



## Mountain Lakes and Reservoirs in Tajikistan - Basis of Formation of Mining and Recreational Complexes

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### Abstract

As a result of a comprehensive assessment of natural resources in the field of water resources of the mountain rivers and lakes in the foothills of Tajikistan a huge area of natural landscapes for the organization of a complex of sanatoriums and tourist camps was revealed. In this regard, the recreational value of mountain lakes as well as a number of large reservoirs for the country, especially in lowland areas and middle zones is evaluated. In present, on the banks of the reservoir in the North region there are very important areas for the organization of improving the rest of the population. In this region, you can organize new enterprises for treatment and rest of tens of thousands of people.

Mountain reservoirs in Tajikistan, partly are used as objects for the leisure of the population. These include Nurek, Karakum, Bai-pazi, Golovnoe Reservoir. Rogun reservoir and Sangtuda, which are under construction, have great prospects as objects of irrigation and recreational values. In future, this issue will be very important for the organization of leisure of the population of large cities of the republic.

It is very important to establish the boundaries of areas of sanitary protection of recreational structures (resorts and tourist centers) in water sources. It is a question of establishing special protection regime of those areas where there is a formation and recovery of medical resources of the resort. For this purpose, in each case there should be conducted appropriate studies. Borders of sanitary protection zones should be selected so that it includes possible contamination of water sources and to protect them from contamination.

In the conditions of Tajikistan, the protection from contamination of components of the natural environment within the developing recreation areas in mountain lakes and reservoirs can be provided only by the creation of centralized sewage systems, water supply, heating supply all objects of therapeutic and tourist complexes, as well as each of them separately.

**Keywords:** Lakes and Reservoirs; Mountain Landscape; Mountain Areas; Recreational Complex

Tajikistan is rich in lakes and reservoirs and its water surface is approximately 1005 square kilometers. The area of 22 largest lakes in Tajikistan is about 625 square kilometers. The largest lakes in the republic are Lake Karakul, Kulikalon and Iskandar Kul.

According to the main Board of "Tajik geology" in the territory of the Rasht valley there are more than 30 fields and outputs of

mineral waters and three sulfur lakes. But there is only one resort - "Obi-Garm" with 450 seats. Source of Obi-Garm has long been used by local population for medicinal purposes. Its chemical composition is represented by mainly water sulfates, chlorine, sodium, and calcium. Because there is trace elements manganese, copper, molybdenum, strontium, barium, boron, etc. water in their properties close to the waters of Tkvarcheli resort (Georgia).

The recreation of the population belongs to the special role of mountain landscape zones, lakes and reservoirs, as well as mineral waters and sources. In this regard, the recreational value of mountain lakes Iskander Kul, KuliKalon, Alovaddin and Haftkul, as well as a number of large reservoirs of the country, especially in lowland areas and middle zones are very important for the Republic. Studies show that a good rest at the water area significantly improves the functional state of the central nervous, cardiovascular, respiratory system and helps to increase productivity by 5-7% (Figure 1 and 2).



**Figure 1:** High mountain lake Alovaddin in Penjikent district.



**Figure 2:** Mountain Land shaft. Mountain Lake Iskandar Kul with the view of Fan Mountains.

As a result of a comprehensive assessment of natural resources in the field of water resource of the mountain rivers and lakes in the foothills of Tajikistan it was revealed huge area of natural landscapes for the organization of a complex of sanatoriums and tourist camps. In present, on the banks of the reservoir and Kairakkum and Aksukon mud in the North region are very important areas for the organization of improving rest of the population. In

this region, you can organize new enterprises for treatment and rest of tens of thousands of people. There are great opportunities for the most timeous medical procedures, both on shore and on the water: the sun, sand, air baths, therapeutic and restorative dip in the pool and pond, health path, etc. On the banks of Kairakkum sea it is appropriate to establish a major resort - sanatorium harder climatic complex.

Mountain reservoir in Tajikistan, partly used as objects for the rest of the population. These include Nurek, Karakum, Baipazi, Golovnoe Reservoir. Under construction of Rogun reservoir and Sangtuda have great prospects as objects of irrigation and recreational values. In the future, this issue will be very important for the organization of leisure of the population of large cities of the republic. It is also important the organization of agro and ethno-tourism in the mountainous villages of historical Zarafshan and Badakhshan in the future development of the mining and recreational facilities.

It was found that most of the banks of mountain lakes and reservoirs are suitable for construction of recreation facilities and only in mountainous areas of the northern slopes of the small areas are suitable for development is limited. However, mountain areas can create a unique mountain and recreational facilities. It should be noted that the building of Mining and recreational facilities become more expensive building to 12-16% due to a large amount of earthwork, slope protection structures and retaining walls, as well as the construction of serpentine roads and engineering structures for the vertical lift transport.

In this context, the development of recreational activities in Tajikistan requires a thorough study of recreational potential all reservoirs and mountain lakes and natural and landscape conditions, taking into account economic and geographical position, the settlement system, the nature of relationships with medical and health complex and ultimately of recreation zones in the territory of the republic.

Northern region of Tajikistan includes the valley of the Syrdarya river and mountain lakes system Turkestan ridge, where there is a unique mountain lakes and water sources for recreation. Mineral water Istravshan, mud lake Aksukon, harder climatic complex "Bakhoriston" on the shore of Kairakum reservoir, wellness ozone air swimming pool and a lake landscape and Iskandarkul, Oydinkul in Ayni and Shahrstan mountain areas are favorite places for recreation for the citizens of cities of the republic.

In the central region of the country, mountain Zeravshan zone, consisting of a mountain lake systems have special landscapes for recreation and treatment of urban residents. Touristic and climbing facilities of Lake Iskanderkul, Marguzar, Kulikalon, Payron and other mountain lakes have a unique landscape and unique views of the mountain scenery. Nurek on the Vakhsh River, Chimtarga peaks (5494 m) on the Zeravshan Range are unique areas for tourism development.

The role of the natural landscape and water areas are very important in the formation of the microclimate of the resort and recreational facilities and building of village environment, as a new urban education. Rational use of water areas and natural landscape elements in the formation of recreational facilities provides a hygienic, architectural and artistic effect.

Analysis and assessment of natural and landscape conditions of the mountain rivers and lakes are needed to determine the feasibility of an enabling environment and development of coastal landscapes and resources to accommodate the formation of the architectural environment of therapeutic complexes. Proper use of the functional areas of water bodies depending on climatic, geological, hydrological and soil conditions and characteristics of vegetation is also important for the development of sanatorium-resort complex.

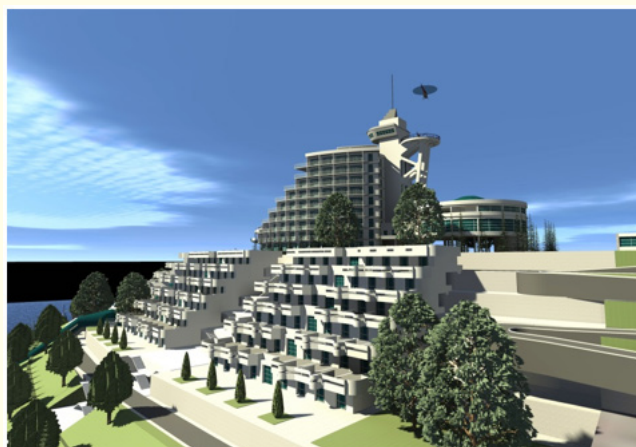
Analysis and assessment of natural and landscape conditions in the territorial organization of mining and recreational facilities have a purpose, that is, we consider only those properties nearby (hydrogeological conditions, the terrain slopes, green land cover, slope orientation, and so on. etc.) that affect the achievement of the goal. Features of the geological conditions and terrain affect the activities on land development, the choice of building types and construction costs.



**Figure 3:** The Land shaft of Mountain Canyon Tavildara at the river Khingob.

When the assay is a relief depth maps, and density of the dismemberment of the relief, surface slope, based on which are determined by the volume and cost of works on vertical planning and engineering preparation of the territory. Density of the dismemberment of the relief surface and biases affect the layout of the road network and the laying of utilities especially.

At the same time the possibility of the organization of the territory and the need for building institutions rest on the mountain areas are largely determined by the complexity of the relief forms and slope steepness of the mountain slopes surface. In addition, the angles of inclination of the slope of the mountain to a large extent determine the nature of a vertical layout and reception building the village. According to the generally accepted norms of the slope terrain from 12° to 30° are suitable for residential and public construction.



**Figure 4:** Experimental project for Tourist-leisure Complex on the bank of the lake Iskandar Kul.

It is very important to establish the boundaries of areas of sanitary protection of recreational structures (resorts and tourist centers) in water sources. It is a question of establishing special protection regime of those areas where there is a formation and recovery of medical resources of the resort. For this purpose, in each case should be conducted appropriate studies. Borders sanitary protection zones should be selected so that it includes possible contamination of water sources and to protect them from contamination. First of all this kind of activities should be carried out for existing resorts: Khoja Obi Garm, Obi Garm, Garmchashma, Havatag and Shoambary.



Protection component against pollution of the environment in Tajikistan, in particular water bodies within developing recreation areas can be ensured only the creation of centralized sewage systems, water and heat on the objects of medical-improving complexes.

In conditions of Tajikistan protection from contamination of components of the natural environment within the developing recreation areas in mountain lakes and reservoirs can be provided only by the creation of centralized sewage systems, water supply and heating supply systems all objects of therapeutic and tourist complexes, as well as each of them separately.



**Figure 5:** Health resort Khoja Obi Garm Is successfully matches the mountain land shaft. Centrally solved the issues of water supply, sewage system and heating.

The development of scientific and technological progress can positively change the intensive development or use of recreational resources in the mountainous region of the Republic of Tajikistan. Intensive development of mountain slopes and land areas Shahrستان district in the foothills of Turkestan range (after the transfer of the Zarafshan River at an altitude of 1700 m -1900m) will contribute to the preservation of the unique natural landscape with a predominance of juniper woodlands. This will allow real opportunities of expansion of recreational areas within the Sughd region.

On the basis of the mountain irrigation system development and formation of new agricultural and recreational facilities, the conditions for the development of mountain tourism and mountaineering in Shahrستان, Ganchidistricts and Penjikent city of Sughd province of Tajikistan [1,2].

## Conclusion

Based on the results of the research, the following principles were identified for the integrated development of mountain lakes in order to form on their basis modern recreational - tourist and health-improving complexes:

- Creation of multifunctional recreational zones of various forms of recreation and treatment, tourism and sports;
- Organization of the system of service establishments (Treatment and climatic resorts, tourist routes, mountainous ski complexes);
- Group accommodation of recreational centers in order to reduce the urbanization level of the environment;
- Organization of mobile service centers, places for resettlement of service personnel associated with recreational areas;
- Complex development of transport infrastructure: - equipping recreational zones with cable, monorail and special roads;
- Use of the network of trails and mountain roads for recreation;
- Creation of a unified system of water-green landscape, organization of forest park strips and "green" trails.

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