Towards the creation of state-owned resort in the city of Morshyn (Lviv region (Ukraine))

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For the organization of the resorts natural areas of resorts, which have natural therapeutic and recreational resources, which is a powerful potential for the development of medical rehabilitation, treatment, health improvement and medical tourism are used. The creation of resorts requires the presence of a number of components: natural therapeutic resources, sanatorium and health resorts, infrastructure (balneological, mud therapy, pump room with mineral water, etc.) and a professional staff of employees. Depending on the quality and value of natural therapeutic resources, there are distinct state and local resorts. On the territory of the city of Morshyn (Lviv Oblast, Ukraine), almost 150 years ago, the usage of mineral water for treatment was applied for the first time. During the period of independence of Ukraine, the medical-biological evaluation of medical brines of the Morshynsky deposit of Bonifaci, Banya and Ninivsky deposits was carried out, which included physico-chemical, microbiological and experimental studies in laboratory animals and clinical trials. Also, the current state of the natural territories and infrastructure of sanatorium and resort establishments is assessed, the definition of the natural territory of the city of Morshyn is grounded as a resort of state importance.

Key words: Natural healing resources; recreation areas; physical and chemical studies; experimental studies; clinical testing

Introduction

Article 2 of the Credo of the European Association of resorts (CEAR) states: "Recognition of the status of resorts, health resorts and health facilities must be held on a state legal basis. This recognition should not be based only on local remedies, it should apply to the whole resort with its specific treatment activities". Further, according to article 11, "local natural healing resources are of fundamental importance for resorts, which should be reflected in the state determination of the status of the resort. The healing resources are not yet a resort themselves, health resort or health facility. Despite the provisions of common European law, there are still legal differences in the use of medicines—definition, parameters and legal subordination; these differences are the consequence of different traditions." Other important factors (Art. 12) that make the area a resort, is the availability of resort parks; availability of food, which contributes to the health problems; accessibility for the disabled; appropriate equipment for the use of local medical resources; indications for treatment—based on scientific evidence; the presence of cultural and entertainment programs at the resort.

The above positions of the European Association of Resorts were taken into account when assessing the recreational areas of Morshyn, Lviv region.

The development of the health resort sector in Ukraine received a boost after the adoption of the law of Ukraine “On resorts” (Law of Ukraine” On resorts”, 2000). The health resort sector is an important component of the health care system, which provides a range of services for the treatment, medical rehabilitation, prevention of diseases of the population. The basis for the development of the health resort sector is the availability of natural healing resources (PCR). One of the directions of development of resort areas is the announcement of natural areas that meet the requirements of the Law of Ukraine “On resorts”, resorts of national or local importance.

The resorts of national importance include natural areas that have a particularly valuable and unique PCR and are used for the treatment, medical rehabilitation and prevention of diseases. The resorts of local importance are natural areas with common PCR and are used for the treatment, medical rehabilitation and prevention of diseases.
Materials and Methods

The object of research is natural healing resources (mineral water, climatic conditions, landscapes, recreational resources, environmental condition). The methods are cartographic, comparative-descriptive, ecological, bibliographic methods of analysis of scientific information, physical-geographical, physical-chemical (Certificate, 2017. GOST 23268.0-91, 1999) comprehensive experimental studies on laboratory animals (white rats line Wistar) (Alekseenko N. Ah. 2002), statistical, analytical.

Results and Discussion

One of the directions of development of resort areas is the announcement of natural areas that meet the requirements of the Law of Ukraine “On resorts”, resorts of national or local importance. The basis for the development and attractiveness for investment of resort and tourist areas in modern economic conditions is the implementation of measures to provide resorts with the status of state and local importance, depending on the available PCR, meeting the demand of the population for specific types of Spa services and improving their quality and comfort; increase of profitability due to the introduction of medical tourism, Wellness and SPA treatments (Babov, 2010, 2016).

Nowadays there are seven resorts of national importance in Ukraine – Khmelnik, Saki, Berdyansk, Mirgorod, Skadovsk, Slavyansk, Kuyalnik and three local – Znamenskoye, Solotvino and Kosov. Morshyn city of Lviv region is one of the leading places in Ukraine on the availability of favorable climatic conditions, unique natural healing resources for the treatment and recreation of the population. The presence of a base of sanatorium-resort complexes, mineral healing waters, natural objects and complexes with favorable climatic conditions for the treatment, landscape and floral factors is of particular value.

Natural and environmental factors of formation of economic potential of the city play one of the main roles, as they determine the attractiveness of the territory, the safety of stay in it and the ability to attract investment.

The ecological component of development of economic potential of the region provides preservation of natural and human resources. The mechanisms of their attraction and use depend on the economic levers of development. Environmental conditions directly affect health, living conditions, work, rest and are a condition for a decent human existence. Availability of land, forest, water, mineral, recreational and other types of resources is the basis for economic development. The social sphere through the building of human and social capital, spiritual and cultural potential of human and social development, the rise of the social sphere, the harmonization of social relations has a positive impact on both the economic and environmental spheres (Mashika, 2016).

According to the climatic and geographical characteristics of the resort Morshyn is located in the Carpathian foothills at an altitude of 340 m above sea level, in a continental climate zone with a relatively mild winter, long wet spring, mild summer, dry (in the first half) autumn. The average annual temperature in Morshyn is +7.6°C, the heat (up to +30°C) – in July - August, the coldest (to -25°C) – in January-February. The warm period lasts from May to October, the cold – from November to March. Number of days with sudden temperature fluctuation (more than 5°C) – 10 %, clear days – 28%, cloudy – 27% of the total number of days in the year is observed. The greatest number of clear days is observed in the warm period of the year, which is important for heliotherapy, the effect of which on the body mainly depends on the intensity of ultraviolet (UV) radiation (Figure 1).

![Figure 1. Location of Morshyn, Lviv region.](image-url)
Towards the creation of state-owned resort

Morshyn natural area extends to the East of the city of Bereznitsa to the border with the Ivano-Frankivsk oblast. The main rivers that drain this area and quite deeply dissected surface are Svicha and the Berezhnytsya. Areas of high-layer, covered with sod-medium-and strongly podzolic surface-ogleemy soils, which occupy up to 52% of the territory are dominated in the landscape structure of the Morshyn Natural area. Only the Northern part of this area, adjacent to the Dniester, is expressed by areas of low terraces with sod podzol and meadow soils, which cover 27% of the area of all lands (K. I. Gerenchuk, 1981).

The territory of Morshyn resort belongs to the zone with a small period of UV "hunger strike"—in winter (up to 2.5 months) and strong biological activity in the warm season (more than 5 months). The most intense UV radiation in the area of Morshyn resort is in July. A significant part of it is scattered radiation, so sunbathing can be taken in the shade. Atmospheric pressure in Morshyn is slightly reduced and is equal to an average of 974 kPa (731 mm.m.). Maximum air pressure – up to 1000 kPa (750 mm.m.) it is observed, as a rule, in autumn (more often in October), the minimum – within 954 kPa (715 mm.m.) early winter. Morshyn is surrounded by hills that are covered with forests, so days with moderate winds are only 14 % per year. Harsh winds are observed in January, mild winds – in August-September. The mild climate of the resort Morshyn, the absence of sharp fluctuations in temperature, a beautiful area surrounded by forests, clean, fresh air, filled with the smells of herbs, are favorable conditions for the use of climatotherapy in the complex treatment of patients (L. Fisenko. 2005).

Recreation areas are very popular among tourists. The creation of eco-trails and path is an example of careful attitude to the Spas, which contributes to the protection and rational use of forest plantations.

Many natural areas are managed to provide two basic ecosystem services:
- Support of biodiversity at the expense of nature (landscape conservation);
- Providing opportunities for rest and recreation (cultural services).

Recreation altails contributed the achievement of these two goals, as they provide access to spatially distributive tourist definitions and the simultaneous restriction of their use in special valuable territories. Visitors can view submitted from sensitive and vulnerable areas. On the other hand, traffic that limits routing may lead to a variety of negative environmental effects, which usually include mixed properties of plants and common plants, expansion of stereotypes, development of informal (i.e. visitor-created) trails, soil erosion, and muddiness. Scientific understanding of the relationship between trail impacts and other elements is basic to a more effective and sustained management of recreational trails. Greenways (Association of Green Routes in Central and Eastern Europe) – identifies three main categories of green routes (Zareba, 2007):
- Long-distance green routes (Long-distance Greenways);
- Local green routes (Local Greenways);
- Urban green routes (Urban Greenways).

Urban green route is a multifunctional track (for pedestrians, cyclists, rollers, people in wheelchairs, etc.) that runs along the river, stream, abandoned railway line or natural corridor within the city (Park, green area, etc.). The main purpose of urban green track is a safe movement, rest and get acquainted with the sights.

Criteria:
- At least 90 % of the route is compacted surface;
- The route represents the way for movement by the non-motorized vehicles separated from the road for motor transport;
- The angles of inclination on the route in relation to the horizontal (about 0 or with a slight deviation) allow people with different physical abilities to use the route, including people with disabilities travelling in wheelchairs;
- There is at least one information table (if the route is a loop) or two tables (if the route is linear);
- There is at least one point for rest and / or stop on the route.

The territory of the city of Morshyn is promising for the creation of urban green routes. Near the sanatorium "Marble Palace" is a trail for Nordic walking. There is a scheme with indications and contraindications, which is used by vacationers for the purpose of recovery, and patients – on prescription – in complex rehabilitation treatment on the territory (Fig. 2).

Figure 2. Diagram of the ways Nordic walking in Morshyn.
The territory of Morshyn is promising to create the track. The main forest-forming species of the resort Morshyn is oak, beech, fir and white spruce, but the largest area is occupied by oak stands with an admixture of fir, beech, and sometimes spruce. Often there are aspen, ash ordinary, alder sticky, birch hung, etc. Hydrotherapy is the main type of health improvement and treatment in Morshyn. Hydrotherapy includes, first of all, drinking treatment, which takes place in the equipped pump room of mineral waters, located in the Central part of the old Park (Fig. 3). Mineral waters of different composition and mineralization are given to patients dosed, with specially installed devices called "Jerelo Lux". Pump room of mineral waters provides internal reception of mineral waters to vacationers according to appointment of the doctor (Figure 3).

Underground water spring areas № 4, of the mineral water spring "Morshynskoe", located in the southern and north-eastern outskirts of the resort Morshyn, its composition is hydrocarbonate, sulfate-hydrocarbonate, chloride-hydrocarbonate without specific components and properties. The total mineralization is 0.1-0.4 g/dm³. This groundwater is used for breeding water inland. № 1-κ, № 2-κ and № 3-κ Ninovskoyesourse, which is located in the valley of the river Zhizhava, on the outskirts of the village Horisheof Stryi district of the Lviv region.

Brines of the bore № 1-K are bromine boric sulfate-chloride, magnesium-sodium chloride, sodium slightly acid-neutral, cold, with an iodine content of 2.0 -7.0 mg/dm³.

**Figure 3.** Morshyn Mineral Water Beauvet.

Brines of the bore № 2-κ are iodine-bromine sulfate-chloride, magnesium-sodium chloride, weakly oxidized, cold, containing orthoboric acid from 15.0 mg/L to 150.0 mg/L and iron from 7.0 mg/L to 25.0 mg/L.

Brines of the bore № 3-κ are chloride-sulphate, sulphate sodium, weak-oxide-slightly alkaline, cold, with the content of orthoboric acid from 15.0 mg/L to 150.0 mg/L.

When diluted brine wells № 1 and № 3-groundwater № 4 in proportions from 1:46,32 to 1:42,92 mineral diluted waters (MDW) of small mineralization (from 3.0 g/l to 4.0 g/l) of sulfate-chloride sodium, magnesium-sodium composition without specific components and properties are received, the chemical composition is determined by the following formula:

\[
M_{3,0-4,0} = \frac{ClSO_4 - 51 \text{SO}_4 - 46 - 47}{(Na + K)76 - 78Mg19 - 20} \tag{1}
\]

Complex physiological studies with laboratory animals found that the internal course of a daily dose use of 1% of the bodyweight, this MW is safe for the body and has biological activity, which manifests itself in the sedative effect on the Central nervous system (CNS) and a slight increase in emotional activity, stimulation of the functional state of the kidneys (with the advantage of urine producing renal function) and significant stimulation of bile formation, increased activity of anaerobic oxidation enzymes in the tissues of the stomach, liver and kidneys.

To obtain information on MDW of different salt concentrations, brine brewing has been changed. № 2-Nivsky deposit by underground waters of the mineral water spring № 4. The obtained MDWs are characterized as medium-high-mineralized (from 9.0 g/L to 12.0 g/L) sulfate-chloride magnesium-sodium without specific components and properties. The chemical composition of the MDW corresponds to the following formula:

\[
M_{9,0:12,0} = \frac{Cl74 - 75 \text{SO}_4 - 24 - 25}{(Na + K)72Mg27} \tag{2}
\]

Experimental studies have been carried out on laboratory animals, which, according to model applications of this safety for the organism, have biological activity, which manifests itself in a moderate delay in the effects on the central nervous system (CNS) and the vegetativenervous system (VNS); moderate insisation processes of bile formation.
The experimental researches of the substantiated directions of further clinical trials of MW in Morshyn resorts were made, the results of which were developed recommendations for their practical use in medical practices and received medical (balneological) findings.

According to the (Order of the Ministry of Health of Ukraine), the medical (balneological) conclusion is a unit of complex medical and biological and other special investigations that have the properties of natural resources, including the means related to the use of treatment, medical rehabilitation and disease prevention; a document that regulates the quality of natural resources, as well as the conditional composition of useful and harmful components for human beings.

According to the medical (balneological) findings, the mineral water spring 6 and mineral waters of mineral water spring 1 of the Morshynsky deposit can also be used in medical practice for internal application with appropriate dilutions.

The process of breeding, heating and supplying mineral water is fully automated. After the dilution of mineral water to the given concentration (3.5 g/L; 7 g/L, 14 g/L, 21 g/L), using CHIP cards, the dosage of mineral water for 100 mg, 150 mg, 200 mg is carried out. After consultation of the doctor-gastroenterologist the course of internal reception of mineral waters is realized.

Important components for the assessment of the sustainable development of the sanatorium and resort facilities in Morshyn are the availability of infrastructure and provision to the clinic-diagnostic and medical facilities of five sanatorium and spa establishments "Morshynkurort", as well as TOV "Helms Master" sanatorium "Marble Palace", TOV " Arcadia Plus ", GI Sanatorium "Morshynsky" for the rehabilitation of patients mainly gastroenterological profile, with metabolic disorders, with associated diseases of the musculoskeletal system, as well as women with reproductive functions pathologyand pregnant women. It was determined that the volume of treatment with the use of physiotherapy methods meets the requirements of clinical protocols of sanatorium and resort treatment of patients with diseases presented at the Morshyn resort (Babov, 2012). It should not be forgotten that the purpose of the resorts is not only treatment, but also healing.

To date, the low level of health of the population of Ukraine is due in large part to complex socio-economic and environmental crises. But the analysis of the situation that has arisen showed that it is more profitable to spend money on prevention, that is, healing, rather than on the treatment of diseases and their complications. The purpose of the resorts is not only treatment, but also healing. To date, the low level of health of the population of Ukraine is due in large part to complex socio-economic and environmental crises. But the analysis of the situation that has arisen showed that it is more profitable to spend money on prevention, that is, healing, rather than on the treatment of diseases and their complications (S.I.Kyorenko, 2014). "Healing" means the restoration and increase of functional reserves and adaptive possibilities of an organism that suffer in the event of the impact of adverse environmental factors (Mykhayenko, 2013)

Since the first systems that suffer from adverse (stress) influences are the systems of regulation of processes of vital activity, then recovery begins with the restoration of their activities under the influence of MB or another natural factor. Restoration of regulation provides normalization of the damaged system - CNS and VNS, endocrine and immune organs, organs of the gastrointestinal tract, etc., which increases the adaptability of the whole organism and thus provides for its recovery.

In accordance with the initial orientation at certain levels of the organism's influence, the methods of healing can be divided into two categories: specific, directed on a certain physiological system; holistic, aimed at general improvement of the person (E.I. Semchinskaya, 2009). By the latest methods, the nature of the effect can be attributed to NHR, which are represented by mineral therapeutic waters. In present conditions of unfavorable ecological situation, the need to restore and improve the adaptive capacity of the body is especially urgent.

The objects that can be attributed to the natural resort and recreational resources of the city of Morshyn are as follows: the presence of a base of sanatorium and resort complexes, mineral sulfate natural medical waters, natural objects and complexes with favorable conditions for treatment of climat conditions, landscape and floristic factors.

Conclusions

Taking into account the presence of resort and recreational resources of the city of MorshynLviv region (unique chemical composition of mineral healing waters, natural objects and complexes with favorable climat conditions for the treatment, landscape and floral factors), road and rail links to Lviv, Morshyn has grounds for determining the status of the resort of national importance.

References


Pro zatverdzhennya Poryadku zdjzenshennya mediko-biologicznoi ocini yakosti ta cinnosti prirodnych likuval'nih resursiv, viznachennya metodiv ih vikoristannya. (2003). Nakaz MOZ Ukraini 02.06.2003 № 243 [About the established order of medical and biological assessment of the nature of the natural resource resources, according to the method of its copyright].


