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Geoconservation in Belarus: achievements and problems

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Until recently the problem of study and conservation of natural formations was mainly associated with the biosphere constituents and, to the lesser degree, with the hydrosphere. However, the environmental evolution occurs not is individual events, but within biocenoses involving organic and inorganic elements intrinsically connected with each other. By interfering these elements create a unique natural complex. The most important features of geological formations consists in a long duration of processes that contributed to their creation with the participation of a great number of natural factors, and in their nonrenewability.

Recent landforms had been created in Belarus during at least 5 continental glaciations. Results of glacial activity were different in various parts of the country. If landforms in the north of Belarus – the Poozerje area formed during the last glaciation and are from 10 000 – 20 000 yrs. old, then magnificent natural structures of the central part or the Belarussian Ridge had been formed between 150 000 – 200 000 yrs. before present by the more ancient glacier. In addition to proper glacial deposits and landforms created by moving glaciers there are numerous interesting types of deposits and landforms appeared during the glacier melting. These processes differed in intensity and efficiency and therefore, the results of geological and relief-forming activity of glaciers were essentially different even within territories of two present-day neighbouring districts. Geological objects in every region differ so much in expressive features, origin and abundance, that some of them recognized as reference ones can not represent the complete geological history. Therefore, all the typical natural formations should be identified in every region.

The conservation of inanimate nature in Belarus has a short history. The Law of the nature protection was not adopted until 1961. A long time geological natural monuments were identified and accepted occasionally, they were 32 in 1985. The process of the geological heritage development became more intense since 1985, when the Institute of Geological Sciences of the National Academy of Sciences of Belarus created the Park of Boulders which was subsequently announced a natural monument. The topographic map of Belarus showing major uplands, plains, lowlands and rivers is simulated in the northeastern outskirts of Minsk over an area of 800 ares with 2134 glacial boulders of various composition and size, measuring from 1 to 3 m in diameter and weighing as much as 16 tons that specially collected and brought from various regions of the country. Objects of inanimate nature are of high aesthetic, morphological, palaeontological and historical value, and therefore the study of geological objects as possible natural monuments acquired a great importance. If in the last year at the ProGEO'97 Assembly I reported about 263 protected geological objects, then at present 431 geological zakazniks (protected areas with some unique nature elements without administrative authorities – Category IV in IUCN classification) and natural monuments are already conserved in Belarus as of 1 June, 1998 (Fig. 1), among them there are two national parks, 72 landscape geological, geomorphological and paleontological zakazniks, 26 geological monuments: natural outcrops of Devonian marine deposits, lacustrine, lacustrine-bog and bog deposits of Holsteinian, Eemian and other interglaciations, 257 geological natural objects: glacial boulders and their clusters, conglomerates, 74 geomorphological and paleontological natural mon-

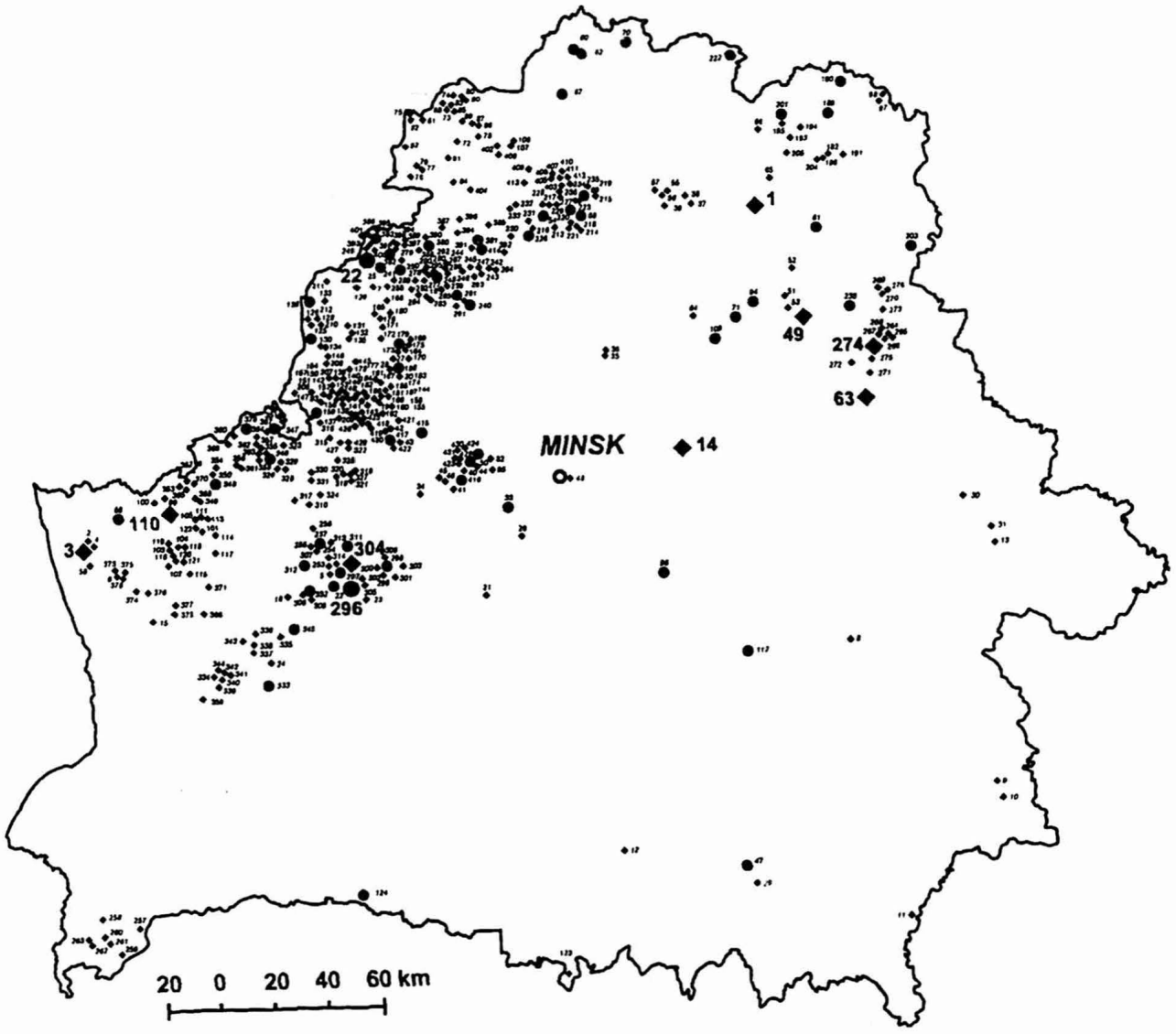

Fig. 1. Location of the geosites of Belarus.
Small circle - national parks, geomorphological zakazniks; Large circle - geosite to be included in the List of the World Heritage - geomorphological zakazniks; Small square - geological and geomorphological monuments; Large square - geosite to be included in the List of the World Heritage - geological and geomorphological monuments. Numbers in the text.

uments (landforms). Their total area is as large as 3,600 sq. km, which is only 2% of the country territory. Every protected object is supplied with a special passport where its most important properties and distinctive features are described. A large network of protected geological objects and territories was created as a result of efforts made by workers of the Institute of Geological Sciences, however it does not reflect all the peculiarities of geology of the country. The lack of protected objects within a rather large part of Belarus does not suggest a real absence of valuable or reference geosites there. This is due the fact that special research and studies have not yet been carried out within these territories.

The main lead of works aimed at extending the geological heritage in Belarus are successive revealing, recognition and study of new unique and the most typical objects of inanimate nature of our country. A full list of such objects will reflect its specific character, peculiarities of the structure, and will pre-

NAME	SUM	ACREAGE
National Parks	**2**	**450720**
Landscape geological, geomorphological and palaeontological natural zakazniks	**72**	**824055**
Geological and geomorphological natural monuments:		
Outcrops of marine, lake, lake-bog and peat deposits of the Devonian, Holstenian, Eemian, Voigtstedt, Elsterian, etc.	**26**	
Glacial boulders and their clusters, Conglomerates	**257**	
Landforms	**74**	**65582**

serve forever the main natural features of Belarus. Research performed resulted in the elaboration of major criteria used to identify geological objects. Such features as the diversity of natural processes, unique properties of an objects that reflect a specific character of the Earth's interior and relief, scientific instructive and recreational importance are taken as the basis in selection of natural monument. These criteria are used as a ground of suggested classification of geological protected objects, 8 types and 38 kinds of natural monuments were justified: geomorphological, stratigraphic and palaeontological, mineralogical and petrographic, geophysical and geochemical, hydrogeological, tectonic, mining and industrial, cosmogenic. Depending on dimensions and importance geological objects are subdivided into landscape zakazniks and natural geological monuments.

Works carried out at the Institute to create the national geological heritage have permitted us to selected 10 most valuable, typical and studied geosites out of 431 protected objects of Belarus.

Ten most interesting natural zakazniks and monuments situated in various geological regions of Belarus are suggested to be included in the List of the most important geosites of the Middle European Lowlands. These are as follows: "GOLUBIYE OZERA" ("Blue Lakes") – the territory of the landscape geomorphological and hydrological zakaznik in northwestern Belarus, which includes the Weichselian end-morainic ridges and hills of standard morphology with a groups of lakes found in glacial valleys (Fig. 1, 22); "NEVDA" – the landscape geomorphological and paleontological reserve situated within the Novogrudok Upland which is a type marginal runoff valley and an expressive end-morainic ridge of the Middle Pleistocene age (Warthian) with a ravine, where the unique and representative "Timoshkovichy" outcrop of the Eemian lake, lake-bog and peat deposits is found (296); "PRINIEMANSKOYE (ZHIDOVSCHIZNA)" outcrop of lake, lake-bog and peat deposits of the Holsteinian Interglacial is exposed in the ravine in the outskirts of Grodno within the Grodno Upland (3); "MURAVA" stratotype section is showing the Eemian interglacial deposits in the Berezina bedrock scarp near the town of Borisov (14); "NIZHNINSKY ROV" reference section interglacial deposits of the Cromerian /3, 4/ Interglacial at Shklov in the Dnieper left bank gully (63); "ORSHA DEVONIAN DOLOMITE", one of three exposures of Devonian dolomites is situated on the Dnieper river bank in the central part of the town of Orsha (274); one block of THE SMOLCHICY CONGLOMERATES found near Korelichy and three largest erratic glacial boulders (304); DAMNED STONE SHUMILINSKY found west of Vitebsk (1), TAILOR-STONE (DAMNED STONE) SENNENSKY – located south of Senno (49) and GREAT STONE SCHUCHINSKY – north of Schuchin (110).