POSSIBILITIES OF ESTABLISHING AND FUNCTIONING OF SPELEOLOGICAL NATIONAL PARK

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Abstract. Podillia speleoregion belongs to the most promising districts of Ukraine in terms of tourism and recreation industry development. A significant number of cave systems of the country are concentrated here, which are characterized by the highest attractive values. The use of their recreational and tourist potential requires a rather complicated system integration of its components (peculiar reduction approach) and a combined generalized assessment (multifaceted approach). It is this duality that allows us to reveal all the aspects of the potential and, on this basis, to plan the appropriate use of territories. In general, the recovery of tourist and recreational activities in Podillia speleoregion will automatically "revive" the economic components of each of the isolated zones. This is primarily due to the need to intensify transportation, road construction, and bus stations. At the same time there is a real possibility of attracting foreign investments, since such projects are most often supported. Another area of intensification of the economic development of zones is related to the need for their significant infrastructure expansion. There is no need to create large complexes. It would be better to be restricted to tourist camping sites and small camps, which would specialize in relatively short-term stay of recreants and speleotourists. Such recreation and training centers should become centers for the development of the surrounding infrastructure in the form of hire points for speleoequipment, dining facilities, medical institutions, sales outlets, which would specialize in the sales of promotional and advertising products, souvenirs, etc. It would be appropriate to create in each such infrastructural center a center for regulating recreational and tourist activities that would perform control and statistical functions. All information from the zonal regulatory centers should be reported to the management of institution of speleoregion. The develop-

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ment according to this scheme in all ten zones of Podillia speleoregion is able to increase promptly the number of jobs offered due to the significant funding not only from the investors (this is virtually a precondition for the first stages of the region development), but also directly from the tourists themselves and the recreants. Another problem that may arise from the intensive operation of the cave systems of the Podillia speleoregion is their relative environmental vulnerability (instability). The article analyses the present speleological resources on the territory of Ukraine. Within the boundaries of Podillia speleoregion zonation has been performed in order to improve the organizational and administrative control of its tourist recreational reclamation. The relevance of Podillia speleoregion establishnment in the structure of national park has been proposed as to adjust and to monitor the whole recreational activity on its territory. The purpose of such park establishment and main dimensions of its activity have been specified. Implementation of proposed ecologically directed actions will allow to support ecological survival of caves upon the controlled intensity of recreational tourist flows.

1. Introduction

Podillia with the adjacent territories where the largest Ukrainian and world gypsum caves are located has not only a prospect, but even today's ability for the quality enhancement of the recreational potential. However, implementation of this objective is associated with the number of challenges, primarily caused by the lack of scientific reasoning of the capacity as well as attractiveness potential of particular cave systems, their aesthetic, educational and historical value, safety, etc.

Such achievements are impossible without the provisions and measures development aimed at preservation of the unique cave formations against the background of prospective enhancement of the tourist and recreational exploitation rate thereof. Keeping the balance between these types of activity is one of the major objectives for the entire Podillia speleoregion. It is necessary to reform the environmental management system through the introduction of new regulatory and financial and economic mechanisms of recreational use and reproduction of the natural resources of this speleoregion, considering priority environmental requirements and standards.

The purpose of the study is to develop the basic theoretical and methodological and practical provisions with respect to the ensuring of preservation and sustainable use of the unique Podillia karst caves by means of the karst-speleological national park "Podillia Speleoregion" establishment. Such purpose anticipates a number of objectives:

- reasoning of capabilities for the recreational and tourist traffic significant increase within the Podillia speleoregion;
- for this purpose, differentiation of the speleoregion in order to ensure more reasonable allocation of funds and other resources;
- provision of the relevant research information to the administration (at the local and regional levels), proving the existing prospects of the recreational and tourist reorientation of the region's specialty;
- reasoning of the regional infrastructure development prospects, as differentiated based on proposed respective zoning;
- provision of scientifically justified recommendations concerning the preservation of the unique cave systems of the Podillia speleoregion in the context of the tourist and recreational traffic increase;
- provision of scientific basis for the speleological activity development to the existing speleoclubs of Ukraine;
- reasoning of the study comprehension and use of the particular cave systems as well as the Podillia speleoregion in the whole.

Achievement of the purpose set will be possible only if there are clearly defined methods of the study. First of all, these are the methods of the tourist potential determination. Assessment of the speleoregion tourist potential shall be appropriate if conducted according to the plan as follows:

- availability of the attractive sites of natural and historical legacy: specifically caves, as well as monasteries, village churches, archaeological monuments, historic battlefields, historic sites (associated with interesting historical events), preserved architectural centres of villages and other settlements;
- availability of the unique natural sites among the caves (Kryshtaleva and Mlynky caves) as well as the sites associated with the cultural landscape: village parks, monastery parks, old mills and dams on the rivers, ancient water routes, old lanes and individual trees;
- beautiful cave lakes; attractive areas; unique outcrops; springs, etc.;
- areas which it is practicable to use for the extreme tourism;
- availability of locations chosen by the recreationists for their independent research: areas with speleothems, places of recreation, areas around the underground lakes.

Specifically, the caves are assessed by their potentials: aesthetic, tourist capacity, educational, safety, etc. Each provision should be assessed using the score system approved through the marketing research.

2. Analysis of recent research and publications

Theoretical fundamentals of the tourist and recreational natural resource management are highlighted in the research papers of the geographers, in particular V. Andreichuk (1987), M. Blaha (2000), B. Vakhrushev (2001), V. Dubliansky (1969), V. Korzhyk (2007), A. Kucheruk (1976), V. Radziievsky (Радзієвський, 1984), B. Ridush (2005), J. Grodzicki (ed.) (1993), J. Gubała (2001), J. Kozłowski (Jahn et al. (eds.), 1989), R. Konieczny et al. (1996) and others. As of today the peculiarities and specificity of the tourist and recreational natural resource management within the protected territories have been well developed. However, the problem of determination of the speleotourism functioning principles, methods of the speleotourist potential assessment, main directions of the natural resource management optimization within the Podillia speleoregion remains unsolved. The necessity of the development of the scientific reasoning and practical recommendations concerning carrying out of the recreational activities in Podillia, as well as implementation of the strategic management mechanisms aimed at the enhancement of the recreational use of speleological resources efficiency determines the relevance and practical value of this study.

Except for the history of the Podillia caves exploration, today not only scientific works as to their tourist and recreational development are practically lacking, but they remain yet poorly explored sites themselves. Present efforts of several speleoclubs acting completely on their personal interest, often in the absence of the directed control on the part of professional speleologists are obviously not enough. And the lack of funding of the research works turns them into a spontaneous event.

Mysteriousness, unexploredness, danger and strangeness – these attractive features are well inherent to the Podillia cave systems. Simultaneously they represent the tourist recreational resource quality by the highest scores. It is necessary to use this opportunity both frugally and at the same time efficiently. For this purpose, it is necessary to clearly differentiate resources by zone, setting up the reasonable order of particular zones development (Figure 1).

Fig. 1. Tourist and recreational zoning of the Podillia speleoregion

Source: personal elaboration

Examination of the tourist and recreational activity development in the Podillia speleoregion will facilitate the improvement of general methodological and methodical fundamentals of study and optimization of such activity. Additionally, the economic activity is very prospective, able to provide an increase of jobs in the region and substantial fund inflows.

3. Conditions for the Podillia speleological national park establishment

Establishment and existence of speleological national parks in the world practice can be characterised by significant peculiarities. Primarily, these are the specificity of the protected sites and those used for recreational purposes, where along with the substantial tourist and recreational interest there are present still substantial risks. The analysis of the famous world speleological complexes shows that such activities are necessary, since there are

created best conditions for the unique speleological sites protection along with the regulated use here.

The karst caves are one of characteristic natural features of Podillia. The caves varied by size penetrate the gypsum and limestone rocks creating complicated underground labyrinths and vertical wells.

One of the most important areas of activity of the tourist-speleologists is a research work. Due to the multi-purpose use of caves in different sectors of economy in a number of karst regions of Ukraine, the caves have been put under the protection of the state and the access thereto has been restricted for the hikers and tourists.

Reaching the previously unexplored corners of the nature the human will inevitably intrude the environment that has been forming over the thousands of years. That is why in order to preserve the caves being of great scientific and educational value, they are declared nature reserves, reservation, integrated into national natural parks. The caves of the studied region, such as: Optymistychna, Ozerna, Kryshtaleva, Verteba, Yuvileina, Perlyna, Atlantyda and Popeliushka are the natural monuments of national and regional value (Ridush, 2005) (table 1 and 2).

It is sufficient to state a number of interesting facts concerning the caves of Podillia, namely:

1) The longest cave in Podillia is the Optimistic Cave, opened in 1966 by the group of Lviv speleologists under the guidance of M. Savchyn. The Optimistic Cave is listed in the Guinness Book of Records as the world's longest gypsum cave, the longest in Eurasia, and the second largest cave in the world. The total mapped length of its moves exceeds 250 km at a

Table 1

Caves – geological natural monuments of national value

No.	Cave name	Length [m]	Location
1.	Optymistychna	240,500	Korolivka Vil., Borshchiv District, Ternopil Reg.
2.	Ozerna	134,000	Strilkivtsi Vil., Borshchiv District, Ternopil Reg.
3.	Kryshtaleva	23,000	Nyzhnie Kryvche Vil., Borshchiv District, Ternopil Reg.
4.	Verteba	9021	Bilche-Zolote Vil., Borshchiv District, Ternopil Reg.
5.	Mlynky	45,737	Zalissia Vil., Chortkiv District, Ternopil Reg.
6.	Yuvileina	1623	Sapohiv Vil., Borshchiv District, Ternopil Reg.
7.	Perlyna	240	Krutyliv Vil., Husiatyn District, Ternopil Reg.

Source: personal elaboration based on B.T. Ridush (2005)

Table 2

Caves – geological natural monuments of regional (local) value

No.	Cave name	Length [m]	Location
1.	Dzhurynska	1135	Nahoriany Vil., Zalishchyky District, Ternopil Reg.
2.	Uhryn	2120	Uhryn Vil., Chortkiv District, Ternopil Reg.
3.	Ulashkivska	94	Ulashkivtsi Vil., Chortkiv District, Ternopil Reg.
4.	Zholoby	7	Skomorokhy Vil., Buchach District, Ternopil Reg.
5.	Zbruchanska	254	Zbruchanske Vil., Borshchiv District, Ternopil Reg.
6.	Na Khomakh	128	Nyzhnie Kryvche Vil., Borshchiv District, Ternopil Reg.
7.	Yazychnytska	42	Mizhhiria Vil., Borshchiv District, Ternopil Reg.
8.	Dvokh Ozer	57	Muravinets Vil., Borshchiv District, Ternopil Reg.
9.	Slavka	9100	Verkhnie Kryvche Vil., Borshchiv District, Ternopil Reg.

Source: personal elaboration based on B.T. Ridush (2005)

depth of 20 m. The cave has not been explored until the end. Together with numerous winding passages, it occupies an area of about 2 hectares.

In November 2012, the first underground museum of sculptures was opened in the cave in Ukraine. The Optimistic Cave was decorated with clay sculptures created by students of artistic institutions and artisans of Ternopil and Lviv cities within three days. The museum has such expositions: "Prehistoric aquarium", "The mystery of nature", "Mr. Glyba" and the others. The cave itself prompted the idea of "Sculptural Exposition". This exposition is life-long. The microclimate in the cave is ideal, a stable temperature (+10 °C) and constant humidity. The author of the idea is Olena Sheptytska.

In order to popularize and maximize the productive study of the Optimistic Cave with minimal damage to the cave, the speleological club "Cyclop" opened the underground exposition. The underground museum presents various cave lightnings – beautiful colorful gypsum crystals that reach fifty centimeters in length. Various speleothems, stalactites, stalagmites, capes, calcite "black rivers", huge dusks of laminar gypsum, rocky plants, as well as unique and very rare helichetites deserve to be seen at least once in your life.

The museum is located in the gallery "Cyclop" – a very symbolic place. It was in this gallery in 1967 that the speleologists set up the first underground camp. Now underground camps are located in more distant areas of the Optimistic Cave, coonected by a power transmission line.

2) The most spacious cave is the Ozerna cave in Ternopil region. With a length of 132 km, it has a volume of 700 thousand m^3 and an area of 310 thousand m^2. It was opened in 1938 by local inhabitants. The name of the cave owes its name to large underground lakes with an average depth of 1.5-2.0 m. The depth of certain reservoirs reaches 4 m. Its most spacious labyrinths are called: "Crystal" halls, "Winter Tale", "Alps", "Black Tulips Path", "Gallery of the Giants", "Large White Galleries", "Gas" and "Gothic Fireplaces", lakes – "Unexpected", "Captain Nemo". Many unique karst forms were fund in the cave: chimneys, giant halls, underground lakes, established periods of lifting and lowering the water level in the cave.

The explored paths of Ozerna in the southern direction are close to the Optimistic Cave. Work takes place in order to merge them into a single "cave country", which in the future may become the largest cave system in the world (now the largest Flint Ridge-Mammoth Cave in the USA). Annual researches of speleoexpeditions continue;

3) The most accessible cave for the tourists is Kryshtaleva. It is located on a high rocky coast of Tsyhanka near the village of Nizhnie Kryvche in Ternopil region. All its corridors and halls extend for 23 km, the tourist route is 2.5 km, it has a convenient access, and the central labyrinth is electrified. There are many corridors, halls, grottoes, walls and ceilings in the cave, which are covered with colored gypsum crystals.

The active work on the arrangement of the Kryshtaleva Cave for visiting tourists was initiated by the Warsaw archaeologist Ludwig Savicki at the beginning of the XX century. In 1931, the cave was examined in details by the engineer Victor Nekhai on behalf of Lviv State Committee for Nature Protection and the Central Board of the Podillia Tourist and Local-Life Society in Ternopil. In 1933 he published the book "A Guide to the Cave in Kryvche", which contained a description and map of the studied part of the cave. The local landowner Melzeruw, who owned the lands, kindly presented the Podillia Tourist Society a land plot at the entrance to the Kryshtaleva Cave, as well as two picturesque towers remaining from the castle of the Katski of the XVII century. One of the castle towers for the visitors of the cave was equipped with a tourist shelter for 20 people. So, in the 30's of the twentieth century Kryshtaleva Cave became one of the most famous in Central Europe. It is mentioned in numerous tourist guides, published in different languages in what was then Poland (Korzhyk, 2007);

4) Verteba cave became known to all of the world, thanks to the talented and tireless scientist, the speleologist Mykhailo Sokhatskyi created the first museum on the planet in the cave – the Museum of Archeology, the Museum of Trypillian Culture, the Museum of the Neolithic Age. By the quantity and riches of findings of material culture objects of different epochs is not equal among other caves of the world. The pride of the cave exposition is diorama. It recreates the moment of life of Trypillians. White sculptures made of gypsum, contrastingly stand out against the background of darkness, attracting views. Dishes are copies of samples that are now in the Krakow Museum of Archeology. The cave is located 2.5 km from the village of Bilche-Zolote. For the first time, the cave was mentioned in the German magazine "Myscellen" in 1822. Archaeologists call it Naddnistrianska Pompeia.

The first detailed survey of Verteb was carried out by the archaeologist A. Kirkor in 1876, and his work was cintinued in 1890 by the member of the anthropological commission of Krakow Academy of Sciences H. Osovskyi. He, in particular, found 25 skeletons of people who died under rubble several thousand years ago, and next to them – numerous things of household and ritual use. The quantity and scientific value of the findings caused a real furor among archaeologists, so these rare objects were to be exported to the museums of Warsaw, Krakow and Vienna. According to some reports, only in 1904 about forty chests with historical cargo were sent to Krakow Academy.

An excursion electrified route with an overview of archaeological excavations, historical monuments, which are thousands of years old, a few dioramas extends for 1.5 km;

5) the third place in Ukraine and the third in the world among the gypsum caves takes the Cinderella Cave (90.2 km). It was opened in 1977 by Chernivtsi speleologists under the guidance of V.P. Korzhyk. Its main part is located on the territory of the Novoselytskyi district of Chernivtsi region, but the entrance to the cave is constructed on the territory of Moldova (near Kriva village). For the purpose of speleotourism, scientific researches and speleotherapy, a new entrance from the territory of Novoselytskyi district of Chernivtsi region was opened. In general, there are 14 protected sites on the territory. There are dozens of lakes in the cave, about a dozen of wells with a depth of 12-15 m, iron manganese clay stalactites and crystals of transparent gypsum. Cinderella Cave is called the most "multi-storey" cave in Ukraine.

Unlike other well-known caves, Cinderella Cave has three storeys, connected by 15-20 meter wells, which in the cross section have the form of the right circle. The average width of the labyrinth of underground passages is 3-4 m, and the height – 2-4 m. Galleries and cave halls are decorated with fantastically beautiful chaos of native formations – stalactites and stalagmites (Korzhyk, 2007).

6) The Bukovynka cave located 1.5 km southwest of Stalnivtsi Village is an interesting home-science and tourist site. Today there are two sister-caves with separate entrances and passage networks – Bukovynka-1 and Bukovynka-2. The cave is reach in various morphological elements and secondary crystal formations. It was the first in Bukovyna where the stalactites were found. The cave can be used for the scientific and health resort and treatment purposes, as well as for the speleotourism development.

7) the most beautiful cave in Chernivtsi region is Dovhyi Yar Cave, which is is located near Pohorilovka village of Zastavnivskyi district in Dniester "wall". This is a unique three-storey cave labyrinth, the length of the passed paths by the speleologists reaches 377m. The cave presents nine of the eleven stages of the karst process development (Ridush, 2005).

8) The sports and tourist cave is Mlynky Cave, located near Zalissia village in Chortkiv district of the Ternopil region, on the right slope of Mlynky river. It was discovered by the local inhabitants in 1960. The speleologists under the guidance of V. Radziievskyi conducted the research of the cave and made its first plan. The map depicts 45.7 km of underground passages. The cave is distinguished by a great number of diverse forms and abindance of crystalline formations.

The first excursion groups in the Mlynky Cave appeared in the early 60's. The organizers of the excursion groups were Ternopil regional excursion and tourist station, regional tourism council, speleotourism station, regional history museum. Also, the cave was visited by separate groups of tourists (employees of different enterprises, students).

In August 2007, Chortkiv cavers on the western side of the cave opened a new district called the "Global Area", which is one third of the well-known cave labyrinth. His researches are still ongoing. The explored length of the Mlynky Cave reaches 49.684 m.

The excursion route of its labyrinths is held annually by numerous sports and tourist groups. In Mlynky there are competitions for landing and speleosurveying, training sessions of speleotourists. At the same time,

the excursion route is not intended for mass visitors. Despite almost 100% humidity, the temperature in the cave is relatively high (9.6 ° C). In most galleries, the walls are abundantly covered with gypsum crystals of various sizes, painted in white, yellow, black and red colors, crystalline "snow", helictites can be rarely found, exits of "sword-like" gypsum, lamellar plaster ceilings and carbonate stalactites, groups of stalactites, "macaroni" and single stalagmites.

Mlynky cave is used for wintering and daily bat shelter. Bats can be found not only at the entrance, but also in the most remote areas of the cave. They are well oriented underground and for moving in the cave often use their "trails". It was behind "the way of bats" that some districts of Mlynky were opened.

9) complex geological monument of nature, which has a significant scientific and aesthetic value, is Atlantis Cave. It is located on one of the slopes of Zbruch river valley near Zavallia village, Kamianets-Podilskyi district of Khmelnytskyi region. This karstic cave in the wall of a local thrown plaster quarry (18 m high) was opened in 1969 by speleologists of Kyiv Palace of Pioneers (leader V. Ya. Rohozhnikov). Captured by the sculptural beauty of the structure and the richness of the deposit of gypsum crystals, the pioneers called the cave "Atlantis". The cave has three storeys and consists of several very large halls connected by a net of narrow passages.

The creation of the tourist-excursion object "Atlantis" is definitely promising. The confirmed existence of a significant underground cavity gives grounds for planning works on the opening of the still inaccessible part of the cave and its involvement in recreational exploitation. This is also facilitated by the geographical position of the cave system – near the major tourist streams from Khmelnytskyi, Kamianets-Podilskyi, Chernivtsi, Ivano-Frankivsk cities and the others.

We have distinguished the Podillia speleoregion as a regional taxonomic unit characterised by a complex of territorially structured features (physiographic, economical, etc.) inherent to it, associated with the existence of a group of genetic cave natural formations determining its tourist and recreational specialty (figure 1).

Organisational basis of the proposed Podillia speleoregion zoning as an interconnected system was formed not only by the availability of the cave formations, but also the transport accessibility. Railway and road transport systems penetrate the separated zones expending the opportunities of com-

prehensive tourist projects implementation, focused on more detailed familiarising both with the speleological resources of the territory and its culture, history, traditions, etc.

It has been found that the rate of the Podillia speleoregion use is extremely low (figure 2) due to several reasons:

- not equipped cave systems, their non-compliance with the speleotourists' safety requirements;
- acute shortage of experienced tourist guides – cave labyrinth guides;
- absence of servicing;
- absence of advertising support.

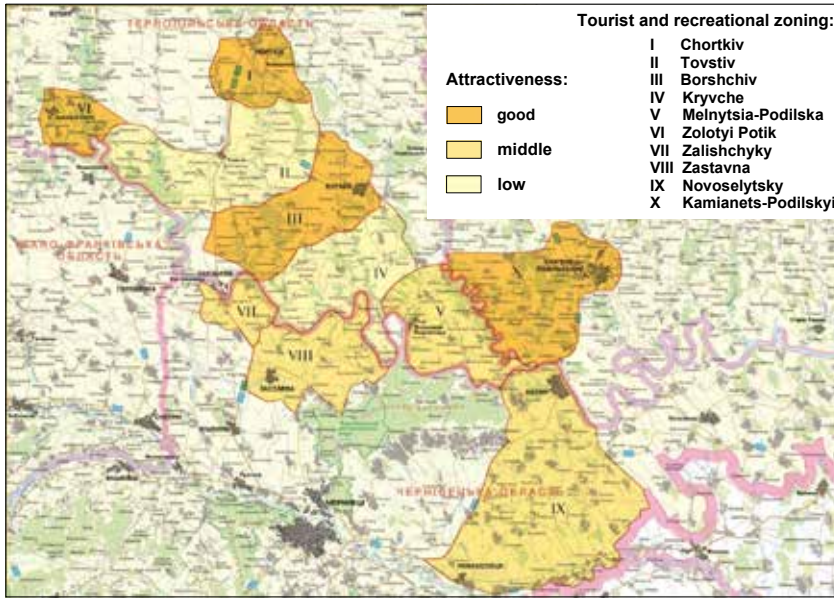

Fig. 2. Assessment of the Podillia speleoregion tourist and recreational zones

Source: personal elaboration

The program of optimization measures aimed at the tourist and recreational potential of the Podillia speleoregion development shall contain necessary and long-term subdivisions and shall be based on the corresponding tourist and recreational zoning of the territory.

We consider it appropriate to advocate the idea of the famous Crimean geographer B. Vakhrushev (Vakhrushev, Toporkova, 2001) concerning the establishment of the karst-speleological national parks in the territory of Ukraine.

4. Scientific approaches to the optimizations of measures of the Podillia park establishment

To ensure sustainable use of the karst landscapes with high recreational potential, it is necessary to structure the human impact, create special categories of the natural sites under protection – karst-speleological national parks and tourist-hiking speleological complexes. According to the international classification of natural landscapes, and especially the territories under protection, national parks represent the highest level form of recreational arrangement of the natural territory which is simultaneously reserve and recreational (Vakhrushev, Toporkova, 2001). Therefore, when establishing national parks, unlike natural reserves, such features of the territory as attractiveness, natural and utility comfort, attendance accessibility are of the critical importance. National parks are a kind of the "open-air museums". Provided that the demonstration of the natural and historic sites should be carried out in conformance with the museum tours and museology laws with maximum utilisation of the natural site's specificity (Vakhrushev, Toporkova, 2001). Two the most important dates in the history of the world national parks development should be distinguished: establishment of the first national park in 1872 (Yellowstone National Park in the USA, area – 898.3 thous. ha), and adoption of the "national park" notion by the General Assembly of the International Union for Conservation of Nature and Natural Resources in 1969 (Weaver, 2006). Establishment of national parks has opened new opportunities to the mankind to stand against the unsustainable use of the planet's natural resources. Historically the idea of national parks has emerged from the endeavour to perpetuate the best samples of the nature and show them to people (Vakhrushev, Toporkova, 2001).

Practicability of the Podillia speleoregion organisation into the structure of a national park cast no doubts, since this will arrange and put under the control the whole recreational activity within the territory thereof. Along with this, the functional features of management of such complex site as a national park are multi-variant and require consideration of the branched population of strategic, tactical and unpredictable by now challenges. Since

the spatial extrapolation of any situation shall be most appropriate when the natural and human-modified territorial structure of the park are taken into consideration, the management measures should be developed just on the same basis, that will give additional opportunities with rather high probability of the general situation analysis, its interrelations and projected states.

National parks are established with the intent to preserve geological formations and wildlife, and usually become popular tourist areas. With the exploitation thereof, it is necessary to maintain the balance between these two directions which are, however, often interrelated: tourists often bring revenue to the parks, which can be invested in the nature preservation projects (Vakhrushev, Toporkova, 2001), for instance, establishment of the national park in the studied region. At the same time the situation is complicated due to the availability of the areas with absolutely reserved operation mode (particular cave systems, such as Atlantyda, Ozerna, etc.) as well as the areas with controlled restricted utilisation.

We have determined the purpose of such national park establishment – it shall be preservation of nature of the national park in the mode which allows harmonious functioning of natural systems as well as independent plant aggregations in the time and space. Additionally, we have determined basic lines of its activities:

- study of the natural (including the cave) flora and fauna of the national park territory (and in certain cases – the adjacent territories which are functionally related to the park territorial systems);
- absolute protection of the territorial systems' functioning in a spontaneous mode within the absolutely reserved sites (certain cave systems);
- preservation of living plants, including rare and endangered species, as well as plant communities and landscape compositions in the natural and artificial environment within the park location, in order to improve aesthetic attractiveness of the territory;
- conducting research works aimed at the region's cave systems optimization;
- scientific and educational work in the field of the cave systems' nature protection;
- research work in the field of the tourist business development;
- research work in the field of the park construction;
- monitoring survey of the spatiotemporal functioning of the protected cave systems, biogeocenoses and phytocenoses;

• monitoring survey of the natural systems' state within the areas of regulated and recreational use.

At the same time, each line can be characterised by its individual purpose.

Activation of the tourist and recreational activities in the Podillia speleoregion will automatically "revitalise" the economic components of every marked zone. This is primarily associated with the need to intensify transport communication, construct roads, bus stations, etc. In this regard there is a real opportunity to attract foreign investments, since precisely such projects often enjoy support.

Another direction of promotion of the zone economic development is associated with the necessity of substantial expansion of the infrastructure thereof. Provided that there is no need for the major complexes establishment. It would be practicable to be limited to the tourist campsites and small camps which would specialise in relatively short-time accommodation of speleorecreationists and speleotourists. Such leisure and training camps should become the centres of the surrounding infrastructure development in the form of the speleological equipment rental stores, catering units, health care facilities, retail outlets to be specialised in the sale of the reference and promotional materials, souvenirs, etc.

It would be practicable to create a centre of the recreational and tourist activity regulation with every such infrastructural centre, that would perform control and statistical functions. All the information obtained from the zonal regulation centres should be accumulated with the central regulation institution of the speleoregion.

Development of all ten zones of the Podillia speleoregion (see figure 1) according to such pattern shall be able to rapidly increase the number of proposed jobs due to substantial funding not only from investors (this shall be almost binding condition at the first steps of the region development), but also directly from the tourists and recreationists themselves.

Another problem that may emerge resulting from the intensification of exploitation of the Podillia speleoregion cave systems is their relative environmental vulnerability (instability).

In order to preserve the unique cave systems, it is necessary to:

• conduct preliminary environmental examination of all caves which are planned for the tourist and recreational use;

• produce appropriate ecological passports for the caves and periodically renew them;

• develop scientifically justified restriction criteria, both general and individual for every cave;

• arrange and implement environmental monitoring in all exploited caves;

• arrange the environmental control service which shall incur not only control obligations, but also the obligations to impose appropriate penal sanctions on those guilty of a violation of the environmentally safe state of the caves and the parts thereof.

Implementation of the proposed environmentally oriented measures will allow ensuring the environmental safety of caves under the terms of controlled rate of the recreational and tourist traffic.

5. Conclusions

Given researches prove the urgent need for the development of the Podillia caves' preservation and sustainable use complex program. It can be accomplished in the most effective manner through the establishment of the karst-speleological national park "Podillia Speleoregion", reasonably combining nature protection, economic and educational functions. Primarily this becomes possible with the establishment of the unified administrative body (the park directorate) which would consolidate regional and nationwide interests, could reasonably direct the funds, consider the rate of the recreational and tourist traffic, optimally create the appropriate infrastructure.

The park research council would be able to provide the scientific and methodological grounds for the implementation of such objectives. Provided that, since the situation can be variable whether by state of the caves, or the load thereon, it is crucial to create the system of speleomonitoring and periodical assessment of the utilised potentials' aggregation.

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