Ukraine in the history of the movement for the conservation of geological heritage in Europe

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Abstract. The paper focuses on the history of the movement for preservation of geological heritage of Ukraine, closely related to the history of geoconservation in Europe; determines the relationship of the extent of geodiversity and geological structure of a certain country, political system, historical traditions and attitude towards wildlife and inanimate nature. Despite the fact that geodiversity and biodiversity have always been in parallel, traditionally all nations in all the continents have focused more on the preservation of so-called wildlife. The article describes that preservation of the so-called inanimate nature; provides a rather sufficient analysis of literature sources which report on the problem of preserving bio- and geodiversity not only in Ukraine, but also in other countries of Europe. In particular, the combination of biotic and abiotic constituents of nature proved to be an essential aspect in determining the place of the world’s first nature reserve and location of an important centre of Buddhism in Mihintale, Sri Lanka. The start of the movement for preservation of so-called inanimate nature in Europe could, with a certain extent of possibility, be considered the first historical written mention of the subject, which was declared in the 10th Chapter of Third Statute of Lithuania in 1588. That is protection of rivers against artificial change of their banks, change in currents and preservation of large erratic boulders. As an important stage of the beginning of the movement for preservation of the so-called inanimate, can be considered the year 1668, when in Germany the Baumannshöhle cave was preserved. It was first mentioned in the literature in 1565, and in 1646 the cave became an object of tourism. During the analysis of the historical stage related to the movement ProGEO, we emphasizes international events in which the representatives of the Ukrainian ProGEO group took part. Active work of the Ukrainian ProGEO group created conditions for transition to a new level of geoconservation, i.e. determination of the possibility of creating a new category of objects of the Nature-Reserve fund of Ukraine – geological parks (geoparks) as important locations for the development of geotourism and territories of complex conservation of the natural environment.

Key words: geoconservation history, geoheritage, geosites, geodiversity, geotourism, Ukraine.

Україна в історії руху за збереження геологічної спадщини в Європі

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Анотація. Розглядається історія руху за збереження геологічної спадщини в Україні у тісному зв’язку з історією геоконсервації в Європі. Встановлено зв’язок ступеня георізноманіття з геологічною будовою певної країни, політичним устроєм, історичними традиціями та відношенням до живої і неживої природи. Попри те, що георізноманіття і біорізноманіття завжди були порівняно, традиційно у всіх народів на всіх континентах перевага віддавалася збереженню об’єктів так званої живої природи. Визначається, що справа збереження так званої неживої природи ускладнюється неможливістю відновлення геосайтів на відміну від об’єктів живої природи. Наведено досить вичерпний аналіз літературних джерел, які висвітлюють проблему збереження біо- і георізноманіття ні тільки в Україні, але й в інших країнах Європи. Саме поєднання біотичної і абіотичної складових природи стало вирішальним при визначенні місця першого на світі заповідника та місцем розташування осередку буддизму на Шрі-Ланці. Початком руху за збереження так званої неживої природи в Європі з повною мірою їмовірності можна вважати першу історичну письмову згадку, оприлюднену у 10 главі Третього статуту Литви у 1588 році. Ідеється мова про захист річок від штучного змінення берегів, змінення напрямку їх течії і збереження великих ератичних валунів. Важливим етапом початку руху за збереження так званої неживої природи в Європі з повною мірою їмовірності можна вважати першу історичну письмову згадку, оприлюднену у 10 главі Третього статуту Литви у 1588 році. Ідеється мова про захист річок від штучного змінення берегів, змінення напрямку їх течії і збереження великих ератичних валунів. Важливим етапом початку руху за збереження так званої неживої природи цілком доречно визнати 1668 рік, коли у Німеччині уже зберігалася печера Буаманшопле. Вона вперше згадується у літературі у 1565 р., а у 1646 печера стала об’єктом туризму. При розгляді історичних етапів пов’язаних з діяльністю ПроГЕО акцентовано увагу на тих міжнародних подіях, в яких брали участь представники української групи ПроГЕО. Активною діяльністю української групи ПроГЕО створено умови для переходу на новий рівень геоконсервації, а саме на вивчення можливості створення нової для України категорії об’єктів
Introduction. The history of the movement for preserving geological heritage in different countries of the European continent has a lot in common, as well certain differences, conditioned on the one hand by the geological structure of one or the other country and the corresponding extent of geodiversity, and on the other hand by the country’s political system, historical traditions and attitude towards wildlife and inanimate nature in general. Therefore the history has been long and controversial with its main feature being integral connection with the history of the movement for preservation of wildlife. Geodiversity and biodiversity have always been closely related, but traditionally all nations in all continents have focused more on preserving objects from the so-called wildlife. And that was despite the fact that as for the inanimate system, which is the main source of material values and within which not the least role belongs to mineral deposits, the task of its preservation is complicated by impossibility of its renewal, unlike wildlife (Fig.1).

Mankind has gradually understood that by destroying the biosystems and inanimate systems – mineral reserves, air, water bodies, it creates conditions incompatible with its existence. The previously unchallenged paradigm of the non-exhaustiveness of mineral resources was refuted by the realities of life in the light of the massive scale of exploitation of the land by man, whose needs increase in geometric progression. Currently not only most scientists, but also the subjects of the economy understand the necessity of protection and preservation of inanimate nature, particularly, the geological environment.

Results and their analysis. One of the most complete analyses of the history of preservation of geological monuments of nature (geosites) is the book of the European Association for the Conservation of the Geological Heritage (ProGEO) “Geoheritage in Europe and its Conservation.” which is a collective study by the members of ProGEO from different countries of Europe and Asia edited by Wimbledon, W.A.P. & Smith-Meyer, S., and published in 2012. (Geoheritage, 2012). In historic sequences, the main stages of determining and preserving geosites and motivation of the necessity for their preservation were analyzed and substantiated by the corresponding legislative acts. The review manner of provision of the material does not allow one to completely understand the problem of preserving geosites of Ukraine in their historical context. Among other works regarding the history of preserving the geological heritage, the most significant is the compilation of materials of the special Conference of the Geological Society of London on the history of geoconservation (“The History of Geoconservation.”, 2008). Not only is the condition of the geoconservation in Great Britain analyzed, but also in some countries of Europe, Australia, the United States of America, etc. The participants of the Conference emphasize that preservation and geoconservation are not the same things. Geoconservation is an action aimed at preserving and strengthening the
geological and geomorphological peculiarities, processes, locations and examples. The notions geoheritage and geoconservation, and history of geoconservation are also discussed in the study by Brocx and Semeniuk, published in 2007 in the Royal Society of West Australia (Brocx, Semeniuk, 2007). According to the authors, geoconservation should include all important geological peculiarities from regional scale to separate crystals. It is important to range them by importance and distinguish five types of objects: international, national, state-wide, regional and local. The authors think that the United Kingdom in particular should be considered as the birthplace of geoheritage and systematic geoconservation, which now is a component integrated into education, tourism, planning and management (Brocx, Semeniuk, 2007). History of geoconservation is also described in the study by Scottish scientists Vanessa Brazier, John E. Gordon et al. “The Parallel Roads of Glen Roy, Scotland: geoconservation history and challenges.” (Brazier, Gordon, Faulkner, Warner, Hoole and Blair, 2017); by the president of ProGEO José Brilha (Brilha, 2015); Ian Houshold and Chris Sharples “Geodiversity in the wilderness: A brief history of geoconservation in Tasmania” (Houshold, Sharples, 2008) etc.


The history of discovery and preserving of geological monuments is integrally related to the history of preserving nature in general and for-
The first legislative acts on the protection of natural relics in the territory of Ukraine were introduced during the Kiev Rus. Therefore, “Ruska Pravda” by Yaroslav Mudry made hunting for beavers and some rare species of birds a criminal offence. The order of Danylo Halytsky (1220-1264) declared large nature reserves within current Bilovezka (Belarus) and Umanska (Ukraine) forests. Those were the first incarnations of nature reserve objects, which were the object of taboo. Entering such places was restricted, and violators would face various penalties.

The first mentions of the protected status of territory now known as Ishkel National Park (within nowadays Tunisia) dates back to the XIII century, when then ruling Hafsid Dynasty of the Arab caliphate prohibited hunting there. In 1997 it was announced a biosphere reserve by UNESCO and in 1980 was enlisted in the Global Heritage. In that same year it received the status of National Park protected by the Ramsar Convention (Fig. 4).

In the Middle Ages, in Europe attention was paid to preserving productivity of lands for hunting. For this purpose special areas were allocated; there, hunting of any kind was for some periods banned with the purpose of restoration of prey populations. West-Ukrainian lands were affected by nature-protecting orders of Polish, Lithuanian and Hungarian Kings. Particularly, the Lithuanian Statute of 1529 included the first legislative act on protection of waters, according to which anyone who poisoned a lake or river would be fined, destroying beaver-inhabited virgin land in a protected water strip and cutting trees and bushes were prohibited.

During the Zaporizhia Sich, for aesthetic reasons, the forest tract on the Monastyrsky Island on the Dni-pro was taken under protection. In such way, at that time, a well-known forest on the Vorskla has been preserved thanks to Ohtyrka Monastery, and also a tract of Pinus sylvestris var. cretacea – thanks to the Sviatohirsky Monastery. The forest tract Kytaevo, Koncha-Zaspa and Holosiivsky Forest near Kyiv have been also preserved by monks (Boreiko, 1995) (Fig. 5).

The beginning of the movement for the preservation of so-called inanimate nature in Europe can, with a certain degree of certainty, be considered the first historical written records in the 10th Chapter of the Third Statute of Lithuania in 1588. That is the protection of rivers against artificial alteration of banks, change of the direction of the current and preservation of large erratic boulders (Geoheritage, 2012).

A significant stage in the movement for preservation of so-called inanimate nature is considered to be 1668, when in Germany Baumannshöhle Cave was already being preserved (Grube, 1994). It is first
mentioned in the literature in 1565, and in 1646 the cave became a touristic object. In 1668 it was also an object of a decree on nature protection issued by Duke Rudolf Augustus, which controlled entry to the cave. An important example of preserving geological heritage (considered the earliest not only in Germany, but in the world) is preservation of the “Quarry on the Hill” (quarrying of the hill) – Drachenfels near Bonn (Fig. 6, 7, 8). This place was bought by Prussian Crowned Prince Frederick Wilhelm in 1832. In 1840, a gorge made by the valley of the Danube in the rocks of the Jurassic system near Weltenburg was taken under protection by the Bavarian King, and in 1844 the granodiorite rock called “Totenstein” in Saxony was subjected to protection.

An important role in the preservation of the natural heritage in general and particularly geological heritage belonged to the Societies of Nature Researchers which were created in large administrative centers of Russia in the XIX century. The first and the most influential was the Moscow Society of Nature Researchers created in 1805. The Society aimed not only at studying various aspects of natural environment and its popularization, but also nature protection.

As for other European countries, the next example of attempts to preserve geological objects can be considered the local regulation of visits to the caves in Hungary, where in 1839 ruination and collecting of dripstones in the Baradla cave was banned. In Austria, first attempt to protect nature dates back to 1856. As proposed by Franz Karl Heinrich, the Assembly of German Scientists and Doctors of Germany purchased erratic boulders in the Helvetian zone of Upper Austria in order to preserve them from quarrying (Fig. 9). On a gigantic boulder, which is now considered the first geotope in Austria, one can still read words devoted to the notable geologist Leopold von Buch (Geoheritage, 2012).

In that period, in Ukraine, first botanical gardens, dendrological and zoological parks were created, areas of virgin steppe were subjected to protection, fish reserves and numerous park monuments of garden

Fig. 6. The Drachenfels in 1624 by Matthäus Merian.

Fig. 7. The ruins of Burg Drachenfels (https://en.wikipedia.org/wiki/Drachenfels_(Siebengebirge)

Fig. 8. Trachyte Quarry remains since Roman times in Drachenfels (https://en.wikipedia.org/wiki/Drachenfels_(Siebengebirge)
design were established. For example, in 1852 the botanical garden in Lviv was created, the first aviaries for birds in Askania-Nova were constructed; in 1883 in Eastern Ukraine a part of virgin steppe obtained protection (eight dessiatins were fenced off), the land was donated by F. E. Falz-Fein from his own property (Boreiko, 1995) (Fig.10).

In 1879 academician G.P. Helmersen was first in Russia to note the necessity of preserving large erratic boulders. He collected data on over 60 boulders left after melting of covering glaciers in the territory of Estonia (Viiding, 1976) (Fig.11).

The oldest specifically geological objects of Czech Republic, taken under protection in 1884, were the Barrande Rocks which are a part of the Barrandien geological structure, named after French paleontologist and geologist Joachim Barrande, who made a great contribution to the work on provision of geoconservation to paleontological, stratigraphic and geological objects (Geoheritage, 2012) (Fig.12). Most famous are the Czech karst, a location of trilobites of Carboniferous period in Skryje Rakovník District.

In 1886, count, ornithologist and forester W. Dzieduszycki established the first nature-reserve after melting of covering glaciers in the territory of Estonia (Viiding, 1976) (Fig.11).

The oldest specifically geological objects of Czech Republic, taken under protection in 1884, were in Western Ukraine – Pamiatka Peniatska on 20 ha of his land near Peniaky village (Brodivsk raion of Lviv Oblast) for preservation of beech forest and population of white-tailed eagles. Most of the
protected objects at that time were in private, state or monastery ownership with utility (hunting, forestry, fishery), scientific, esthetic and religious purpose of preservation. Therefore, the first official state reserve in Russia was Barguzinsky Nature Reserve established in Zabaykalie on 29.12.1916 (Fig.13).

In Ukraine, at that time, around 150 private dendroparks and park monuments of garden design were established. By 1917, there were around 30 other larger nature reserve territories of different status (Fig. 14-16). Prototypes of present-day nature reserves in Ukraine, with scientific and protective functions, began to be established in the 1880s. One can say that since that historic moment, nature protection began its development as a sphere on a professional basis.

An important historical event was founding of Russia’s first society of nature protection with approved status, emblem and signet on 21st May of 1910 in Khortytsia village of Katerynoslav governorate. The founder of the Society was Petro Pylypowych Buzuk, who worked as a teacher of nature science and the Russian language in Khortytsia Central College (district of current city of Zaporizhia). The purpose and tasks of the Society were formulated in the Statute: “The Society aims at preserving nature within the animal, plant and mineral kingdoms of nature, based on the understanding of preserving integrality, beauty and diversity of their representatives and spreading ideas about the wise use of the gifts of nature among the local population”. It is important to emphasize that this is not only the date of creation of the first society of nature protection, but also the first written record stipulating that not only wildlife, but inanimate nature should be preserved. A bright example of active work of the Society is as follows. In order to save the rocks on the Dnipro near Kichkas and Khortytsia villages from ruination, the Society bought them from the owners (Fig.17, 18). On this occasion P.P. Buzuk wrote: “The Dnipro, as we know, from Katerynoslav to Oleksandrivsk, for 70 versts fascinates us and is beautiful. And these picturesque views, beautiful rocks are daily destroyed by the locals and outside contractors…” (Ninety years to the Khortytsia Society of Nature Protectors, 2000).

Among the countries of Western Europe, we should note the Netherlands, where in 1905 the...
The first nature protection organization was established (Natuurmonumenten). As they announced, one of their activities was geological conservation (geoservation). However, on the practical level, the volunteers of the organization emphasized activity mostly on biodiversity issues. In 1970 there existed only several nature reserves where erratic boulders were preserved. The beginning of movement for preservation of inanimate nature in Ukraine is similar to the one in Norway. In 1910, when the Charter of the Khortytsia Society of Nature Protection was promoting protection of not only wildlife, but also the mineral kingdom, Ireland obtained its first Act on nature protection, in which geology was clearly indicated as an important constituent of that Act. The Act stated: “protected areas can be established to protect wild plants and animals and geological and mineralogical sites”. The first geosites protected by this act were the island in the Oslofjorden and erratic boulders in the southwest Norway (Geoheritage, 2012). In Spain, in 1916, the Ministry of Development announced the Act designed for creation of National Parks. Between 1920 and 1930, in Spain, 6 sites of national interest were established and declared objects of geological heritage. In Denmark, on whose small area 38 geosites are located, which are characterized by astonishing geodiversity, the first law on the nature protection appeared in 2017 (Geoheritage, 2012). Moreover, due to
support of the state and the movement for preservation of geological heritage, the country’s first geopark has been established – Odsherred Geopark, in which signs of Ice Age are safeguarded (Odsherred Geopark – Denmark, 2019).

Examples of establishing the first nature reserves in the European countries are also Lassee (Austria, 1902 and 1914), Olympus (Greece, 1938), Graesholm Island (Denmark, 1926), three reserves on islands and seashores – Inish Keel, Lough Oughter and North Bull Island (Ireland, 1930), Covadonga Naational Park (Spain, 1918), Veluwezoom Park (Netherlands, 1911), Nordmarka National Park near Oslo (Norway, 1932), Saint-Isle Reserve (France, 1912), Abisko, Sarek and Garphyttan National Parks (Sweden, 1909).

The first reserve in the territory of modern-day Ukraine and the second after the Barguzinsky Nature Reserve in the territory of the former USSR (which included Ukraine) was the Crimean Nature Reserve, established on 10th March 1919 at the initiative of G.F.Morozov on a territory of 16,350 ha area (now 44,175). In that same year, chronologically only 20 days after (April 1st) after the Crimean Reserve, the Askania Nova Reserve was established, which had formally existed since 1874 when Count F. E. Falz-Fein set up the first aviaries for birds (Boreiko, 2015). And after 10 more days, on April 11 1919, the Astrakhan Reserve was established in the delta of the Volga River, which for some reason was for a long time considered the first one in the territory of the Soviet Union. Apart from the Reserves there are other examples of wildlife protection. In the Crimea, for example, in 1910 the following objects were subjected to protection: pine forest on the Yalta slope of the Ai-Petri mountain, a beech forest near the Kosmo-Damianovskiy Monastery, juniper forests in Hanaki-Tuatska forest dacha between Alupka and Sudak, protected fauna in the Babugan tract (Fig.19,20). In the territory of the reserve Chatyra-Dag (1,527 m), Kemal-Egerek (1,529 m), Demir-Kapu (1,542 m) mountains and the highest Crimean mountain Roman-Kosh (1,545 m) are located (Fig. 21).

The uniqueness of the geodiversity of the Crimean Mountains allows one to consider this territory of Ukraine the most favourable for the development of geotourism and establishment of future geoparks (Manyuk, 2007). The presence of the marbled Upper Jurassic loams which compose the upper parts of these mountains, their fracturing, division of the relief, significant amount of atmospheric precipitations and presence of thick horizons of groundwaters contributed to the development and distribution of various forms of karst: sinkholes, ponors, pit holes, pit caves, grottos, caves, etc. (Fig. 22).

A reason for creating first nature reserves was the Soviet Project “Decree of the Soviet of the Peoples’ Commissars on State Protection of areas of land, water and mineral resources for scientific purposes” developed in January of 1919 by M. M. Podiapolsky in Moscow after meeting V. I. Lenin, who recognized the scientific protection as “allocating areas of virgin nature from any interference by humans”.

An important event was the creation in 1912, with active participation of Ivan Parfenovych Borodin, of the Regular Nature Protection Commission of the Russian Geographical Society. The head of
the Commission was A. S. Yermolaev, his deputy I. P. Borodin. Borodin I. P. wrote: “We cannot avoid joining a broad movement for protection of nature, which is spread across Western Europe: this is our moral debt to the Fatherland, humanity and science. No matter how many protected areas our neighbours have established, they cannot replace our future nature reserves. Being scattered on a giant area in two parts of the globe, we are the owners of in their way unique nature treasures, it is easy to destroy them, but impossible to recreate them.”

In Switzerland in 1913, the first International Conference on Nature Protection took place, starting the history of today’s national parks, nature reserves and zakazniks. The representative of Russia at that Conference was Borodin I. P.

Fig. 20. Tithonian Upper Jurassic loams in the Crimean Nature Reserve

In 1918 the Ministry of Horticulture of the Ukrainian National Republic established a Department of Protection of Nature Relics. In 1926 The Ukrainian Central Executive Committee and the Soviet of People’s Commissars of Ukrainian Soviet Socialist Republic adopted the “Regulations on the Monuments of Culture and Nature”, which became the first legisla-

Fig. 21. The highest peaks of the Crimean Mountains within the Crimean Nature Reserve

tive act of Ukraine in the sphere of Nature Protection. This regulation set out the rules for registering objects of nature, types of monuments, costs of their preservation. At the same time, under the Peoples’ Commissariat of Education, the Ukrainian Committee of Protection of Nature Relics was established. Sometime earlier, in 1923, the first Law on Nature Conversation (Nature Conservation Act) in Finland came into force, but Finnish representatives of ProGEO think that fac-
tually the conception of nature preservation appeared in the country in the late 1800s. In 1928, in Bulgaria the Temporary Committee of Nature Protection was created, which later was transformed into the Union of Native Nature Protection. One of most important steps after this union was the announcement of the first protected objects of Nature Heritage of Bulgaria. The Special Law on Nature Protection was adopted in 1930 in Romania, based on which in 1935 the first National Park in the Retezat Mountains was established (Geoheritage, 2012).

As at 1930, in Ukraine, around 200 specifically nature protection objects existed, and also, according to some sources, around 300 hunting reserves. A whole network of reserves emerged, various nature objects were distinguished and certain trees, steppe and forest areas, swamps, lakes, places of birds’ nesting, parks, rocks, etc were subjected to protection of the state. The Committee was represented by 4 inspectorates: Kharkiv, Kyiv, Odessa and Dnipropetrovsk (Fig.23).

Therefore, there is every reason to consider the foundation of the Ukrainian Committee of Protection of Nature Relics as the beginning of the movement for preservation of not only wildlife but the inanimate nature in Ukraine. So, the bright proof of it is the selfless work of Mykola Karpovyych Leshchenko in the Dnipropetrovsk Committee of Nature Protection, who at that time was the representative of the Scientific-research Department of Geology of the Dnipropetrovsk Mining Institute. During the study of the Naddniprianski granites (terminology of that time) M. K. Leshchenko noted rocks in Shevchenko Park as a monument of nature, and at his initiative they were taken under protection (Fig. 24).

In fact, it was the first protected geological nature monument in the post-Soviet countries (Fig. 25).

In order to preserve and promote this “Natural Mineralogical-Petrographic Museum of the Dnipro Bank”, as M.K. Leshchenko defined the rocks, he thought of bringing them into order and publishing a guide about them.

In 1932 the first catalogue of nature protected objects of Ukraine was published, “Reserves and Natural monuments of Ukraine” by M.S. Shalyt, and in 1937 the ultimate resolution of the Ukrainian SSR “On the State Nature Reserves of USSR” which halved the area of the main nature protected territories. In 1946 the Soviet of Ministers of the Ukrainian SSR adopted Ukraine’s...
first in “Regulation on the State Nature Reserves and Nature monuments”, which initiated the division of the objects by republican and local significance and also allowed the Oblast Executive Committee to approve establishment of the new reserves of local significance. At the same time, the Resolution of the Soviet of Ministers of the Ukrainian SSR №1273 from 26 July 1946 granted official status to the Ukraine Nature Conservation Society, which still plays an important role in the development of nature protection.

In fact, the history of the Society begins with the start of organized public movement for nature protection in Ukraine, which emerged on the basis of the Students’ Circle of Friends of Nature of Kharkiv University, the first gathering of which took place on the 1 November of 1906. This particular date is considered the beginning and prototype of the Ukraine Nature Conservation Society. Formally nature protection in Ukraine somewhat intensified from the late 1950s and early 1960s, though another round of destruction of nature reserves in 1961 was unavoidable, leaving only the Chornomorsky and Ukrainian Steppe Reserves (Fig. 26).

One of the units of the Ukrainian Steppe Reserve is a unique object of geological heritage – Kamiany Mohyly, which was taken under protection in 1927 and is located within Zaporizhia and Donetsk Oblasts. The reserve is considered one of the promising objects for establishing a geopark. There are all necessary and compelling conditions for creating geopark in the reserve, including good geodiversity of the territory with geosites of international significance and sufficient area (400 ha) and possibility of development of geotourism and presence of exotic peculiarities of relief which are characteristic only of Pryazovia (Fig. 27).

An important incitement to notable revival of the movement for the preservation of geological relics was the publication of the brochure “Geological Relics of Ukraine” written by the prominent geologist academician V.H. Bondarchuk in 1961. The large print run of this brochure (18 thousand copies) ensured that it received the attention it deserved and
contributed not only to increase of interest in geological monuments, but also adoption of some important regulations, instructions, laws on geological heritage. According to V.H. Bondarchuk, “Geological monuments - the witnesses to events of the remote past – are seen everywhere. Some of them are well-known masses of sand, clay, detritus that level up the immense landscapes. The others look like sheer cliffs, picturesque rocks and ravines, which create unique landscapes” (Bondarchuk, 1961) (Fig. 28).

Under pressure from the Ukraine Society of Nature Conservation, in 1967 the Government of the Ukrainian SSR established a State Committee on Nature as a Central Organ of Power. This occurred three years before the Environmental Protection Agency in USA had been created and 21 years before the establishment of similar state organs in Moscow. Since 1991 it worked at the rank of ministry, and in 2018 it was integrated into the Ministry of Energy and Environmental Protection. In 1972 the Soviet of the Ministry of Ukrainian SSR adopted the resolution “On measures for enlarging the network of state nature reserves and improvement of nature protection”, which approved the “Classification of nature protected and other territories of Ukrainian SSR which are protected by the State”, which included such categories as: nature reserves, reserves, nature parks, nature relics, park monuments of garden design of republican and local level.

The next notable event in the work on protection

Fig. 26. Ukrainian Steppe (Cretaceous flora) (A) and Chornomorsky (B) State Reserves

Fig. 27. Objects of geological heritage in the Kamiani Mohyly Nature Reserve (metamorphic rocks of the complex dated to the Upper Proterozoic Eon, of West-Pryazovia series of the Lower Archean Eon) (Manyuk, 2018, https://uk.wikipedia.org/wiki/%D0%A1%D0%B0%D1%80%D0%B2%D0%B5%D0%B4%D0%BE%D0%B2_%D0%B8%D1%80%D0%BA%D0%BB%D0%BE)
of geological natural monuments was the creation of the Republican Section of Protection of Mineral Resources of the Ukraine Nature Conservation Society during the gathering in the Institute of Geological Sciences of the Academy of Science of Ukraine on 4th February of 1974. The Section was continuously, over 35 years, ruled by the Candidate of Geological and Mineral Sciences, Oleksa Stepanovych Shechyrtysia. Particularly due to the laborious work of the geologists in the section and surveys by geologists, in 1985 the publication of the guide “Geological Monuments of Ukraine” became possible. The guide played an important role not only in the preservation of natural geological monuments, but became the first complete register of both active objects of the nature protection fund and promising ones (Geological Monuments of Ukraine, 1985). The Guide, without exaggeration, became the handbook for a whole generation of those concerned about preservation of the geological heritage. The book provides a description and illustrations of 179 geological natural monuments and has a map with locations of the objects in the Oblasts of Ukraine.

The following history of the movement for preservation of geological monuments of Ukraine is closely related to the emergence and rapid development of the European Association for the Conservation of the Geological Heritage or ProGEO. A notable event that has determined the change in the philosophy of views on geological heritage was the establishment of first a working group and then, in 1988, the European Association for the Conservation of the Geological Heritage (ProGEO) in the Netherlands. The ideas of ProGEO, the head of which in those years was Carl-Erik Johansson from Sweden, have rapidly spread across many countries of Europe. In 1989 in Austria, in 1990 in Norway, the first meetings of the ProGEO working groups took place. However, the actual start of ProGEO as the leading organization on preservation of geological heritage, no doubt was the year 1991, when in Digne-les-Bains, France, with the support of UNESCO, the I International Symposium of ProGEO was held, at which a historic declaration, the “Declaration of the Rights of the Memory of the Earth”, was adopted (Fig 29).

Thanks to the information the future president of ProGEO Todor Todorov gave to the Journal “Survey and Protection of Mineral Resources” (1991) regarding the results of the I International Symposium of the Association of the Conservation of Geological Heritage, the ideas of ProGEO have spread among many of those from various European and post-Soviet countries who are concerned about the future of unique objects of geological heritage. The first person in Ukraine who joined the work of ProGEO was a notable geomorphologist scientist from Lviv, the head of the Lviv Oblast Center of Support of the Development of Rural Green Tourism, Yurii Zinko. He participated in the meeting of the European working group (EWGESC - future ProGEO) in 1992 in England (Weymouth), in the session of ProGEO which took place in Hungary in 1994 (Budapest), in the work of the General Assembly of ProGEO which was held in Sweden and Finland in 1995 (Sigtuna, Stockholm County) and the first Conference of the Central European Group (WG – Central European Working Group) which, thanks to Y.V. Zinko, Ukraine has joined (Fig. 30). The main orientations of the work of Regional working groups were realization of the ProGEO ideas on creating a national network of geosites, evaluation of the resources of the
geological heritage; survey, inventoring, cataloguing and developing a computer data base of geological monuments in every country, development and implementation of means regarding the touristic aspects of use of geosites for their promotion and preservation for posterity, preparation and selection of the objects which must be included in the lists of European and Global levels, development and introduction of the legislative base intended to protect the unique objects of geological heritage against damage and ruination.

Since the Group has been established in 1997, conferences were held in Prague in 2000, where the previous results of the development of the network of geosites in the countries of the group were discussed and in ancient Polish city Krakow in 2003, where for the first time the computer programs on the data bases in Poland and the Czech Republic were presented, various aspects of the problems of selecting geosites and their evaluation, legislative base regarding their protection and preservation, relations between geosites and ecological networks were discussed. The conceptual notions on preservation of geological heritage in Ukraine were described in the reports of V.P. Grytsenko, V.V. Manyuk and A.S. Ivchenko, the full format of which were published in a Special Edition of the Polish Geological Institute in 2004 (Proceeding of the Conference, 2004).

In 1993 in Germany, in Mitwitz-Köln, the First International Assembly was held, where ProGEO was formally established with adoptions of its statute. This particular date is considered the official date of the establishment of the Association. At that meeting, at the initiative of G. Gonggrijp, a decision was adopted to prepare a project on publishing a guide “Preservation of the Geological Heritage in Europe” which would describe the national laws and practical condition regarding protection of geological natural monuments in each European country. This question was later raised again a number of times by the president Todor Todorov and others, but so far no practical implementation of it has been made. After working meetings in Sweden and Finland, in 1995 ProGEO had prepared to the II Symposium, which was held at a high level in the Italian Capital Rome in 1996. That Symposium contributed to increase in the authority of ProGEO around the world and soon UNESCO invited the heads of the organization headed by C. E. Johansson to represent ProGEO at the 30th International Geological Congress in China.

Important for popularization of the ideas of ProGEO and revival of the movement for preservation of geological monuments in Ukraine was the brochure “Geological Natural Mmonuments of Ukraine: problems of study, conservation and rational use”, written in 1995 by the next after N.P. Gerasimenko head of
Ukrainian ProGEO V.P. Grytsenko with co-authors A.A. Ishchenko and others. For the first time the concept of preservation and rational use of unique geological monuments of nature as components of the geological heritage of Ukraine were described, the book proposed a quite successful broadened classification of geological relics and described the experience of preservation of geological natural relics in other European countries on particular examples, and included an overview of condition of protection of the monuments in Ukraine, ways of using them for educational and touristic purposes.

The next step in the movement for preservation of geological heritage took place in 1997 when the State Enterprise Geoinform of the State Survey of Geology of Ukraine established the project “Systemizing and description of geological monuments of Ukraine, development of recommendations on their popularization, use and protection”, responsible for which was an active member of the Ukrainian National Group ProGEO, a prominent geologist of Geoinform, senior research specialist of the Institute of Geography A.S. Ivchenko. This person is worth a separate mention. Andrii Ivchenko can be objectively considered the founder of the new wave of the movement for conservation of geological heritage in Ukraine. In 1996 he took part in the work of the II Symposium on the Conservation of Geological Heritage held in Rome as the only representative of Ukraine with the report “Transeuropean geological monuments as a symbol of our geological heritage”. Later he visited Tallinn, Estonia, in 1997 for participation in the Second General Assembly of ProGEO with the report “Databases of the Ukrainian geological heritage sites”, Krakow in the same year (together with Ukrainian representatives of ProGEO Zhanna Matviischina and Natalia Herasimenko, who at that time was the head of the local committee of the European Association for the Conservation of Geological Heritage in Ukraine) with two reports. Also, he represented Ukraine in Bulgaria (Sofia, 1998) with the report “The most important geosites of Ukraine as the component of geological heritage of Europe”, Tallinn in 1997 (“Databases of the Ukrainian geosites (past, present and future”), Poland (Krakow, 1999) (“Geosites of the Ukrainian Carpathians as candidates of the geosites representative of Central Europe.”), etc.

Tallinn also held the Second General Assembly of ProGEO with the support of the Geological Service of Estonia, and in 1998, at the initiative of the new president of ProGEO Todor Todorov, a Conference Geological Heritage of Europe in Bulgaria (Belogradchik) took place, gathering the participants from most countries of Europe for exchange of thoughts about preservation of geosites (Fig.31).

In 1999 in the Spanish Capital Madrid, on 23-27th November, the III Symposium ProGEO was held, under the motto “Towards balanced management and preservation of Geological heritage in the new Century”. At the Symposium in Madrid, the executive secretary of ProGEO W.A.P. Wimbledon for the first time presented the project GEOSITES of the International Union of Geological Sciences (IUGS), supported by the UNESCO and orientated at creating the global register of geosites of global significance. The representative of Ukraine at the Symposium was N.P. Gerasymenko from the Institute of Geography of the National Academy of Sciences of Ukraine, who at that time was the head of the National Group of ProGEO in Ukraine and became a member of the III Symposium. At the initiative of N.P. Herasimenko,
in 1997 the book “Problems of the Protection of the Geological Heritage of Ukraine” was published, the first author of which was W.A.P. Wimbledon, with whom N.P. Gerasimenko, A.A. Ishchenko, H.V. Lysychenko and K.V. Lysychenko worked (Fig. 32). The book was published in Ukrainian and English, and was of great importance for promotion of the movement for the conservation of the geological heritage in Ukraine (Wimbledon et al., 1999).

In the research, the authors for the first time gave a pattern of comparative evaluation of geological monuments of Ukraine, analyzed the criteria and methods of evaluation and selection of geosites, described the GEOSITES project started in Europe and its use in the conditions of Ukraine.

An important event in the work of ProGEO was the Conference: «Natural and Cultural Landscapes: geological foundation» in Dublin, Ireland, in September 2002. At the Conference, representatives of ProGEO of 26 countries of Europe participated, including Ukrainian members of the movement for conservation of geological monuments of nature: V.P. Grytsenko (Kyiv National University) and V.V. Manyuk representing the State Geological Service of Ukraine and Dnipropetrovsk National University. At the Conference, the participants discussed issues of conservation of geological monuments of nature in the countries of Europe, integral approach to integration of geo- and biodeiversity of nature, protection and management of landscapes at the international, national and local levels; touristic aspects of conservation of geosites, anthropogenic impact on the landscapes, etc. In the process of approval of the declaration of the Conference, the idea of holding one of the following symposiums in Ukraine was proposed and supported for the first time.

Increase in the authority of ProGEO around the world was persuasively proved by participation
of its members in the main geological event of the geological community of the world, the 32nd International Geological Congress held in Florence in 2004. Problems of the work of ProGEO were the object of discussion in two sections:

- Geology – the creator of cultural and geological heritage: geosites in danger.
- Geological heritage and tourism

Published materials of the Congress included the theses of the representative of Ukrainian ProGEO V.V. Manyuk “New strategy for conservation of geosites in Ukraine” (Manyuk, 2004).

The next step in the work of the European Association for the Conservation of geological heritage was thorough preparation of and holding at high level of the IV International Symposium of ProGEO in Braga, Portugal (13-16 September of 2005). A total of 312 participants from 35 countries took part in the Symposium (Fig. 33). The main goals, which the participants of the Symposium successfully achieved, were as follows:

• Discussion of the current condition of development and methodology in the strategy of geoconservation
• Presenting successful examples of the practice of geoconservation which could be copied in other countries
• Discussion of the legal basis for support of geoconservation at European and international levels
• Evaluation of relationship between European and non-European specialists of geoconservation

The materials of the Conference included reports by V. P. Grytsenko (Geological and Cultural Heritage of the valley of the Middle Dnipro) (Grytsenko, 2005) and V.V. Manyuk (Peculiarities of geoconservation in Ukraine). (Manyuk, 2005).

In May of 2003, in Kyiv, at the meeting of the panel of the State Geological Service of Ukraine the exceptionally valuable document “Complex programme of work on scientific-methodological provision of regional geological surveys in Ukraine” was considered. The programme pays special attention to such tasks which correspond to the fundamental orientations of geological science. Therefore, a significant and timely step was the suggestion by V.V. Manyuk to include the problem of study, inventorising and development of a computer data base of geological relics in Ukraine in the programme.

Furthermore, at that time, the programme of forming the national ecological network of all oblasts of Ukraine was being developed, based on the “State programme of National Ecological Network of Ukraine for 2000-2015”, adopted by the Law of Ukraine from 21.09.2000, designed for further processing, improvement and development of the legislation of Ukraine with correspondence to the recommendations of the European strategy of preserving biological and landscape diversity for forming of the European ecological network. Taking everything together, according to the fact that the geological environment is the most important constituent of the natural environment and creates incredible diversity of its landscapes, became a real stimulation of the practical realization of the task of the general complex programme and in the same year the State Geological Service initiated the publication of the updated variant of the book “Geological Landmarks of Ukraine”, based on the abovementioned report of the State Geological Enterprise Geoinform, with obligatory elaboration of the lists of geosites, descriptions of geological monuments and, if possible, addition of photographic materials (Fig. 34). The idea of re-publishing the book was expressed earlier, but
the essential for its implementaion was the work of
Ukrainian representatives of ProGEO promoting the
idea of conservation of geological heritage both at
state and international levels.

Over 2003-2004, i.e. in a short period of time,
field surveys and cameral work on the collected
materials were performed. Finding, field survey,
selection of samples of rocks and minerals, fossil
fauna and flora, photographing of the objects,
geographic connection with the determination of
coordinates and detailed sketching, inventoriisation,
cataloguing and composing the computer data base of
geological monuments of Ukraine were undertaken.
The works were coordinated with the departments
of the protected territories of Oblast managements
of ecology, the workers of which consulted on
the condition and location of current geological
monuments in the territory under their protection.

Thus, materials on publishing the updated variant
of the book “Geological Landmarks of Ukraine” were
prepared by the specialists of geological institutions
and scientists and published in 2006-2012. It was
a 4-volume, large, full-coloured, well illustrated bilingual (in Ukrainian and English) edition, the first
volume of which was presented to the participants of
the V International Symposium of ProGEO held in
Holding the first symposium of such level for the
countries of the former USSR was possible due to the
active work of Ukrainian representatives of ProGEO
in the international work of the European Association
for the Conservation of the Geological Heritage and
was planned during the conference in Ireland in 2002.
Organization of the Symposium in Ukraine was
intended to contribute to the development of nature
protection in the geological sphere and approximate
it to the European standards, improve the relations
between various branches of power responsible for
the development of nature protection. The main topics
of the Conference were as follows:

• Development and elucidation of normative-
legislative base regarding the status of geosites
of different level of significance (local, national,
European and global)

• Development and implementation of the methods
and criteria of selecting geological objects of
nature-protection fund

• Legalizing geosites at national levels with
definition of their statuses in state and local
institutions of power, including them in the State
Land Cadastre of member counties of ProGEO

• Development and approval of typical measures
for protection of geosites with determination of
the system of financing and their practical use.

A very important consequence of holding the V
Symposium in Ukraine can be considered the increase
in the authority of ProGEO and its innovative ideas in
the circle of scientists and practitioners of geological
and nature-related institutions, and, eventually,
introduction of a new type of work into the geological

Fig. 34. Geosites of Ukraine (Geological monuments of Ukraine)

Fig. 35. ProGEO symposia. W.A.P.Wimbledon (UK) &
Y.Kazakova (Kazakhstan).
From 6 to 14 August 2008, the 33rd International Geological Congress was held in the capital of Norway, Oslo, gathering over 6300 delegates from all over the world under the roof of a giant congress hall. At this giant meeting of ProGEO geologists, four symposiums have already been presented, unlike the previous congress in Florence, with one section in operation (Fig. 35). At the symposium Geological Heritage and Society the following sections worked: The main contribution to geological heritage and society, earth surface: science, education and development, geosites and landscapes – strategy of preservation and management and geoparks and tourism. From Ukraine only one report was presented – “The problem of creation of a network of geoparks in Ukraine”, delivered by V.V. Manyuk at the section IES-04 (Geoparks and tourism) (Fig. 36).

In May 2011, Kamianets-Podilsky held the II International scientific-practical Conference Geological Monuments Bright Proofs of the Earth’s Evolution (Fig. 37). The main topics of the conference were:

- Geological monuments (definitions, classification, geological structure, lithological-facies peculiarities, etc)
- Legislative base of geological heritage, relevance and perspectives of establishing geological parks
- Management, monitoring and protection of geological heritage
- Tourism and popularization of geological relics
- Geological monuments – museums under the open sky. Geological heritage in the expositions of museums.

In 2012 in Brisbane in the East of Australia the 34th International Geological Congress took place. The congress was visited by 6,012 delegates from 112 counties of the world, 3,712 reports and 1,469 posters were presented (34th International Geological Congress, 2012).

The heads of the section were the famous leader of the movement for preservation of geological heritage in Australia, professor Bernie Joyce and the future president of ProGEO (process of his election took place right after the Congress) Jose Bernardo Brilha from Portugal. The key moments were the reports by William Wimbledon (at that moment president of ProGEO, Patrick McKeever from Ireland, Nikolas Zouros (vice-president of ProGEO) from Greece and Ross Dowling from Australia. Compared with the previous congresses, the geography of the participants broadened: Brazil, England, Vietnam, Sweden, Ireland, Russia, South Africa, China, Poland, Serbia, Spain, Finland, Iran, Uganda, etc. No representatives of ProGEO Ukraine were present that time.

**Conclusion.** After preparation and publication of the book “Geological Landmarks of Ukraine” the work on inventorisation of the geological heritage and development of the computer data base has not
stopped, but has continued in a new format. Geological enterprises of the State Service of Geology and Mineral Resources of Ukraine implemented the work on monitoring of geological heritage, including systematic examination of the objects on site, updating the information on the condition of their preservation, additional, more detailed study on all aspects of the monument, photographing, taking samples and many others. The condition of geoconservation in Ukraine, entire fund of the objects of geological heritage were evaluated, their inventorisation and cataloguing was performed, and the specialists of the Ukrainian State Geological Survey Institute have developed the computer data base and interactive map of the country’s geosites (Map of geological monuments of Ukraine, 2019), making possible the transition to a new level of geoconservation. The prospects for introducing a category of new objects to the nature-reserve fund of Ukraine – geoparks are being studied. The territories promising for creating geoparks and ideas for their establishment as objects of geotourism and protection of areas and preservation of geological heritage are presented in the studies by Zinko Y.V. (Zinko, 2006, 2008, 2011, 2012), Gritsenko V.P. (Gritsenko, 2004), Manyuk V.V. (Manyuk, 2006, 2007, 2008, 2008a), Golturenko I. (Golturenko, Artamonov, Manyuk, 2010, 2011), Kravchuk Y. (Kravchuk, 2012), Yaholnyk O.V. (Yaholnyk, Manyuk, 2017) and others.

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