

Development of a model for assessing the potential of health resorts based on landscape-recreational and medical-climatic conditions

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Abstract. *The article is dedicated to theoretical and methodological research and the development of an effective model for assessing the potential of health resorts in the Chelyabinsk region based on an analysis of landscape-recreational and medical-climatic conditions. The authors' model for assessing the potential of health resorts is consistent with program documents implemented in the Chelyabinsk region. Assessment of the potential of health resorts in the Chelyabinsk region will be successful if:*

1) as a methodological basis for solving the problem, integrated, systemic, and geographical approaches are used, as fundamental for the implementation of the model;

2) the developed model for assessing the potential of health resorts reflects the combination of substructural blocks: medical and climatic conditions - natural factors of space, atmospheric and terrestrial origin that affect the human body to some extent; landscape-recreational characteristics, which reflect the following components essential for health improvement: relief; water bodies; vegetation cover;

3) the effective functioning of this model will be determined by a set of conditions: a) a phased allocation of the main components based on the analysis of landscape-recreational and medical-climatic conditions of the environment; b) the geographical zoning of the region (mountain, forest-steppe and steppe zones with their own landscapes, water resources, and bioclimatic indicators; c) an assessment of the potential of health resorts in the region will be based on comprehensive studies that require taking into account many parameters, the combination of which determines the integral effect of climate on humans, as well as taking into account anti-resources that reduce the level of favorable environment and sometimes threaten human health.

Results: *the paper clarifies the essential characteristics of the natural components for assessing the potential of health resorts in the Chelyabinsk region, which reflect the elements necessary for health improvement. The relationships between the structural components of the model are substantiated (the medical and climatic conditions, landscape and recreational characteristics of the region).*

Keywords – *health resorts, assessment of potential, assessment model.*

I. INTRODUCTION

The functioning and further development of the system of health resort and recreational services in Russia are currently an integral part of the state policy in national rehabilitation medicine and recreational infrastructure. This is also an important link between federal and regional executive bodies responsible for health care, resort, tourist, and recreational activities, which consist of medical social, economic, geographical, geological, and geoecological factors [1, 2]. In order to obtain objective and competent information for the development of an accessible and comfortable tourist environment in the Russian Federation, in accordance with the scientific basis for the organization and implementation of health services based on natural healing resources, the National Resort Association with the participation of the Federal Research Institute for Health Organization and Informatics and the Institute for Health Economics – National Research University Higher School of Economics have developed a system for evaluating health resorts with quality assessment by the National Resort Association. A professional assessment of health resorts will be a confirmation of its responsibility in health tourism. This will become a guarantee for consumers and will increase the demand for the domestic health resorts. All information about health resorts, where one can have a good and affordable rest and receive treatment, will be stored in a specialized application, the development of which is currently being carried out by Rostourism. In addition to health resorts, users will have access to maps of Russia's natural resources and information about the features of recreation in each of the regions. The application will be useful for both tourists choosing a health resort and doctors. All these data can also be found in the thematic section of the national tourism portal Russia.Travel.

Currently, the resort facilities of the Chelyabinsk region are represented by 6 resort areas: the Kisegach and Uvildy

resorts, the Khomutinsky, Miass and Karagaysky districts, the Troitsk kumis treatment district. The region has about 20 health resort facilities, most of which are located on the picturesque shores of large and small lakes in the region. The basis of treatment is mineral water and local therapeutic mud. The Khomutinsky mineral lakes located in the Uvelsky region, whose bottom deposits are rich in healing mud, are of the greatest value. Fresh lakes of the Chelyabinsk region (Akachkul, Bolyash, Sabanay, Maly and Bolshoi Bugodak) are distinguished by large sapropel deposits. Chelyabinsk region is an almost unified recreational complex. However, the possibilities of the region are far from being fully utilized. This is due to a number of factors, first of all, the limited financial means, both among the population and the social protection authorities, as well as the inconsistency of the regulatory framework in health care and tourism. At the same time, the share of health resort and recreation services in the total volume of paid services is decreasing.

The relevance of the study is determined by the need to develop an effective model for assessing the potential of health resorts in the Chelyabinsk region and informing the consumer of this type of services. Such information should reflect the components necessary for health improvement and is essential for bringing these services to the standards of health resorts. Based on these standards, health resorts will be able to find possible ways to develop and improve their services for attracting more potential consumers.

II. MATERIALS AND METHODS

The study was carried out on the premises of the Union of Resort Business Experts and the Kisegach Resort company. The most visited health resorts were taken from each natural zone of the Chelyabinsk region (mountain forest, forest-steppe, and steppe) to further evaluate them individually and to determine their effect on the human body.

The assessment of health resorts as objects of tourism was based on modern research in the field of the tourist and recreational potential of tourist destinations conducted by both Russian (P. Shirinkin, T. Nagoyeva, M. Oborin, N. Frolova, O. Artamonova, N. Girovka, L. Ermakova) [3, 4, 5, 6] and foreign scientists (A. Al Mamun, S. Mitra) [7].

This assessment was carried out by an integrated method, based on the analysis of landscape-recreational and medical-climatic conditions, in accordance with the recommendations developed by the National Medical Research Center for Rehabilitation and Balneology (approved by the Ministry of Health of the Russian Federation on February 7, 1997 No 96/226). This methodology uses unified assessment criteria for landscape and climatic parameters, which, due to the difference in units of measurement, are converted to points. 3 points indicate the most favorable conditions in terms of impact on the human body; 1 point indicates the least favorable conditions.

The balneological assessment of the landscape-recreational potential was carried out with respect to its functional and aesthetic qualities. The landscape is characterized by the following components essential for health improvement: 1) relief; 2) water bodies; 3) vegetation cover [8]. Assessment of landscape and recreational potential included the following characteristics: total area, thousand km²; surface area of water bodies, thousand km²; forest area, thousand km²; area of land suitable for agriculture, thousand

km²; undeveloped territories, thousand km²; terrain, points; wildlife resources, points; unique natural resources (mineral springs, lakes, caves, therapeutic mud, etc.).

Relief as a basic element of the natural zone significantly affects health resort activities. When assessing the territory, not only the absolute elevation of the terrain was taken into account, but also the dissection of the relief, and the steepness of the slopes. Rough terrain is both functionally and aesthetically most favorable for health resorts, as it allows obtaining the necessary loads for the cardiovascular, respiratory, and musculoskeletal systems [9].

The most favorable is a ridge relief on the plains, hills or in the foothills. It is used for terrankurs (a dosed walking route for training the cardiovascular, musculoskeletal, and respiratory systems) of various complexity depending on loads on the human body. Therefore, health trails are divided into three categories: 1) weak loads that are prescribed to patients who after serious illnesses; 2) medium loads that are prescribed to people with chronic diseases in remission; 3) heavy loads that are prescribed to healthy people and sometimes people with mild forms of the disease [10].

Hydrological resources for assessing the potential of health resorts were considered from the perspective of safety and the possibility of contact (bathing, diving, fishing, etc.), non-contact (boating, kayaking, yachting, etc.), and hunting (recreational fishing and hunting) types of holidays. To assess water bodies, the following parameters were used: the nature of the coastal slopes; the criteria for the beach strip: width (m), length (m), lithological composition of the soil; criteria for the water area for swimming: width of the bathing area (m), maximum depth (m), lithological composition of the soil of the bottom, flow velocity (m/s), mechanical pollution. According to A. Menshchikov, the hydrological resources include: water resources (surface water bodies, sea, river and lake water areas, groundwater) and natural monuments such as open water bodies, springs, etc. [11].

In health resort services, the diverse properties of the plant world can satisfy almost all recreational needs of a person: aesthetic, physiological (create a microclimate, improve the gas composition of the air, oxygen content, release phytoncides), consumer (berries, mushrooms, herbs), and spiritual. Assessment of the vegetation cover consisted of determining such parameters as: forestry area (%), vegetation on the site, type of forest not far from the site, the age of forest and its thickness, visibility, composition, grass cover.

The assessment of the medical and climatic conditions was carried out both factor-wise and integrally by the level of their impact on the human body. Bioclimatic indicators and resources were evaluated in relation to humans and characterized the relationships between climate and thermal status, health, features of recreation and sanitary-hygienic assessment.

The bioclimatic features of the territory were determined by both geophysical and climatic factors. Geophysical factors are manifested depending on the geographical location of the resort area and its landscape (natural area, terrain, vegetation and water bodies), solar radiation (direct, reflected, scattered), cosmic radiation, seasonal and daily rhythms of solar activity, constant magnetic field of the Earth, the electrostatic field of the Earth.

The need to use a systematic approach that establishes the integral properties of both the system and its elements is determined by the multifactorial impact of climate. The assessment of medical and climatic conditions is based on the modular principle. Each module (medical and climatic parameter) is subdivided into categories characterizing the load from environmental factors on the body's adaptation systems (annoying (1 point), training (2 points), sparing (3 points)).

In the bioclimatic passport of health resorts, 4 bioclimatic modules were categorized, which included all the main meteorological regimes: radiation, circulation, thermal, and precipitation. An integrated assessment of bioclimatic modules gives an objective idea of the bioclimatic potential of the health resorts of the Chelyabinsk region and allows comparing it with other resort areas of Russia. Long-term meteorological data of meteorological stations of the Chelyabinsk region were used as the main material for assessing bioclimatic resources.

III. RESULTS AND DISCUSSION

In our study, the model for assessing the potential of health resorts in the Chelyabinsk region is based on an analysis of landscape-recreational and medical-climatic conditions. We consider this model as an example that displays certain conceptual connections between the parts of the whole and thereby serves for assessing the potential of health resorts of the region or other constituent entities of the Russian Federation.

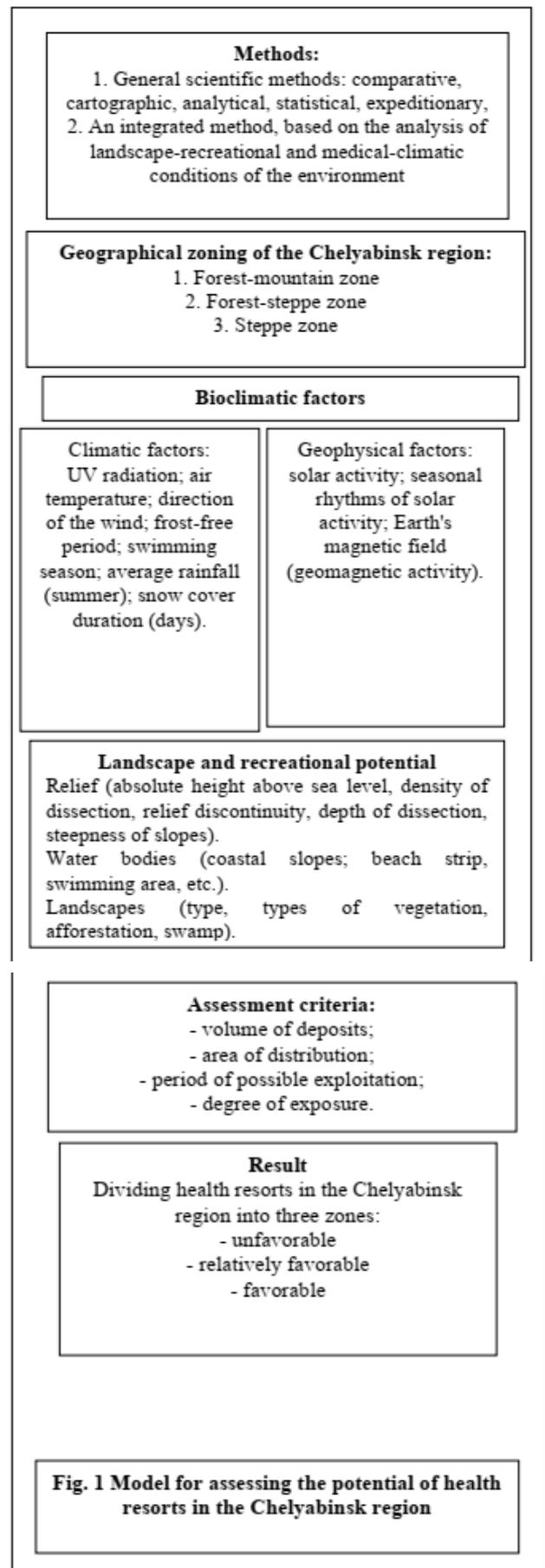


Figure 1 shows the model for assessing the potential of health resorts in the Chelyabinsk region. For this purpose, the following approaches have been chosen: integrated, systemic, and geographical approaches.

To build a model for assessing the potential of health resorts in the Chelyabinsk region, the principle of consistency and stages of assessment was chosen as the main principle.

First stage deals with establishing the object of assessment. In geographical studies at the regional level, most often geosystems act as objects of assessment. However, we propose to use health resorts as objects of assessment that provide health treatment and recreational services.

Second stage consists of identification of the subject of assessment, from the position of which the assessment of the object will be carried out. Certain categories of tourists, providers of tourist services, and types of tourist and recreational activities usually serve as a subject of assessment. In our study, the subject of assessment is the providers of tourist services in the region and their consumers.

Third stage deals with determining the criteria for assessing the object, including factors and conditions that are based on the purpose of the assessment. The purpose of the assessment is to identify the potential of health resorts in the Chelyabinsk region. The list of assessment criteria was established based on an analysis of the problem and the assumptions of the researchers. From the general list of assessment criteria, the most suitable criteria were isolated, and their weight was determined.

To assess the bioclimatic potential, we have identified:

1) geophysical factors, including solar radiation (solar mode), seasonal rhythms of solar activity, Earth's magnetic field (geomagnetic activity).

2) climatic factors: ultraviolet radiation, air temperature (for winter and summer recreation), wind direction, frost-free period (days), the duration of the winter and summer period (days), the duration of the swimming season (days), the average rainfall (summer period), snow cover duration (days).

To assess the landscape-recreational potential, such parameters as terrain, water resources, and landscapes were used. Moreover, the following criteria were taken: reserves volume, distribution area, period of possible exploitation, impact on the human body. Based on the results obtained, the favorable landscape conditions of the area were assessed to identify the impact on the human body: 1.0-1.4 points - unfavorable landscapes; 1.5-2.4 points - relatively favorable landscapes; 2.5-3.0 points - favorable landscapes with significant climatotherapeutic indicators.

It should be noted that the criteria and indicators for assessing the potential of individual resource elements and their groups may vary. It depends on the specific features of the territory, its natural and geographical characteristics and historical development, as well as strategic and current economic priorities.

The fourth stage consists of collecting the information essential for evaluation. The main data on landscapes was obtained during a balneological survey of the Chelyabinsk

region, processing statistical documentation and reports, and conducting surveys and expert assessments.

The fifth stage deals with bringing assessment criteria to a single measurement system. For this purpose, rating scales, ranking, etc. are usually used.

Methods for converting the assessment criteria into particular and integral indicators are determined. In this study, the method of tourist assessment of the territory was used. This method is based on the fact that individual features of a territory receive the corresponding number of points according to the chosen scale. Various "features" are reduced to a common denominator, the sum of the points gives a synthetic assessment of this territory in terms of its attractiveness. We used a 3-point scale.

The sixth stage includes the calculation of an integral indicator as well as verification, adjustment and interpretation of the results obtained. On the example of the Chelyabinsk region, a model for assessing the potential of health resorts was tested based on an analysis of landscape-recreational and medical-climatic conditions.

The productive component of the model is based on assessing the potential of health resorts in the Chelyabinsk region (the total number of objects to be assessed is 35) taking into account its geographical zoning (mountain, forest-steppe, and steppe zones), which allowed identifying the most favorable / unfavorable territories of the region (Table 1).

TABLE I. ASSESSMENT OF THE POTENTIAL OF HEALTH RESORTS IN THE CHELYABINSK REGION

Health resort	Landscape-climatic and resort-recreational factors		Bioclimatic potential
	Landscape and recreational potential	Assessment of a water body	Medical and climatic potential
Mountain-forest area			
Sosnovaya Gorka	2.6	2.75	2.35
Kisegach	2.7	2.7	2.4
Dalnaya Dacha	2.7	2.2	2.5
Uvildy	2.7	2.9	2.45
Lesnoye ozero	2.7	2.7	2.45
Average score of the area	2.68	2.65	2.43
Mountain-forest area	The most favorable		2.586
Forest steppe area			
Ural-zlak	2.3	2.55	2.35
Ural	2.3	2.6	2.4
Plast Disease Prevention Center	1.8	0	2.6
Zhemchuzhina Urala	2.8	2.6	2.35
Average score of the area	2.3	1.91	2.425
Forest steppe area	Favorable		2.09
Steppe area			
Yubileiniy	2.8	2.7	2.3
Karagaiskiy Bor	2.75	2.2	2.45
Yuzhniy	2	0	2.3
Average score of the area	2.51	1.6	2.35
Steppe area	Favorable		2.15

IV. CONCLUSION

The assessment of health resorts in the Chelyabinsk region based on the analysis of landscape-recreational and medical-climatic conditions revealed that the mountain-forest area of the Chelyabinsk region has the highest resort-recreational potential, characterized as “the most favorable” (2.586 points). The largest resorts in Russia, Kisegach, and Uvildy, which have a unique natural climate, large reserves of sapropelic mud from lakes Akachkul, Sabanay, Maly, Bolshoy Bilishkul and Bolshoy Bolyash, as well as unique radon sources, are located in this natural zone. In both resorts, cardiac rehabilitation centers have been opened, where rich medical experience and modern scientific methods for the rehabilitation of patients with cardiovascular pathology allow qualified treatment of heart disease, select optimal programs, create patterns of behavior and lifestyle.

Forest-steppe and steppe natural areas approach the highest values but there are not a large number of natural

objects, in particular rivers and lakes, which could be used for recreation. In the forest-steppe area, the Ural health resort is the most developed, which is the oldest health resort in the entire Urals. Favorable ecological conditions, healing climate, attractive landscapes attract tourists. However, the low level of the infrastructure, the insufficient number of recreation facilities reduce the attractiveness of this resort.

The steppe area has a kind of resort and recreational potential. The problems of long-term development are a small amount of natural mineral waters and therapeutic muds, which can be used for treatment and rehabilitation. However, the climate in general is healing. A comprehensive assessment of the potential of the Chelyabinsk region showed that the Yubileiniy health resort of the steppe zone has the highest score of landscape and recreational potential, which is 2.8 points. However, the low ecological status as a result of industrial development of Magnitogorsk reduces the resort and recreational potential of this territory.

Thus, the model proposed by the authors for assessing the potential of health resorts in the region is considered as a complex and multi-level system that includes interconnected blocks based on medical and climatic conditions of different nature.

This model is essential for the coordination and management of the resources of health resorts, which are able to create the necessary conditions for the provision of competitive health services.

The proposed methodology and its forms, can be used when conducting an inventory of the region’s recreational resources, creating a modern market for health resort services, and also when evaluating health resorts on the territory of the Russian Federation

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