl, dolomite, sandstone; Jurassic clay and sandstone. Cretaceous sediments are marl, chalk with weathering rind thickness, less often quartz-glauconite sand.

The Polesie saddle and the east part of the Belarusian Polesie had the highest Paleogene sediments accumulation rate. Anisomerous quartz-qluaconite and quartz sands and sandstones, less often alueirite, marl, and clay. Sediments of Neogene are quartz sand, aleurite, clay.

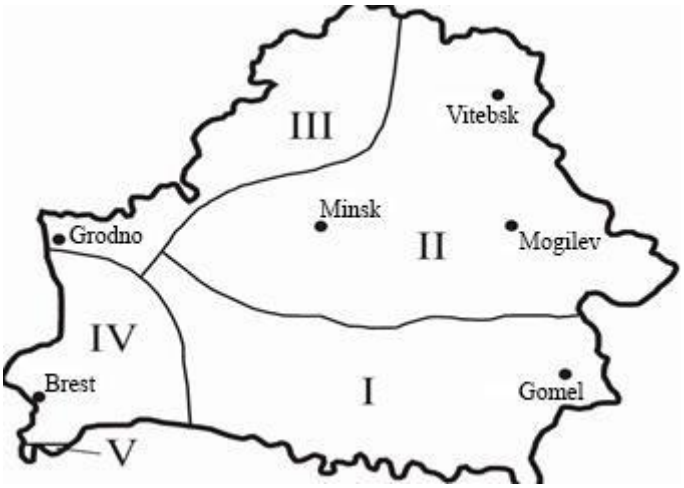
Quaternary sedimentscover most of the territory. The thickness is 30–50 meters, increasing up to 80–120 meters in the west and in the north-west (picture 2).

Quaternary sediments aren't found in the region of Stolin, Gluskovichi and other particular river valleys.

The Belarusian Polesie is located within two aquifers – the Brest artesian region and the Pripyat artesian region (picture 3).



Picture 2 – Quaternary sediments thickness map



I – Pripyat artesian basin (Dnieper-Donetsk)
II – Orshanian (Moscow artesian basin)
III – Baltic artesian basin IV – Brest artesian basin V– Volino-Podolskiy artesian basin

Picture 3 – Belarus hydrogeological zoning

The Brest Hydrogeological Basin. The groundwater is mostly fresh and low mineralized (1–3 g/dm^3), less often mineralization can be up to 12 g/dm^3.

Chemical composition of fresh water is sodium hydrocarbonate, composition of mineralized water features by sodium chloride.

The piezometric surfaces related to the surface level and established at the marks of 0–45 meters. Upper water-bearing horizons contain majority of usable fresh water. Fluvio-glacial, alluvial, lake-alluvial aquifer deposits occur between Dnieper (*g,gtII d*) and Berezinsky (*f,lgIIbr*^{i}) moraine deposits. Those aquifers are intensively used.

The Pripyat Hydrogeological basin.

Higher aquifer. The rocks are mainly represented by Quaternary, Neogene-Paleogene, Cretaceous and Jurassic deposits. Water mineralization above impermeable layer of Bathonian clay vary from 1 g/dm^3 up to 2–3 g/dm^3.

The total thickness of aquifer depends on region's impermeable layer and increases from 50 meters in the west part of the Pripyat depression, up to 350–400 meters.

Middle aquifer. The water bearing deposits are represented by Bathonian, Triassic, Permian, Carboniferous and suprasalt Devonian sandy-clay formations.

Lower aquifer. It is represented by subsalt and intrasalt carbonate–terrigenous water-bearing horizons, and impermeable upper and lower salt layer.

Groundwater flow direction in Quaternary sandy-clay sediments oriented from water divide to river valleys, where aquifer releases.

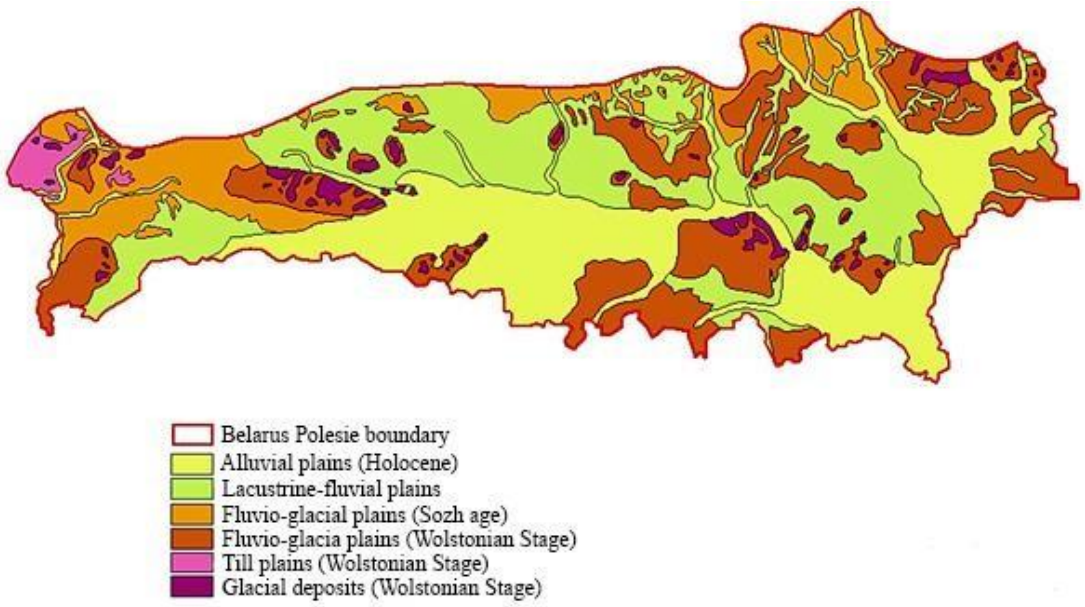
Hydrogeochemical cross–section shows, that fresh water aquifers occur at Quaternary, Neogene-Paleogene, Cretaceous and Late Jurassic sediments. Total thickness is 250–300 meters.

With further increase in depth, mineralization of groundwater rises up to 453 g/dm^3 (more at > 3000 meters depth). Brine composition changes from chloride-sodium to chloride- sodium-calcium with depth.

Crystalline basement has complex tectonic structure. The occurrence depth ranging from 115 meters above the sea level at Mikashevichi-Zhytkovichi projection up to 4000–6000 meters (picture 4).

The area of confined intermoraine aquifers are uneven. In river valleys, wheremoraine deposits are washed out, and in the areas, where facies replacement of loam and clay sands take place, so called «hydrological windows» are formed, through which a hydraulic connection between intermoraine aquifers and their links with groundwater and surface water occur.

Boundries of the region and geomorphology structure are determinated by tectonic structures.



Picture 4 – The Belarusian Polesie geomorphological conditions map

Heterogenity of tectonic causes high amplitude of sedimrntary cover thickness, from 20–30 meters at Mikashevichi-Zhytkovichi shield, up to 4000 meters at Bragin-Love saddle.

Total amount of lakes is more than 5000. Local neotectonic movements have positive (2 mm/y) and negative (1,3 mm/year) amplitude.

The region of the Belarusian Polesie has a complex geological structure. It is a result of interaction between the Podlaska-Brest Depression, the Poleskaya saddle, the Mikashevichi- Zhytkovichi shield, the Prypiat sag. Fault zones are widely spread at the region. The Belarusian Polesie was formed at the territory with a relatively high crystalline basement depth. The region is located within the Prypiatsky artesian and the Poleski artesian basins. Geomorphologically the Polesie is a part of a huge territory within the Poleskaya depression and the Pripyat river basin.

Geological and paleogeographic development conditions the peculiarity of the Belarus Polesie natural environment.