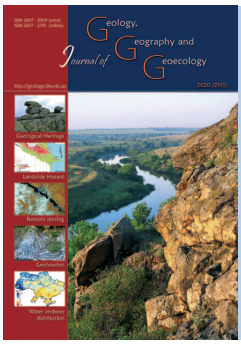

Journal of Geology, Geography and Geoecology

Journal home page: geology-dnu-dp.ua

ISSN 2617-2909 (print)
ISSN 2617-2119 (online)

Journ.Geol.Geograph. Geology, 29(1), 111–134.
doi: 10.15421/112011

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

Volodymyr V. Manyuk, Olesia V. Bondar, Oleh V. Yaholnyk

Oles Honchar Dnipro National University, Dnipro, Ukraine, vgeoman@gmail.com

Received: 02.12.2019
Received in revised form: 26.12.2019
Accepted: 16.01.2020

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

В. В. Манюк, О. В. Бондар, О. В. Ягольник

Дніпровський національний університет імені Олеся Гончара, Дніпро, Україна, vgeoman@gmail.com

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 поряд, традиційно у всіх народів на всіх континентах перевага віддавалася збереженню об'єктів так званої живої природи. Визначається, що справа збереження так званої неживої природи ускладняється неможливістю відновлення геосайтів на відміну від об'єктів живої природи. Наведено досить вичерпний аналіз літературних джерел, в яких висвітлюється проблема збереження біо- і георізноманіття не тільки в Україні але й в інших країнах Європи. Саме поєднання біотичної і абіотичної складових природи стало вирішальним при визначенні місця першого в світі заповідника та місцем розташування осередку буддизму у Міхінтале на Шрі-Ланці. Початком руху за збереження так званої неживої природи в Європі з певною мірою ймовірності можна вважати першу історичну письмову згадку, оприлюднену у 10 главі Третього статуту Литви у 1588 році. Йдеться 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 Боуманшолле. 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 діяльність української групи ПроГЕО створено умови для переходу на новий рівень геоконсервації, а саме на вивчення можливості створення нової для України категорії об'єктів

Природно-заповідного фонду – геологічних парків (Geoparks), як потужних осередків розвитку геотуризму та територій комплексного збереження природного середовища.

Ключові слова: Geoconservation history, Geoheritage, Geosites, geodiversity, geotourism, Ukraine.

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

Fig. 1. A tree can be grown, and rocks…?

Fig 2. Stonehenge, cromlechs – the earliest example of use of mountain rocks for sacral purposes. (https://simple.wikipedia.org/wiki/Stonehenge)

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 birth place 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.

Fig. 3. This spectacular combination of biotic and abiotic elements of nature became a place for the world`s first nature reserve and important Buddhist site for a good reason (Mihintale, Sri Lanka http://litetrip.ru/shri-lanka-mixintale-mihintale-gora-missionera-maxindy.html). A fragment of the Deccan Plateau, or one of the erosive remains of ancient crystalline rocks characteristic of the relief of Sri Lanka.

There are no special publications on history of geoconservation or preservation of objects of geological heritage in Ukraine, but the problem has been described in different years in the studies by A. Ivchenko (Ivchenko, 1998a, 1998b, 2003), V. Grytsenko (Grytsenko, 1995, 2001, 2003,2005), Y. Zinko (Zinko, 2011,2012), N. P. Gerasimenko (Wimbledon, Gerasimenko, Ishchenko, Lisichenko G.B. & Lisichenko K.G., 1999), V. Manyuk (Manyuk, 2004,2005, 2006, 2016).

The history of discovery and preserving of geological monuments is integrally related to the history of preserving nature in general and formation of the nature-reserve fund, which most completely was described in the studies by one of the most notable Ukrainian environmentalists V. Y. Boreiko (*Boreiko*, 1997, 2001, 2002, 2014). Particularly based on the obvious relation between wildlife and inanimate nature, we shall trace back the historical sequence of formation of attitudes to objects of the geological constituent of the natural environment and attempts to preserve it in Ukraine. For restoring the complete picture of this process, if possible the first steps towards preserving geosites will be traced in other countries of Europe.

Since the appearance of the first tribes, mankind has began to understand the cult significance of nature, therefore as religions emerged, primitive peoples` communities created special sacred places in the natural environment (mountain tops, highlands, valleys, forests, groves, etc) (Fig.2). The first law on the protection of the natural environment and wildlife is considered to be the law which was adopted in Sri Lanka (Ceylon) in III century B.C. At the same time, in a town called Mihintale, King Devanampiyatissa created the world`s first nature reserve (Boreiko, 2001) (Fig.3).

Fig. 4. Presentday view of Ishkel National Park in Tunisia (https://flic.kr/p/9ot9HK)

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 Dnipro 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

Fig. 5. Examples of preservation of forests thanks to monasteries: 1 – Ohtyrka Holy Trinity Monastery; 2 – Holy Assumption Monastery; 3 – Forest tract Kytaievo (http://mesta.kiev.ua/nature)

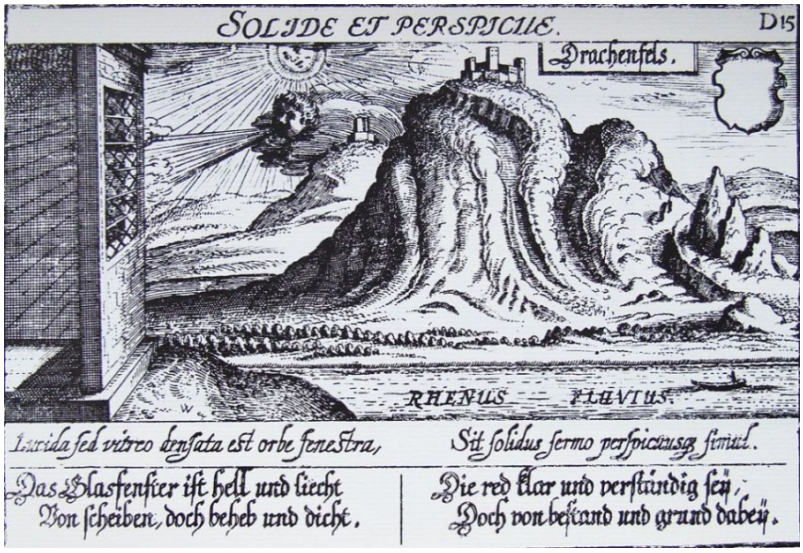

Fig. 6. The Drachenfels in 1624 by Matthäus Merian.

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

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. 8. Trachyte Quarry remains since Roman times in Drachenfels (https://en.wikipedia.org/wiki/Drachenfels_(Siebengebirge)

Fig. 9. The first geosite in Austria, devoted to Leopold von Buch (Geoheritage, 2012).

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 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 s population of white-tailed eagles. Most of the

Fig. 10. Biosphere nature reserve Askania-Nova named after Friedrich Eduardovych Falz-Fein
(modified after https://rudana.com.ua/news/kryvorizki-atovci-ta-yihni-ridni-vyrushyly-na-ekskursiyu-do-askaniyi-novoyi)

Fig. 11. Käsmu field of boulders, Estonia (https://www.visitestonia.com/ru/валунное-поле-кясму)

Fig. 12. Barrande rocks (https://www. hej-zolotoj-lixoradki-v-krayu-rycarej)

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 Pylypovych 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).

Fig. 13. Postage stamps devoted to the anniversary of the nature reserve and presentday landscape of the Barguzin Nature Reserve

Among the countries of Western Europe, we should note the Netherlands, where in 1905 the

Fig. 14. Arboretum Oleksandriya

Fig. 15. Stryisky Dendropark

Fig. 16. Cherkasky dendropark

first nature protection organization was established (Natuurmonumenten). As they announced, one of their activities was geological conservation (geoconservation). 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 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

Fig. 17. Khortytsia Island, Zaporizhia (https://www.photoforum.ru/photo/770813/)

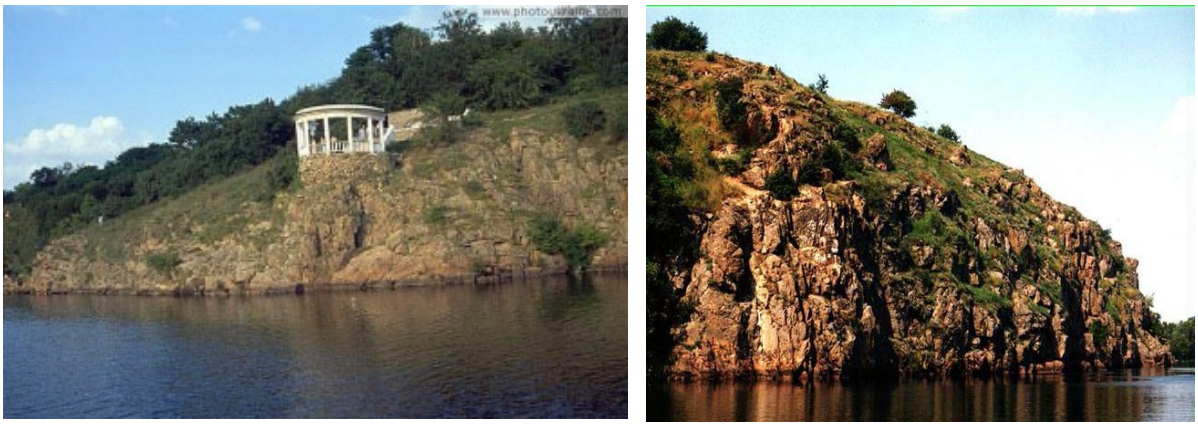

Fig. 18. Outcrops of plagiogranites of Khortytsia complex ($p\gamma AR_3$ hr) on Khortytsia Island

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 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

Fig. 19 Pine and beech forests of the Crimean Nature Reserve (https://zen.yandex.ru/media/kaiart/aipetri-peshkom-iz-alupki-razvedka-tropy-5b4ebbf86e028100a85b706f)

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

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

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.

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 Peoples` Commissars of Ukrainian Soviet Socialistic Republic adopted the "Regulations on the Monuments of Culture and Nature", which became the first legislative 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-

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

Fig. 22. Various karst speleothems in the Emine Bayir Hasar cave

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 Karpovych 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 Naddnipri-anski 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.

Fig. 23. In these Oblast centers local inspectorates were established: Kharkiv, Kyiv, Odessa and Dnipropetrovsk

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

Fig. 24 The first geological monument of nature (geosite) in the city of Dnipro – Monastyrski Rocks

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 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 – Kamiani

Fig. 25 Monastyrski Rocks

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 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

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

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. 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/Кам%27яні_Могили)

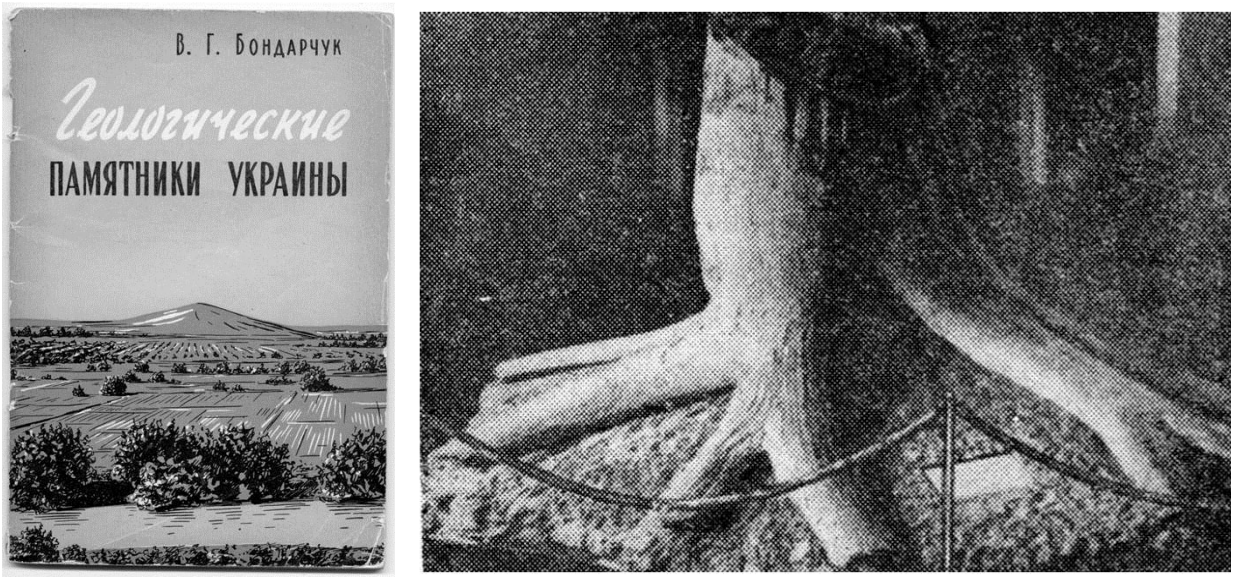

Fig. 28. Book by Bondarchuk V.H. "Geological monuments of Ukraine" and a photo of fossil trunk of *Sigillaria* tree from the book.

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 Shchyrytsia. 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.

Fig. 29. The ammonite slab in Digne-Les-Bains (https://www.sciencephoto.com./media/852231/view/ammonite-slab-digneles-bains-france)

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

Fig. 30. Members of the Central European working group of ProGEO

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,

Fig. 31. Geosites of Bulgaria (Belogradchik Rocks and Pobiti Kamani)

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

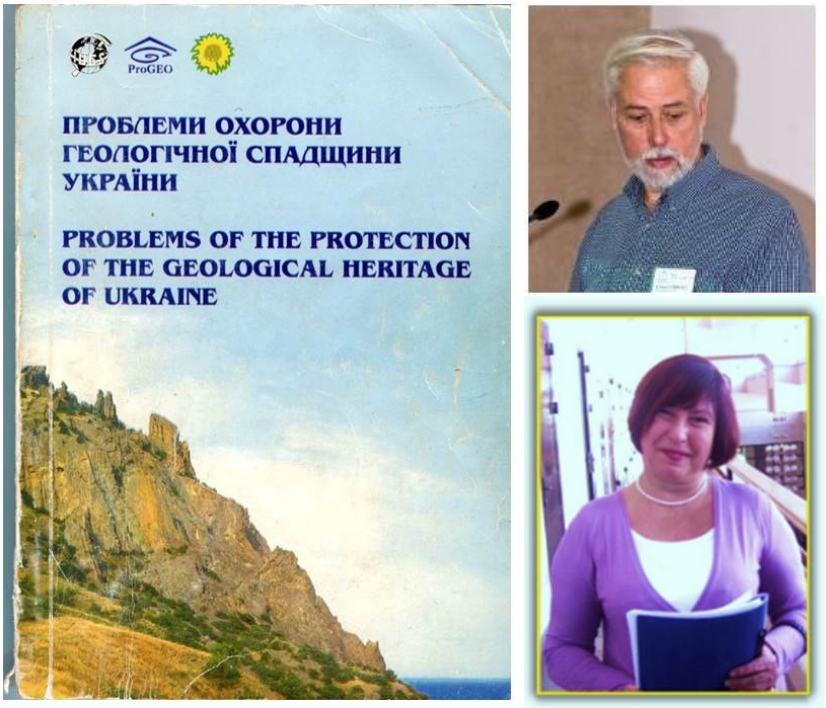

Fig. 32. The book "Problems of the protection of the geological heritage of Ukraine" and first authors (W.A.P. Wimbledon & N.P. Gerasimenko)

Fig. 33. Abstracts of Braga symposium and Azores (Volcanism of Azores Archipelago) (https://mishka.travel/blog/index/node/id/4522-10-veshei-kotorie-nujno-sdelat-na-azorskih-ostrovah)

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

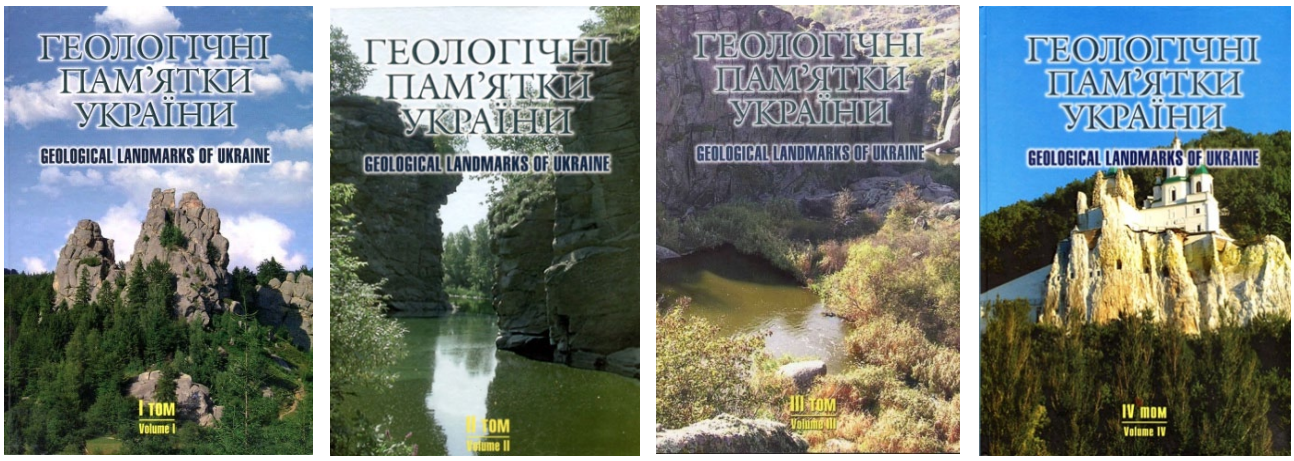

Fig. 34. Geosites of Ukraine (Geological monuments of Ukraine)

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, inventorisation, 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 Kyiv and Kamianets-Podilsky in September 2006. 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.

Fig. 35. ProGEO symposia. W.A.P.Wimbledon (UK) & Y.Kazakova (Kazakhstan).

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. 36. Volodymyr Manyuk oral presentation «The problem of creation of a network of geoparks in Ukraine»

enterprises – monitoring of geological relics.

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

Fig. 37. Kamianets-Podilsky – location for the II International Scientific-practical Conference of ProGEO

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.

References

Anon, 1999. National Estate identification and assessment in the north east region of Victoria. Report by the Joint Commonwealth and Victorian Regional Forest Agreement Steering Committee to Environment Australia, Canberra, ACT.

Bondarchuk, V.G., 1961. Geologicheskie pamjatniki Ukrainy. [Geological monuments of Ukraine.] Society for the dissemination of political and scientific knowledge of the Ukrainian SSR. Kyiv, 1–80 (In Russian).

Borejko, V.E. 1997. Istorija ohrany prirody Ukrainy (X VEK - 1980). [History of Nature Conservation of Ukraine (Xth Century – 1980)]. Kiev ecological cultures center, 1: X century – 1941. (History of Nature Conservation, issue, 12) Kyiv, 1–299. (In Russian).

Borejko,V. E. 2001. Istorija ohrany prirody Ukrainy. [History of nature protection of Ukraine.] Kyiv, KECC, 2001. 1–544. (In Russian).

Borejko, V. E., 2002. Istorija zapovednogo dela v Ukraine. [The history of conservation in Ukraine.] History of Nature Conservation; Issue 30, 2nd ed., Kyiv, Kiev Ecological and Cultural Center, 1–270. (In Russian).

Borejko, V. E., 2014. Poslednie ostrovki svobody. Istorija ukrainskih zapovednikov i zapovednosti (passivnoj ohrany prirody) (X vek – 2015). [The last islands of freedom.History of Ukrainian nature reserves and nature reserves (passive nature protection) (X century – 2015).] Kiev. ecological cult. center. (Series "History of Nature Protection." Issue 34). Kiev, Logos, 1–240. (In Russian).

Borodin, I.P., 1914. Ohrana pamjatnikov prirody. [Protection of natural monuments]. SPb, Permanent Environmental Commission of the Imperial Russian Geographical Society, 32. (In Russian).

Brazier, Vanessa, Gordon, John E., Faulkner, Martin, Warner, Derrick, Keith Hoole, Jim Blair. 2017. The Parallel Roads of Glen Roy, Scotland: geoconservation history and challenges. Proceedings of the Geologists' Association 128 (2017) 151–162. https://doi.org/10.1016/j.pgeola.2016.11.008

Brilha, J., 2015. Geoconservation, history of. Retrievied from: https://www. researchgate. net/ publication/273795304_Geoconservation_History_of. Doi: https://doi.org/10.1007/978-3-642-40871-7

Brocx, M. & Semeniuk, V., 2007. Geoheritage and geoconservation – history, definition, scope and scale. Journal of the Royal Society of Western Australia, 90: 53–87.

Devjanosto let Hortickomu obshhestvu ohranitelej prirody. 2000. [Ninety years of the Khortytsya Society of Nature Conservatives.] Zaporozhye, Planet, 1–4.

Erikstad, Lars. 2008. History of geoconservation in Europe. Geological Society, London, Special publications, 300, 249-256, https://doi.org/10.1144/SP300.19.

Geological Society London. Special Publications, January, 2008.

Geologicheskie pamjatniki Ukrainy. Spravochnik-putevoditel. 1985. [Geological monuments of Ukraine. Reference book and Guidebook.] Korotenko N.E., Shchiritsa A.S., Kanevskaya A.Ya. and etc. Kyiv, Naukova Dumka, 1–155. (In Russian).

Geoheritage in Europe and its conservation. 2012. Wimbledon, W.A.P. & Smith-Meyer, S. (eds), 2012, 405.

Golturenko, I., Artamonov, V., Manyuk, V. 2010. Do pytannja docil'nosti stvorennja geologichnyh parkiv. [The question of the feasibility of creating geological parks]. Proceedings of the 5th Scientific and Production Meeting of Geologists-Surveyors of Ukraine.UkrDGRI, 71–73. (In Ukrainian).

Golturenko, I., V., Manyuk, V., Artamonov, 2011. Geologichnyj park Mykolai'vshhyny. [Geological park of Mykolaiv region.] Geologic monuments are a clear testament to Earth's evolution.] Collection of materials of the Second Scientific and Practical Conference.Kyiv, Logos, 30–33 (In Ukrainian).

Grube, A. & Wiedenbein F.W., 1992.Geotopchutz – eine wichtige Aufgabe der Geowissenschaften. Die Geowissenschaften, 10 (8), 215-219.

Grytsenko, V.V., Ishchenko, AA, Rus'ko, Yu.O., Shevchenko, 1995. Geologichni pam'jatky pryrody Ukrai'ny: Problemy vyvchennja, zberezhennja ta racional'nogo vykorystannja. [Geological monuments of nature of Ukraine: Problems of study, conservation and rational use.]Kyiv, CSNM of NAS of Ukraine (95-1 Preprint of CSNM of NAS). 61p. (In Ukrainian).

Grytsenko, V., Shumliansky, V. & Stetsyuk V., 2001.ProGEO Activities in Ukraine. ProGEO News. 4, 4-5.

Grytsenko, V., Ivchenko, A., 2003. Geosite of Ukraine (General Review).Geological heritage concept, conservation and protection policy in Central Europe, 75–76.

Grytsenko, V.V., 2004. Geosajty Ukrai'ny ta geologichna spadshhyna Jevropy. [Geosites of Ukraine and geological heritage of Europe.] Geologist of Ukraine, 2, April-June, 55–62. (In Ukrainian).

Grytsenko, V.V., 2004. Geoparky novyj naprjamok zapovidnoi' spravy v Ukrai'ni. [Geoparks a new direction of nature conservation in Ukraine.] Nature diversity of Khmelnytsky region. Collection of articles on materials of the All-Ukrainian scientific-practical conference "Landscape and biological diversity of Khmelnytsky region: research, conservation and reproduction"; Kamianets-Podilskyi, December 17-18, 2003. Kamianets-Podilskyi: Nova ABC, 151-158. (In Ukrainian).

Grytsenko, V., 2005. Geological and cultural heritage of middle Dniestr valley. IV International Symposium ProGeo on the Conservation of the Geological Heritage.Braga, Portugal, University of Minho, 72.

Houshold I., Sharples C., 2008. Geodiversity in the wilderness: A brief history of geoconservation in Tasmania. Geological Society, London, Special Publications; v. 300, 257-272. doi:10.1144/SP300.20

Istorijaza rodzhennja, utvorennja ta dijal'nosti Ukrai'ns'kogo tovarystva ohorony pryrody. 2016. [History of origin, formation and activity of the Ukrainian Society for Nature Conservation.] Retriewed from: http://www.ukrpryroda.org/2019/07/ukrpryroda73.html (In Ukrainian).

Ivchenko, A. S.,1998a. Geologichna spadshhyna Ukrai'ny: istorija pytannja. [Geological heritage of Ukraine: history of the issue.] Geography and fundamentals of economics at school. Kyiv, Pedagogical Press, 1, 12–13. (In Ukrainian).

Ivchenko, A. S. 1998b. The most important geosites of Ukraine as the components of geological heritage of Europe.Symposium of European Association-for Conservation of Geological Heritage. Sofia, Bulgaria, 1–26.

Ivchenko A. S. 2003. The most important geosites of the Ukrainian Carpathians. Geological heritage concept, conservation and protection policy in Central Europe. Polish Geological Institute, Warsaw, 27–29.

Odsherred Geopark – Denmark. 2019. Retriewed from: http://www.europeangeoparks.org/?page_id=4127

Konvenc, G. Praktika ohrany pamjatnikov prirody. 1911. [The practice of protecting natural monuments.] The practice of protecting natural monuments. Translation from a German publication 1911. Kyiv, KECC, 1–45.

Karta geologichnyh pam'jatok Ukrai'ny. 2019. [Map of geological monuments of Ukraine.] Ukrainian State Geological Research Institute. Retrieved from: http://supermaps.ukrdgri.gov.ua/landmarks/default.aspx (In Ukrainian).

Kravchuk, Y., Boguc'kyj A., Brusak, V., Zin'ko, Ju., O. Shevchuk, O., 2012. Proektovani geoparky Ukrai'ns'kyh Karpat jak demonstracijni modeli evoljucii' Zemli. [Projected Geoparks of Ukrainian Carpathians as a demonstration model of the evolution of the Earth.] Chernivtsi National University Scientific Bulletin: Collection of Scientific Papers. Chernivtsi: Chernivtsi National University, Issue. 612–613: Geography. 102–107. (In Ukrainian).

Kravchuk, Ja., Zin'ko, Ju., Homyn, A., Shevchuk, O., 2012. Proektovanyj geopark "Vulkanichni Karpaty" [Geopark "Volcanic Carpathians" designed Visnyk of Lviv University.] Geography Series. Issue 40, Part 2. 30–43(In Ukrainian).

Manyuk, V., 2004. Geological heritage of a southern part of Ukraine. Natural and Cultural landscapes. – Proceedings of a conference, Dublin castel, 2002, 93-98. Edited by Matthew Parkes.

Manyuk, V., 2005a. Peculiarity of Geoconservation in Ukraine. IV International Symposium ProGeo on the Conservation of the Geological Heritage. Braga, Portugal, University of Minho, 26.

Manyuk, V.V., 2005b. Inventory and cataloguing of a geological heritage of Southern and East Ukraine. ProGEO WG-1 subregional meeting and field trip. Tirana, Albania, 20–21.

Manyuk, V.V., 2006a. Istorychni aspekty pryjednannja Ukrai'ny do Jevropejs'koi' Asociacii' zi zberezhennja geologichnoi' spadshhyny (ProGEO). [Historical aspects of Ukraine's accession to the European Association for the Conservation of Geological Heritage (ProGEO).] Mineral Resources of Ukraine, 4, 8–11. (In Ukrainian).

Manyuk, V., 2006b. Potential objects for creation of a network national geopakrs in Ukraine. Volume of abstracts: ProGEO Symposium "Safeguarding our Geological Heritage". Kyiv, Kamianets-Podil'sky, 2006, 30–32.

Manyuk, V., 2007a.New strategy for conservation of geosites in Ukraine.Geology-marker of cultural and geological heritage geosites under threat. Proceeding 32 th, International Geological Congress Florence, 2004.

Manyuk, V., 2007b.Geologichni pam'jatky Krymu, jak vyznachal'nyj komponent navkolyshn'ogo pryrodnogo seredovyshha. [Geological sites of the Crimea as a defining component of the environment.] Problems of Nature Management, Sustainable Development and Technogenic Safety of Regions: Proceedings of the Fourth International Scientific and Practical Conference, Dnipropetrovsk, 134–136. (In Ukrainian).

Manyuk, V., 2007c.The Problem of Creation of Network of National Geoparks in Ukraine.Dnipropetrovsk, DNU Bulletin, 63–67.

Manyuk, V., 2008a.Istorychni peredumovy stvorennja nacional'nogo geologichnogo parku «Orlyne gnizdo» [Historical prerequisites for the creation of the Eagle's Nest National Geological Park.] Protection and management of inanimate objects in protected areas: mater. international scientific and practical conference. Grimail-Ternopil, Dzhura, 2008,175–181. (In Ukrainian).

Manyuk, V., 2008b.The problem of creation of a Network National Geoparks in Ukraine. Proceeding 33 th International Geological Congress, Norway, Oslo, 6-14 August, 2008.

Manyuk, V.V., 2016. Study and preservation of geosites: training course for geology students. Geoheritage, Springer Berlin Heidelberg, doi:12371, 10.1007/s 12371 – 015 – 0147 – y. –Vol.8, 181–187.

Odsherred Geopark – Denmark. 2019. Retriewed from: http://www.europeangeoparks.org/?page_id=4127

Proceeding of the Conference "Geological heritage concept, conservation and protection policy in Central Europe.2004. Polish Geological Institute Special Papers, 13, Cracow-Warzawa, 212.

Shevchuk, O., 2010. Jevropejs'ki geoparky: zberezhennja geospadshhyny i rozvytok geoturyzmu.[European geoparks: conservation of the geo-heritage and the development of geotourism.] Scientific notes of Ternopil National Pedagogical University. Series: Geography. Spec. Issue: Sustainable Environmental Management: Approaches, Issues, Prospects. – Ternopil, 1 (Issue 27), 369-378. (In Ukrainian).

The History of Geoconservation. 2008. Cynthia V. Burek, Colin D. Prosser (Edit.) Geological Society of London, Special publication, 300. 312.

Viiding, H. ed., 1976. Eesti NSV maapõue kaitsest. Valgus, Tallin. 148-161.

Wimbledon, W.A.P., Gerasimenko, N.P, Ishchenko, A.A., G.B. Lisichenko, K.G. Lisichenko. 1999. Problems of protection of geological heritage in Ukraine. Kyiv, National Academy of Science of Ukraine, Committee of Geologists of Ukraine, 1–130.

Yaholnyk, Oleh V., Manyuk, Volodymyr V., 2017. Legal aspects of creating geoparks in Ukraine "Bulletin of the University of Dnipro.Geology, geography" Dnipro, 25 (2), 136–145.

Zinko, Ju.V.,Gnatjuk. R.M., Blagodyr, S.F., 2006. Problematika stvorennja geoparkiv v Ukraïns'kih Karpatah. [Problems of georeferencing in the Ukrainian Carpathians.]Problems of geomorphology and paleogeography of the Ukrainian Carpathians and adjacent territories. Lviv, VTS I. Franko LNU, 274–281. (In Ukrainian).

Zinko, Ju., Shevchuk, O., 2008. Peredumovy stvorennja geoparku "Ukrai'ns'ki Tovtry." [Prerequisites for the creation of the Ukrainian Tovtry Geopark.] Conservation and management of inanimate nature objects in protected areas: Materials international scientific-practical conf. Grimailiv – Ternopil, Dzhura, 94–99. (In Ukrainian).

Zinko, Ju.V., Shevchuk, O.M., 2009. Peredumovy stvorennja geoparku "Dnistrovs'kyj kan'jon."[Prerequisites for the creation of the Dnestrovsky Canyon geopark.] The Dnestrovsky Canyon is a unique tourism territory: Materials International. Research Practice Conf. Ternopil: Textbooks and manuals, 7–12.(In Ukrainian).

Zinko, Ju.V., Shevchuk, O.M., 2011. Proektovani geoparky Zahidnoi' Ukrai'ny. [Geoparks of Western Ukraine are designed.] Physical Geography and Geomorphology. Kyiv, VGL «Horizons», Issue 3 (64), 41–55. (In Ukrainian).

Zinko, Ju., Skakun, L., Proc, Ja., 2012a. Obg›runtuvannja ukrai›ns›koi› chastyny transkordonnogo geoturystychnogo shljahu "Geo-Karpaty." [Substantiation of the Ukrainian part of the transboundary geotourist path "Geo-Carpathians."] Problems of geomorphology and paleogeography of the Ukrainian Carpathians and adjacent territories: Coll. scientific works. Lviv: Ivan Franko Publishing Center, 274–284. (In Ukrainian).

Zinko, J.V., Blagodyr S.F., 2012b. Ocinka pryrodoohoronnyh terytorij Zahidnogo Podillja v konteksti formuvannja geoparkiv. [Assessment of nature conservation areas of West Podillya in the context of geoparks formation.] Scientific notes of the Ternopil Volodymyr Hnatiuk National

Pedagogical University. Series: Geography. Special issue. Ternopil: SMP "Typ". 2 (Ex. 32), 179–184. (In Ukrainian).

Zinko, Ju. V., Shevchuk O.M., 2012c. Organizacijno-terytorial'ni zasady stvorennja geoparku "Dnistrovs'kyj kan'jon." [Organizational-territorial bases of creation of geopark "Dnestrovsky canyon."] Tourist resources as a factor of development of territory: conference-seminar. Ternopil, V. Hnatik TNPU Publishing House, 23–30. (In Ukrainian).

Zinko, Ju., Kravchuk Ja., Homyn Ja., Petryk T., Shevchuk O., 2012d. Geokonservacijna ocinka ta organizacijno-terytorial'ne planuvannja geoparku "Vulkanichni Karpaty." [Geoconservation assessment and organizational and territorial planning of the Volcanic Carpathians geopark.] Problems of geomorphology and paleogeography of the Ukrainian Carpathians and adjacent territories: Coll. Sciences. wash. Lviv: Ivan Franko Publishing Center, 2012, 258–273. (In Ukrainian).