

## Conference Paper

# Hydro Potential Assessment on the Territory of the Chechen Republic for Recreational Purposes

H Sh Zaburaeva<sup>1,2</sup>, L S Gatsaeva<sup>1</sup>, M S Sarsakov<sup>1</sup>, Asl A Daukaev<sup>1,3</sup>,  
A A Abumuslimov<sup>4</sup>, and I A Abumuslimova<sup>5</sup>

<sup>1</sup>Department of Geology, Geophysics and Geoecology, Kh. Ibragimov Complex Institute of the Russian Academy of Sciences (CI RAS), Grozny, Russia

Institute of Oil and Gas

<sup>2</sup>Grozny State Oil Technical University named after Acad. M.D. Millionshchikov, Grozny, Russia

<sup>3</sup>Department of Earth Sciences, Chechen Academy of Sciences, Grozny, Russia

<sup>4</sup>Laboratory of Ecology, Kh. Ibragimov Complex Institute of the Russian Academy of Sciences (CI RAS), Grozny, Russia

<sup>5</sup>Department of Biological and Medical Research, Chechen Academy of Sciences, Grozny, Russia

## Abstract

The article describes the role of hydro-recreational resources in the form of a set of mineral sources, river systems, lakes, reservoirs and other objects in the structure of recreational potential. The region has a high recreational potential, which allows expanding the existing sanatorium and resort base and developing various types of tourism (medical and recreational, scientific, educational, rural, extreme sports, etc.). Physical and geographical features of the territory of the Chechen Republic provide favorable conditions for almost year-round recreational activities. The main focus is on ecotourism as an environmentally oriented form of recreation, which is most relevant to the concept of balanced environmental management and, in particular, water use. An assessment of the current state of the region recreational complex is given. The main factors limiting the development of recreation and tourism include: lack of infrastructure, a shortage of qualified personnel managers, a negative political image of the republic, created by the media. It is shown that their elimination will allow bringing the industry of recreation and tourism in the Chechen Republic to a higher quality level.

**Keywords:** recreational potential, hydro-recreational potential, recreational activity, hydrological facilities, tourism, recreation.

Corresponding Author:

H Sh Zaburaeva  
eveggne@mail.ru

Received: 25 October 2019

Accepted: 15 November 2019

Published: 25 November 2019

Publishing services provided by  
Knowledge E

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Selection and Peer-review under the responsibility of the AgroSMART 2019 Conference Committee.

## 1. Introduction

The development of the tourist and recreational sphere is one of the priority areas designated by the Strategy of Social and Economic Development of the Chechen Republic until 2025. There are various approaches to the interpretation of the concept of "recreational potential" depending on the purpose of the study. In general, in addition to

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the ability of a natural area to have a positive physical, mental or social and psychological impact on a person, recreational potential includes the entire set of natural, cultural, historical and social and economic prerequisites for recreational activities [3].

In the context of the concept of sustainable development, this concept can also be interpreted as the possibility of using a certain territory for the more sustainable development of regional social and economic systems [4]. Despite the diversity of approaches to the definition of the concept and essence of the recreational potential, along with the characteristics of its various facets, natural recreational resources are recognized as a fundamental component [1, 8, etc.].

Water touring in many countries of the world (USA, UK, Canada, Australia, etc.) is developing dynamically and acts as the main source of income, employment and generally contributes to the development of the social and economic sphere [5, 10, 13]. In the USA, water touring is integrated both into the recreation industry, and into the traffic system and even into the education system: the main tourist routes usually have educational centers, including lectures, workshops and other activities for tourists and local residents [5].

River touring, in particular, has spread widely as an eco-tourism industry. In Iran, for example, rivers are among the important resources of ecotourism [10]. It is also called green, educational, sustainable or responsible tourism [10]. In general, river touring plays a significant role in the global tourism market [15].

The suitability of water resources for recreational activities is determined by the temperature of water and its changes during the year; characteristics of the coast (beaches, rocks, crags, etc.); water pond depth; the security depth of the water basin for swimming (the absence of areas of rush current, whirlpools, algae, various dangerous objects down below, etc.), as well as the peculiarities of coastal landscapes.

## 2. Methods and Materials

The work is based on geosystem and geosituational approaches. To assess the hydro-recreational potential, the methods of comparative geographical analysis, statistical, historical, SWOT and content analysis of published domestic and foreign sources were used.

### 3. Results

The recreational potential of the Caucasus Mountains and the mountain regions the Chechen Republic, in particular, is quite diverse and capacious [9]. Here harmoniously combines flat, mountain and highland landscapes; mineral springs with a significant range of healing properties, curative mud, monuments of nature, history and culture are widespread. The hydro-recreational potential is an integral part of the recreational potential of the studied region, which, along with the bioclimatic, medical and ecological and geo-energy potential, forms its geo-ecological potential [8]. The hydro-recreational potential of Chechnya is formed by a dense river system (mainly in the foothills and mountains), lakes, waterfalls, and mineral springs, which generally creates the prerequisites for the development of a wide range of recreational activities in the region. The only factor limiting the development of water touring is the lack of outlet to the sea.

The recreational potential of Chechnya is far from being fully utilized [6], although in recent years there has been a growth trend in the tourism industry. The main tourist interest is *Akhmad Kadyrov Mosque*, the ensemble of high-rise buildings *Grozny-City Towers*, *Lake Kezenoyam*, the resort *Veduchi*. At the same time, there are many natural objects in the territory of the republic that may be of increased interest for tourists coming from different regions of Russia, the Near and Far Abroad countries.

In the Chechen Republic there are over 3 thousand rivers with a total length of more than 6.5 thousand km [2]. However, most of them are small streams with a length of less than 10 km. All rivers belong to the systems of the largest rivers of the Caspian Sea basin -- the Terek and the Sulak. The leaders are: the Terek (218 km), the Sunzha (205 km), the Argun (125 km), the Belka (83 km), the Dzhalka (83 km), and others. Depending on the power source, they are divided into two types. The first type includes rivers that are mainly glacial and snowy (the Terek, the Sunzha (lower than the confluence of the Assa), the Assa and the Argun), and the second type includes rivers that are characterized by spring water source (the Valerik, the Gehi, the Martan, the Goyta, the Dzhalka, the Belka, the Aksay and others.) [8]. There are many picturesque waterfalls on the mountain rivers of the republic.

A number of hydrological sites in Chechnya have been declared nature monuments. Among them is the Vashindarovsky waterfall with a height of 10 m and a width of up to 2 m, declared a nature monument in 1980 [9]. It is located on the southeastern outskirts of the Vashindaroi village in the valley of the tributary Chanty-Argun (the Varand River). The waterfall is easily accessible and was frequented by tourists until the 1990s. On the right bank of the Sharo-Arguna River near the Ulus-Kert village is Bukkuzinsky waterfall,

striking in its beauty and power. Water falls on a cliff from a height of about 80 meters. Next to it are several sulphur springs. Here (100 m downstream of the Argun river) is located one of the deepest caves of Chechnya -- *Sheki-ehk-heh* [12]. A sulfur spring with a flow rate of 100 l/s flows through the cave. After reaching the surface, the sulfuric river flows into the Sharo-Argun River. The length of the main corridor of the cave reaches 240 m. The Bukkuzinsky hydrological objects play an important recreational and balneological role. For example, they can be used in the treatment of diseases of the gastrointestinal tract, the musculoskeletal system, etc.

For recreational purposes, the Nikhaloye waterfalls, located in the area of the ancient settlement of Chechnya (the Nihaloy village) on the right tributary of the Chanty-Argun River, are of particular importance (Fig. 1). They are a cascade of 12 waterfalls from small streams of water 2--10 m high to powerful waterfalls 12--32 m high. The height of the main one reaches 32 m, powerful water flows falling with great noise form a small natural well.

The attractiveness of mountain landscapes is quite large. The picturesque mountain ranges, dense forests, deep canyons, etc. are harmoniously combined here. A recreation center and a sports and tourist complex, including wooden cottages, summer houses, a gym, a hotel, and a futsal field, are built near the waterfalls. It is designed to receive up to 200 tourists. Among other equally important recreational hydrological objects are the Nokhchi-Keloi Falls 74 meters high, located 1 km east of the village of the same name in the Shatoy district.



**Figure 1:** Nihaloy waterfall.

In the structure of the hydro-recreational potential of Chechnya, an important role is given to lakes, which are used (or can be used) for recreational recreation and boating. In the region there are lakes of various origins (dam, karst, landslide, glacial, etc.) and often attract recreants due to proximity to human settlements and rapid warming. But

it is necessary to take into account the degree of their environmental vulnerability in comparison with large water bodies.

The largest alpine reservoir in the North Caucasus is *Lake Kezenoyam*, with an area of about 2 km<sup>2</sup>. In 1978, the lake was included in the list of nature monuments of regional significance [12]. The lake was formed as a result of the dam of the valley of the Horsum and Kauha rivers, which currently serve as its main source of nourishment. It is located on the slope of the Andean ridge near the border of Chechnya with Dagestan, at an altitude of 1870 meters above sea level in the zone of mountain meadows and steppes and does not have surface runoff. Here was the Olympic base of the USSR national rowing team.

An example of an ancient lake is *Lake Bezenoyam*, located on the slope of *the Sharo-Arguna* river valley (at an altitude of 1500 m above sea level) near the Dai village, which has an oval shape. Its area is less than 2 hectares, and the depth does not exceed 4 m. At present, it is in the stage of extinction. Of particular interest from the standpoint of the development of tourism and recreation are also karst lakes found on *the Yalhoroi* and *Andy* ridges (*Arzham*, *Eyopi*, etc.). Among the lakes of tectonic origin, formed as a result of fractures and fractures of the earth's crust, is Galanchozh Lake. It is confined to the Gekhi River basin at an altitude of 1530 m above sea level. The greatest depth reaches 31 m, and the springs and precipitation serve as the main source of food.

In the north of the republic, within the Terek-Kumskoy near desert, there are *eolian lakes* with characteristic round and oval shapes and sizes, as a rule, not exceeding a few tens of meters in diameter. They feed on lakes with groundwater and precipitation. In the valleys of the Terek, the Sunzha and the Dzhalki rivers there are *flood plain lakes* with a depth not exceeding three meters. The shores are usually covered with solid reed beds.

Mineral springs of various chemical speciation are known on the territory of the Chechen Republic: from carbonic-hydrochloric-alkalotic, sulphated-calcium-hydrosulfuric and hydrosulfuric-chloride-sodic to alkalotic- hydrosulfuric-thermal with healing properties [9]. The first group is confined to the headwaters of the Chanty-Arguna River. Two of them -- Kuroysky and Bashoisky since 1978 have the status of nature monuments. The existence of healing hot sulfuric waters here was known as early as the 17th century. They were studied by Gottlieb Schobert, Kirillov I.K., Guldenstedt I.A. et al. [8]. In the eastern part of the northern slope of the Bragunsky range, the Bragunsky springs of sulphated-chloride-hydrocarbonate-sodic speciation were discovered. Their temperature reaches +96 °C. Until 1938, a small sanatorium (for

100 beds) functioned on the basis of these springs, which was subsequently closed due to the threat of exhaustion of springs.

Among the healing mineral springs is *the Isti-Suysky*, discovered in 1987 within the northern slope of the Gudermes ridge. The highest yield group (1470 m<sup>3</sup> per day) is the eastern one. Their temperature varies between 72--75 °C. The healing properties of the springs allow them to be used for the treatment of nervous, skin, GIT diseases, as well as the musculoskeletal system. Approved reserves of category A+B+C1 are 766 m<sup>3</sup>/day. [8]. Other mineral springs also have balneological properties: Chishkinskie, Chanty-Argunskiy, etc. This creates favorable conditions for creating a wide network of sanatorium-and-spa institution in the region.

Along with numerous native (natural) hydrological objects in Chechnya there are also man-made, for example, artificial reservoirs. The largest in scale of them is the Chernorechensky reservoir (or the Grozny Sea), formed by a dam blocking the Goytinka River in the southwestern part of the city of Grozny on an area of over 100 hectares. A sports and recreation tourist complex is being built on its base, incl. a hotel with 100 rooms, a two-level floating restaurant with 400 seats, etc. Among the artificial reservoirs are also Dzhalkinsky and Karyerny lakes, Chervlensky and Shelkovsky ponds, etc.

The significance of tourist and recreational objects is determined by the so-called indicator of the potential of demand, which characterizes the ratio of the average distance to the object to the square of the population living in the zone of transport accessibility [7]. The ski resort "Veduchi" and other recreational facilities described above in the mountainous part of the Chechen Republic are located within 1-5 hour transport accessibility from any city in the North Caucasus. According to preliminary calculations, they have a significant value of the indicator of potential demand.

Hydrorecreational potential cannot be considered in isolation from other components of natural systems. Mountain landscapes of Chechnya as a whole have significant therapeutic and recreational potential. An important recreational resource is terrain, characterized by great diversity, combining powerful mountain uplifts, uplands and lowlands. In combination with other natural factors, it determines the high tourist and recreational attractiveness of the region, in particular for the development of mountain tourism. Here, from the north to the south, semi-desert zones (with negative absolute elevations), steppes, forest-steppes, mountain forests and alpine meadows, and also the nival zone alternate each other. The high dissection of the relief is the result of powerful young uplifts and is combined with highly elevated flat aligned surfaces, witnesses of the ancient stages of the development of the relief. Some peaks of the Lateral Range

rise more than 4 thousand meters above sea level: Tebulosmta (4493 m), Diklosmta (4285 m).

A variety of landforms led to heterogeneity of climatic conditions. The climate of the studied region is generally warm, moderately continental. With an increase in height, a decrease in temperature and a shorter growing season are observed. In the foothill areas at absolute elevations of about 700 m above sea level, the average July temperature varies from 21--20 °C, in mountainous areas at an altitude of 1500--1600 m it is 15°, and 3000 m does not exceed 7--8°. Already at the snowy peaks of the Bokovoy ridge the temperature drops to 1°. The average temperature in January (the coldest month) ranges from +1° to --11°. With increasing altitude, the amount of precipitation also increases. In the summer, there is an excess of biologically active ultraviolet radiation for the population and the effect of uncomfortable hot weather.

Floral resources are involved in recreational activities in varying degrees. They can be perceived visually, used for walks, or to meet material needs (picking berries, herbs, mushrooms, nuts, etc.). Objects of flora and fauna, as a rule, arouse considerable interest in ecocreants. The vegetation of Chechnya is characterized by pronounced altitudinal zonation, a high level of species composition and diversity of plant communities. Flora has over 2 thousand species of plants.

It is impossible to overestimate the recreational and medical and ecological role of forest geosystems, which also perform environment-forming, climate-forming, water protection and anti-erosion functions. Forests cover about 22 % of the territory of Chechnya. Compared to other mountain landscapes, they are more sustainable, but nevertheless need reasonable, environmentally sound recreational use. For recreational purposes, an important role is given to the species composition of forests, on which their properties depend, determining the physiological and psychological comfort of outdoor recreation (the spatial structure of forests, the presence of open and near open spaces, etc.). Softwood forests, for example, producing phytoncides, perform an antimicrobial role. Therefore, in a pine forest, it is recommended to build sanatoriums for children suffering from chronic diseases of the nasopharynx, rheumatism and other diseases. In Chechnya, they occupy about 7 % of the total forest area.

In mountainous areas, significant areas are natural areas of preferential protection. This indicates the inadmissibility of contradictions between the interests of the tourist industry and nature conservation [11].

Earlier, recreation centers, sanatoriums and resorts functioned in the Chechen Republic. In 1990 there were at least 16 of them in the region, and the number of people who were treated and rested was over 120 thousand [9]. Among them is a multi-resort resort

of the union value "Sernovodsk", the territory of which, with all the outputs of mineral waters, in 1982 was declared a nature monument of Chechen-Ingushetia. Mineral waters have been successfully used to treat cardiovascular system, skin diseases, diseases of the joints, bones, muscles, etc. Until the 1990s, the Chechen Republic was annually visited by about 20 thousand tourists from all over the country, but later, due to well-known reasons, tourism here underwent significant devastating changes.

In recent years, the situation in this direction has largely stabilized. In 2009, on the basis of balneological mineral hydrosulphuric sources, the Sernovodsky resort in the Sunzhensky district was restored and functioning, the Rodnik tourist complex was built in the Gudermes district, a tourist complex was being built on the basis of the Kezenoyam lake in the Vedeno district. The flow of tourists to the republic is growing every year. The number of persons accommodated in hotels and similar accommodation facilities in the region for the period 2004--2016 increased tenfold [8].

Despite the positive trends in recent years, the use of the recreational potential of the republic remains extremely low. Currently, even the internal recreation needs are not satisfied. Many residents of the republic undergo a recovery period in other regions of the Russian Federation or outside the country.

The development of the tourist and recreational sphere of Chechnya is largely hampered by a negative view through the mass media, the poor level of development of the tourist sphere (infrastructure lagging behind modern requirements, low level of service, comfort and quality of recreational and tourist services, an acute shortage of qualified personnel) and other factors.

At this stage, part of the recreational resources, including hydro-recreational, is used spontaneously by the local population. Unorganized recreation, in turn, increases the risk of degradation of landscapes exploited by recreants or their components. Despite the favorable prerequisites for the development of diversified types of tourism and recreation, taking into account the specifics of the mountain landscapes of Chechnya and their vulnerability, priority should be given to sparing forms of tourism, in particular ecological tourism.

However, the development of water tourism should not cause deterioration of the geoecological state of aquatic ecosystems, which indicates the need for continuous geoecological monitoring in order to track chemical, microbiological and other indicators [14]. When developing a strategy for developing water tourism and water resources management, priority should be given to management forms that provide a more sustainable (rational) use of this strategically important resource [16].



## 4. Conclusion

The Chechen Republic has significant recreational potential, creating favorable pre-requisites for sanatorium-resort construction and the development of various types of tourism (medical and recreational, scientific, educational, extreme sports, rural, etc.). The development of the tourism and recreation sector will have a positive impact on employment and, by stimulating related sectors of the economy, will contribute to social, economic and political stability.

A scientifically grounded approach to the use of recreational potential in the future will help solve the problem of rest and treatment of residents of the regions, as well as develop domestic and international tourism and recreation. To accomplish this task it is necessary to solve a whole range of problems, including serious investments in tourism infrastructure and a high level of training of qualified personnel.

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