

# *Development Prospects for Tourism Clustering in Cherek-Bezengiski River Valley and Natural Hazard Processes Limiting Development*

Abdullakh M. Kerimov

Department of Natural Disasters  
High-Mountain Geophysical Institute  
Nalchik, Russia  
kerimov.a.m@mail.ru

Leilya B. Chigirova

Department of Environmental Studies  
High-Mountain Geophysical Institute  
Nalchik, Russia  
Leilyach@yandex.ru

Makhti T. Anaev

Department of Environmental Studies  
High-Mountain Geophysical Institute  
Nalchik, Russia  
Anaev.Mahti@yandex.ru

**Abstract**—The paper deals with recreational resources and potential of the Khulamo-Bezengi Valley in the Kabardino-Balkar Republic. The main attention is paid to recreational resources and development of the area. We distinguished the most promising types of recreation such as traditional mountaineering, mountain tourism and, in the future, ski sports. We also consider the opportunity for extreme sports (paragliding, etc.) as well as ecological and educational tourism. Evaluated existing hazardous natural processes in the local area as impediments to the development of recreational facilities and actions aimed at minimizing the damages resulted from these processes. A particular emphasis has been put on maximum permissible recreational loading that provides the balanced sustainable development of the local area. Meanwhile, the region has only one recreational site - a mountaineering camp "Bezengi". By Resolution of the Government of the Russian Federation of 14 October 2010, No 833 "On the creation of a tourism cluster in the North Caucasus Federal District, the Krasnodar Region and Adygea" [1], an exploitation problem of the most attractive mountainous regions of the North Caucasus is of high relevance.

**Keywords**—*Khulamo-Bezengi Valley; Bezengi Glacier; recreational resources; natural hazards; maximum permissible loads on landscapes*

## I. INTRODUCTION

The Kabardino-Balkar Republic is rich in resources: both natural and historical-cultural, necessary for the development of most types of recreational activities: medical, tourist, sport, excursion, informative and, especially, mountaineering [2].

The Cherek municipal district is one of the most attractive in the territory of the Republic. The mountain climate, unique karst Blue Lakes, mineral waters, a great number of natural, historical, and cultural monuments, easy passes, peaks and slopes are proposed to visitors. All these features create conditions for the development of almost all recreational activities such as tourist excursion, alpine skiing and

mountaineering, and also for extreme sports like paragliding and diving. The district is located to the south of the Nalchik district and consists of the Cherek and Khulamo-Bezengi gorges.

By the Resolution of the Government of the Russian Federation of 14 October 2010, No 833 "On the creation of a tourism cluster in the North Caucasus Federal District, the Krasnodar Region and Adygea" [1], an exploitation problem of recreational resources, in view of the hazardous natural and man-made processes in one of the most attractive areas in the Southern Russia, is becoming highly relevant. Ensuring the conditions for the sustainable development of the region is of most importance.

## II. RESULTS AND DISCUSSION

The Khulamo-Bezengi gorge is of particular interest for climbers, since to the south it closes up with the higher part of the Main Caucasus Range the Bezengi Wall, which extends for more than 12 km. Among all the gorges of the Northern Caucasus, the Khulamo-Bezengi Valley stands out for the highest areas of the Main Caucasus Range to offer. A configuration of six of the eight summits of the Greater Caucasus with over than 5000 meters mark forms the unique "Roof of the Greater Caucasus" - the Bezengi Wall. Fig. 1 shows the Bezengi Wall.

The names of the summits are Dykh-Tau (5204 m), Shkhara (5068 m), Koshtan-Tau (5152 m), Dzhangitau (5085 m), Pushkin's Peak 5100 m), Western Mizhirgi (5025). There are 82 passes, 202 mountaineering routes offering a vast variety of easy and difficult ascents ranging from the first to the sixth category, as well as 27 traverses [3]. Every year the Bezengi Wall attracts hundreds of climbers. For them, the camp "Bezengi" has been built at an altitude of 2,200 m. It can accommodate up to 450 people. The ascents take place from June to September. There are rare winter ascents. Therefore, the camp is open only in summer. With the further

development of recreation, there is the possibility of expanding the Bezengi complex.



Fig. 1. The Bezengi Wall on 12.07.2017

At the time, foreign alpinists referred to this place “Little Himalayas” for the summits heights and climbing difficulties. The Bezengi Glacier (Ullu-Chiran) descends from the Bezengi Wall filling the headwaters of the valley. The largest in the Caucasus glacier has a length over 17 km and covers more than 36 square kilometers, with ice up 400m thick in some areas. The Dykh-Suu glacier (34 km<sup>2</sup>) and the glaciers concentrated in this area form the largest ice sheet in the Caucasus - Bezengi-Tsannersky Unit, covering almost 168.8 km<sup>2</sup> [4-5]. The summertime melting of the Bezengi glacier largely determines the more even flow of the Cherek River, which ensures the supply of scarce water to the foothill areas [6-10]. On the other side, the Cherek-Bezengi River cuts through the rocky ridge in one of its most elevated sections, creating picturesque canyons.

Cherek recreational area has a favorable, but somewhat dry climate. The area is rich in mineral waters (16 sources) of various types: carbon dioxide, with a total flow rate of 431350 l / day; sulfide - with a flow rate of more than 73.5 million liters / day (Lake Ceric-Kel is a large source of mineral water with a flow rate of 72 million liters / day).

Lake Ceric Kehl lies in the valley of the river Cherek. It is one of the deepest lakes in the Caucasus (depth 258 m, length 235 m, width 125 m with a mirror area of 2.6 hectares). The lake is a karst crater developed in limestone and filled with sulphide groundwater.

The lake has a peculiar hydrological regime. It refers to lake water bodies with vertical and siphon circulation of groundwater, which rise from the bottom of the mine to the surface and give rise to a single river flowing out of the lake. The lake is unique in terms of both temperature and water composition. Even in the warmest season, the water in it is always cold, and the temperature of the water and the amount of salts dissolved in it have a very unusual depth distribution. There are three layers in the lake. If on the surface the water temperature in summer is on average 9.6°C, and the total mineralization of water is 1.17 g / l, then at a depth of 60 m these characteristics are equal to 7.4°C and 1.14 g/l,

respectively, and at a depth of 250 m - 8.7°C and 1.36 g / l. The hydrogen sulfide content increases with depth.

Lake fauna is very poor. A small crustacean *Gumarus* lives here; leeches are found near the shores. Occasionally a river trout rises into the lake, which is always kept in the surface layer of water. In the lake there are blue-green algae.

There are also exits of nitrogen-thermal water in v. Aushiger (operational reserves - 3,684 thousand m<sup>3</sup> / day), which are actively used by residents of the republic and even the population of the neighboring republics and edges of the North Caucasus for swimming and taking therapeutic baths all year round. The climate of the area is characterized by an abundance of sunny days, moderate humidity, lack of heat, clean air. All this provides favorable conditions for the organization of sanatorium-resort treatment. On the territory of the Aushiger springs, there is a pool with running mineral water and an equipped guarded beach. For the varieties of tourism (educational, scientific, sports, pedestrian), the entire recreational area covering the entire territory of the Cherek River basin, from the source to the exit from the Cherek gorge, where the “Golubie ozera” (Blue Lakes (Karst)) are located, is of interest. In the upper reaches of Cherek-Bezengiyskogo, there are the largest waterfalls of Kabardino-Balkaria. Not far from the lakes, there are two tourist bases: the circular “Golubie ozera” (seats 280) and the seasonal “Cherek” (120 places) operating from May to October. Only in the area of the Golubie ozera, one-day excursions are carried out by young people (students and schoolchildren) of the republic on weekends and public holidays and camp sites are used in the summer, mainly for children's recreation. Once-popular All-Union Route No. 101 through the Gezewtsek Pass to Georgia and to the Black Sea is now inoperative due to changes in geopolitics [11].

Such favorable combination makes Cherek district very attractive and promising for ecotourism. In the upper reaches of the Khulamo-Bezengi Gorge, there are the largest waterfalls of Kabardino-Balkaria, but unfortunately, owing to their inaccessibility, they are not of recreational use.

The rich historical past of the gorge, the abundance of archaeological sites, including the preserved medieval towers are interesting targets for tourists visit.

Above the village of Karasu the Khulamo-Bezengi Valley is shrinking. On both sides of the gorge, time carved the limestone rocks, creating the steep cliffs. The river squeezed between two sheer cliffs flows along the bottom of a canyon covered with huge stone boulders. Then the gorge Right at the exit from the gorge, local residents built in the Middle Ages a real system of fortifications “Uskhur” to protect them from enemy attack. The system included bastions of various shapes containing loopholes to defend the approaches to the old Balkar Uskhur village and the “Ushur” tower, the main citadel of the entire system.

High on mount, along the right bank of the river, one kilometer from Uskhur village, one can see a medieval fortification “Zhaboevs' Castle”. More higher, along the gorge, above the old Upper Khulam village, opposite the castle there are the Khulam Tower ruins that face a defensive wall. In the

same basin on a small slope, about half a kilometer across from the village of Bezengi, White Tower ("Ak-Kala") is standing. The listed archaeological sites are of federal importance. As you rise higher above the village of Bezengi, you will find yourselves among the ruins of the village Shyka, the birthplace of Kyazim Mechiev, the founder of Balkarian literature. On the poet's place of residence, a house-museum was created to commemorate the first Balkar poet and enlightener. Tourism-business-and-product-development could significantly improve the socio-economic situation in the area [11-12].

Mountainous terrain is an essential factor in the evolution of recreational activities such as tourism, skiing and mountaineering, and also contributes to leisure education, hiking making the place enticing for a large number of visitors.

But nowadays mountaineering in the Khulamo-Bezengi gorge is the main branch of recreation. However just mountain climbing is currently the major recreational sport activity in Khulamo-Bezengi Valley. There is "Bezengi" Educational Base Camp located at 2200 m above sea level. "Bezengi". Having rich climbing traditions and highly qualified instructors the camp offers climbing and hiking routes developed in detail enabling the highest levels of security. Sustained mobile communications and communication over radio are guaranteed. Bezengi mountaineering camp dispose of three alpine remote huts for relaxation between difficult and long ascents. Above we have mentioned unlimited opportunities for the development of mountaineering in the area. However, the recreational loading in the area remains broadly stagnant since the 70s of the last century. Recently, the camp authorities have initiated and constructed residential buildings reminding highland traditional houses "saklya" and two buildings shaped like old Balkarian towers. At present, the alpine camp can accommodate only about 400 climbers and tourists. The reason for this situation is the lack of a well-maintained road from the Bezengi village to the alpine camp (18km). Khulamo-Bezengi gorge is the shortest in lengthwise, about 50 km only. That is one of the limiting factors in exploitation of this valley. In particular, large numbers of simultaneously climbing tourists can create dangerous conditions along the routes, contributing to the emergence of avalanches, icefalls and rockfalls.

Returning to the recreational specialization of the Khulamo-Bezengi gorge, the following can be noted: mountaineering and some types of tourism are fairly well developed here, although not so numerous in visitors. As for the mountain-skiing sports, they are mentioned in the development concept of tourism cluster in the North Caucasus Federal District and present just the project description for constructing ski resorts. In contrast to the Elbrus region, in Khulamo-Bezengi gorge there are fewer slopes useful for ski runs and skiing activities. One of these slopes is shown in Fig. 2. The absolute height of the mountain range is 3088m, depending on the choice, the tracks height can reach 3800m. The slope steepness is ranging from 23° to 40° and the lowest track descends to 1800m. The essential requirement for organizing various types of winter recreation is meteorological conditions of the specified area. Fundamental determinants

include temperature, annual total precipitation during a cold period; the steady snow cover parameters such as its timing, duration, thickness; wind conditions; sunshine duration. Recreation area of Cherek district has a favorable climate for winter sporting though somewhat dry. There is an abundance of sunny but not hot days and moderate humidity. The temperature regime in Cherek - Bezengi river basin, as well as in the entire Northern slope of the Greater Caucasus, is determined by the peculiarities of atmospheric circulation in this region and a High Altitude Range., At an altitude of 2000m the annual average temperature as observed is above zero (+2.9°), meanwhile at an altitude of 2500m the annual average temperature is below zero. Dates of average daily temperature transition of 0° C with respect to absolute altitudes are as follows. Elevation is 1500 m (12 III and 1 XI); the number of days at  $t > 0^\circ$  is 265. At 2000 m (4 IV and 11 XI), the number of days at  $t > 0^\circ$  is 221. At 2500 m (26 IV) and (15 X), the number of days at  $t > 0^\circ$  is 172. At 3000 m - (13 V and 8 X), the number of days at  $t > 0^\circ$  is 148.



Fig. 2. View of Mount Mukurgu Bashi, Khulamo - Bezengi gorge (photo by AnaeV M.T.)

The following precipitation data are available: the village of Bezengi elevation of 1450 m – 377 mm per year; the end of the tongue of the Bezengi glacier – 2030 m – 620 mm per year; Bezengi glacier – 2720 m - 1070mm per year; the western branch of the Bezengi glacier 3150 m – 1160 mm per year. The village of Bezengi and vicinity occur in the rain shadow and never in winter zone according to records from 1966 to 1975. There was no steady snow cover in Bezengi [5].

Stable snow cover on glaciers is formed before the date of the transition of air temperature through 0°. At 2000 - 2500 m above sea level, steady snow cover is formed in the first half of October. Stable snow cover is not formed outside the glaciers, along this area with a small amount of precipitation for some years; therefore, the artificial snowmaking is most apt. On the ridges and plateaus that elevated over 2000 m above the sea level, westerly winds predominate, coinciding in direction with the western transport prevailing in the middle troposphere. Like in any mountainous country in the Cherek-Bezengiysky river basin, the mountain-valley winds are encountered. Higher wind speeds are noted in mountain valleys at the end of the cold and beginning of warm seasons and low speed in the warm season. The average wind speeds in the upper reach of the Cherek-Bezengi river in summer are about 3 m/s and the maximum 13 m/s. [5]. From the above

meteorological parameters it follows that the climatic conditions are quite comfortable.

According to “Resorts of the North Caucasus” program, the “Bezengi” resort will include 165 km of ski runs and 30 lifts serving them. [1]. Since most of the ski slopes in the Cherek-Bezengi river basin have almost not steady snow cover the artificial snowmaking is required acutely. In this regard, 40% of all tracks are proposed for artificial snowmaking. However, it should be also noted that in the nival-glacial zone of the Khulamo-Bezengi Valley, the number of slopes suitable for arranging ski runs is very limited, and the figures given in [1] are somehow inadequate. The Khumalan tract, located 25 km south-west of Nalchik, is most suitable for organizing ski sports. Thus, sport activities that are of highest recreation priority in the Khulamo-Bezengi Valley are mountaineering and mountain tourism.

The effects of natural hazards restrain the recreational development in high-altitude areas [13], in this sense the Khulamo-Bezengi Valley is no exception. The most frequent disasters here include mudflows and avalanches. The entire ravine from the beginning to the headwaters tends to be affected by mudflows. Currently 26 mudflow pools are identified, described, and registered in the gorge [14] with frequency of occurrence from one to 100 years, but mostly the mudflow frequency does not exceed ten years. The removal volumes ranges from one thousand to one million m<sup>3</sup>. Fig. 3 shows mudflows diagram of the Cherek Khulamo-Bezengi river basin. Some mudflows enter the villages of Karasu, Bezengi and the territory of the frontier post; others enter the road and agricultural land. Studies have identified the intensification of mudflow processes in the area since late last century until now, which is, to some extent, due to the intensive degradation of glaciation. [15]. As evident from the explanations above, one should be strictly adhered to the cadastral materials and the boundaries of debris flow basins given in the schematic diagram when constructing recreational facilities.

Another most dangerous natural phenomenon is avalanches. Snow avalanches descend from above Bezengi and, as a rule, threaten the highway to the Bezengi camp. There are 188 avalanche foci found at the Bezengi camp, but they are studied in a less detailed manner than mudflows, since the upper reaches of the gorge are not visited in the winter months [14].

The Mizhyrgi glacier, which belongs to the pulsating glaciers, poses the greatest threat to the Bezengi mountain camp and the entire Khulamo-Bezengi Valley. A little permissible loading on the landscapes affects recreational exploitation of the area. Each territory has its own permissible loading. For landscapes similar to the Elbrus region, the maximum number of tourists is up to 5 people/ha, the greater zones can accommodate people up to 10 people/ha, but with an obligatory promotion of management aiming at increasing the landscape capacity [16].

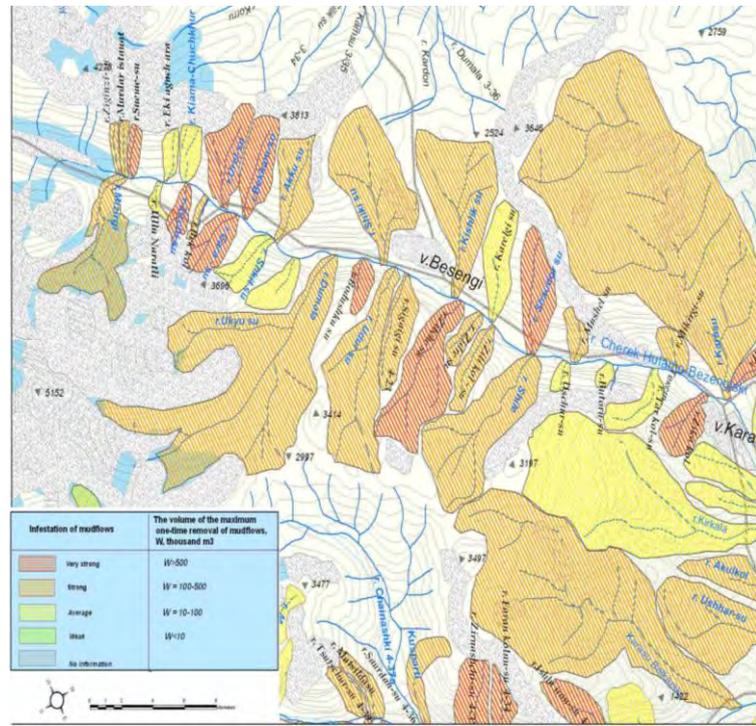


Fig. 3. Schematic diagram of mudflows in the Cherek Hulamo-Bezengi river basin

(Compiled by M.T. Anaev, Z.T. Akshayakov).

### III. GUIDELINES

1. To remove recreational facilities not approved. Do not repeat the mistakes made when exploiting the Elbrus region, whose 80% of recreational facilities are located in avalanching areas.

2. A thorough and efficient evaluation of the territorial specificities of the natural disaster risk by independent experts should be prior to exploitation. Territorial examination is vital, because over time, the degree of natural hazards may change as a result of natural, anthropogenic processes. The villages of the tourist cluster should be compact, entirely self-supporting with respect to electricity, heat and water supply, and also have all the necessary infrastructure for the sustainable functioning in the recreational area. Rental gear and equipment for mountaineering and skiing, as well as rescue services should be located in the area of recreational facilities (cable cars, ski trails).

### IV. CONCLUSIONS

1. Under the current situation, the real development of a recreational complex in the Khulamo-Bezengi Valley is impossible without involving the tourist cluster program, the Resorts of the North Caucasus. In this regard, the urgent implementation of Russian Government resolution No. 833 of 10.14.2010 is of high importance.

2. It is necessary to further develop different types of traditional recreation in this region: mountaineering and mountain tourism; to enhance the capacity of the “Bezengi” base camp, the Dykh-su and Severny shelters aiming at

attraction Russian and foreign climbers; to plot and construct routes to archaeological sites and historical monuments.

## **References**

- [1] "On the establishment of a tourist cluster in the North Caucasus Federal District, the Krasnodar Territory and Adygea." Decree of the Government of the Russian Federation of 14.10.2010, Moscow, No. 833, 2012.
- [2] V.M. Kotlyakov, P.M. Ivanov, and A.B. Bazhev, "Ecological state of natural resources of the North Caucasus and their rational use," *Ethnopolitical Bulletin*, Moscow: Ethnopolis, Iss. 1, 1995, pp. 162-172.
- [3] V.G. Lyapin, "The scheme of mutual arrangement of peaks and passes of the Great Caucasus," Nalchik, 2009.
- [4] U.V. Efremov, V.D. Panov, P.M. Lure, U.G. Ilichev, S.V. Panov, and D.A. Lutkov, "Orography, glaciation, the climate of the Greater Caucasus: the experience of complex characteristics and interrelations," Krasnodar, 2007.
- [5] V.D. Panov, "The regime and evolution of the present-day glaciation of the basin of the river Cherek Bezengisky," Leningrad: Hydrometeoizdat, 1978.
- [6] V.M. Kotlyakova, "Glaciological Dictionary," Leningrad: Hydrometeoizdat, 1984.
- [7] V.D. Panov, "Evolution of the modern glaciation of the Caucasus," St. Petersburg: Gidrometeoizdat, 1993.
- [8] A.A. Kerimov and A.M. Khutuev, "Dynamics of the linguistic parts of the valley glaciers of Bezengi and Mizhirga from the end of the 20th century," *Proceedings of the Kabardino-Balkarian Science Center of the Russian Academy of Sciences*, No. 4 (60), pp. 29-34, 2014.
- [9] V.M. Kotlyakov and G.A. Nosenko, "On the international project "Global Monitoring of Glaciers from Space" and the Moscow Regional Data Center," vol. 91, MGI, 2001, pp. 121-124.
- [10] V.G. Konovalov (principal investigator), "Guide to observations on mountain glaciers," Steering Doc. RD 52.25.315-92, St. Petersburg: Gidrometeoizdat, 1994.
- [11] L.A. Galachieva and A.M. Kerimov, "Recreational complex of Kabardino-Balkaria: formation, prospects and ways of development," Nalchik: Kabardino-Balkarian Science Center of the Russian Academy of Sciences, 2008.
- [12] M.Ch. Zalikhanov, "Snow-avalanche regime and prospects for developing the mountains of the Greater Caucasus," Rostov-on-Don, 1981.
- [13] A.A. Akaeva, A.B. Bazhev, and M.Ch. Zalikhanov, "Elemental natural phenomena in the Caucasus and their intensification under the influence of economic activity. Transformation of the ecosystems of the Greater Caucasus under the influence of economic activity," Moscow: IGAN USSR, 1987, pp. 20-31.
- [14] Cadastre of avalanche-mudflow hazard of the Kabardino-Balkarian Republic. St. Petersburg: Gidrometeoizdat, 2001.
- [15] K.N. Anahaev, "Methodical recommendations for ensuring the safety of the objects of the economy," Nalchik, 2016.
- [16] U.P. Suprenenko, "Geocological principles of organization of mountain-recreational nature management," Report at the meeting of the Commission for Recreational Geography and Tourism, 13.03.2007. Retrieved from: <http://msk.rgo.ru/komissii-i-otdeleniya/>