



Swot Analysis for Recreational Uses: Niğde Akkaya Dam[#]

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ABSTRACT

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The subject of the study is to evaluate the Niğde Akkaya Dam with SWOT analysis and to make recommendations in terms of recreational use. The aim of the study is to identify the strengths and weaknesses, threats and opportunities of the Akkaya dam and to determine its goals and strategies in terms of recreation. In line with this purpose, the socio-economic, cultural and natural features, landscape potential of the area were evaluated using the SWOT, the opportunities that the positive and negative aspects of the area, were presented, and the possible or existing threats were determined. At the same time, the current recreation potential of the dam was determined, and suggestions were developed in line with the data in order to offer alternatives that can be evaluated in terms of sustainable use of the areas. It was determined that pollution occurs in the dam water due to environmental wastes, as a result of this pollution, harmful creatures multiply and bad smells are formed. However, it is accepted that the dam is home to a large number of migratory birds, that it has not lost its naturalness, and that most of the dam is in the university campus. Threats to the dam are; low water level, fishing, duck hunting etc. damage to ecological life due to activities, smell gradually increased. Their opportunities are determined as providing a suitable environment for bird watching, having a suitable infrastructure for ecological research, and being suitable for recreational activities for water. At the end of the study, suggestions were developed in terms of suitability of Akkaya Dam for recreational activities.

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Introduction

80% of the production in the world occurs in urban areas. In addition, 75% of those produced are consumed in cities (Swilling et al., 2013). Water is the primary source of natural resources most affected by this consumption (Mariolakas, 2007). Water pressures are increasing, due to pollution, unconscious farming practices and urbanization (Schnoor, 2010). Therefore, it is necessary to use not only quantitative methods but also qualitative methods in determining the damages in the water resources (Hoekstra and Wiedman, 2014). Today, urbanization is developing and growing rapidly (Tucci et al., 2010; Chung et al., 2011; Mori and Yamashita, 2015). Therefore, sustainable development policies become imperative. Industrial and commercial activities in urban areas can be defined as the main factors that put pressure on existing water resources (Brown et al., 2011; Maurya et al., 2020). Lake and wetlands have a great importance in terms of their features, benefits and biodiversity that they contain. In addition, they provide a living space for a wide variety of flora-fauna, and have important functions in hydrological and chemical cycles related to the cleaning of contaminated waters (Elmacı et al., 2010, Katip et al., 2011, Lai et al., 2012).

Fresh water sources are considered as the natural wealth museums of the region; It is one of the primary ecosystems that must be protected. However, they are the most threatened natural ecosystems. Dams; is currently being evaluated to prevent wasted use of water (Samiotis et al., 2018); In addition, it has high financial and environmental activities for many purposes including electricity production, drought prevention, flood protection, aquaculture, irrigation and water demand (Chowdhury and Al-Zahrani, 2014). The water quality, aquatic species diversity and abundance of a dam lake show significant changes compared to streams. Therefore, it is important to monitor the natural resources of a dam lake formed (Küçükyılmaz et al., 2014). Many studies have been carried out in recent years to determine the water changes occurring in dam lakes and ponds in our country and in the world (Mutlu et al., 2013; Mutlu ve Tepe, 2014; Kutlu et al., 2015; Kurnaz et al., 2016; Mutlu and Uncumusaoğlu, 2017; Tepe and Kutlu, 2019). Some of these studies used SWOT analysis.

In this study, in order to determine the recreational potential of the Akkaya Dam, SWOT Analysis technique

was used. The SWOT Analysis technique was first used by Heinz Weirich. SWOT is an analysis method that takes various rational approaches for the determination, planning and sustainability of potential and existing activities. Also, The SWOT Analysis Technique is a research technique that is used to make decisions in the planning and management by determining the current strengths (advantages) and weaknesses (disadvantages) with future priorities and threats (Gürlek, 2002). The word SWOT consists of the initials of the words Strengths (Weaknesses/Advantages), Weaknesses (Weaknesses/Disadvantages), Opportunities and Threats. There are two main benefits of SWOT Analysis in planning. Firstly, SWOT Analysis is carried out to determine the strengths and weaknesses, opportunities and threats. In this sense, SWOT is a "current state" analysis. SWOT Analysis is also an analysis or research technique for determining and predicting future situations. In this second sense, SWOT is a "future situation" analysis. In line with these explanations, SWOT Analysis can be perceived as a spectacle providing vision of the current and future (Polat, 2006; Dinç 2020). Güngör and Arslan (2004) used the SWOT method to determine the tourism potential in their study.

Studies on the use of the dams for the recreational activities was investigated. Çelik (2018) investigated for recreational use in Seyhan Dam Lake and its surroundings in Adana. Gök (2011) conducted a study to determine the recreational area usage decisions of the Kozan Dam Lake. Tamcan (2005) carried out studies to reveal the importance of Bayındır Dam Lake and its immediate surroundings in terms of meeting the recreational needs of Ankara city people and to determine the recreational potential of the area in this context. Candranegara et al. (2019) examined Telaga Tunjung Dam for compatibility with ecotourism. Ghernaout and Remini (2020) investigated the Mina River for suitability for recreational activities.

This study which was carried out on Akkaya Dam which is of great importance for the Niğde, will not only add quality to the campus area where it is located in, but it will also provide recreational activities to the local people. The aim of the study is to identify the strengths and weaknesses, threats and opportunities of the Akkaya dam and to determine its goals and strategies in terms of recreation. In line with this purpose, the socio-economic, cultural and natural features of the landscape potential of the area were evaluated using the SWOT, the opportunities that the positive and negative aspects of the area, were presented, and the possible or existing threats were determined. At the same time, the current recreation potential of the dam has been determined and suggestions have been developed in line with the data obtained in order to offer alternatives that can be evaluated in terms of sustainable use of these areas.

Material and Method

The study area covers the Akkaya Reservoir basin within the borders of the Niğde Turkey. Niğde located in 34°30'10"-34°45'00" eastern longitude and 37°54'00"-38°06'30" northern latitudes. The size of the study area is 580.00 km² (Figure 1). Akkaya Reservoir Lake where located in the study area, is an irrigation pond formed on the Karasu Stream, which progresses within the city of

Niğde and reaches the Bor Plain (Soydan, 2020). Akkaya Dam was selected as study area both in terms of protecting nature and researching recreational use opportunities that can provide multi-directional benefits for the region. In the study, it was aimed to determine the suitability of the Akkaya Dam in terms of recreational activities. In this context, the relevant literature of the Akkaya Dam was investigated, and field trips were made to determine the current situation. The study was shaped in accordance with the literature reviews and field trip. In line with the information that was obtained from the related units, the current state of Akkaya Dam was analyzed and the properties of the dam were tried to be determined using SWOT analysis. In the study, firstly, the landscape potential of the Akkaya dam was determined. In the second stage, SWOT analysis was used to evaluate this potential in the most suitable way, and their conformity was determined. After determining the SWOT criteria, the criteria were examined by associating them with each other using the SWOT matrix. In SWOT analysis, an analysis is made for the future situation by determining the strengths, weaknesses, opportunities, threats and dangers by considering the current situation. A strategic view for the region can be suggested by researching the analyzes made based on these criteria. The aim of SWOT analysis is to develop new plans and appropriate strategies by taking advantage of the region's strengths and opportunities, reducing threats and identifying weaknesses, taking into account internal and external factors. Finally, suitable recreational activities were suggested for the Akkaya dam.

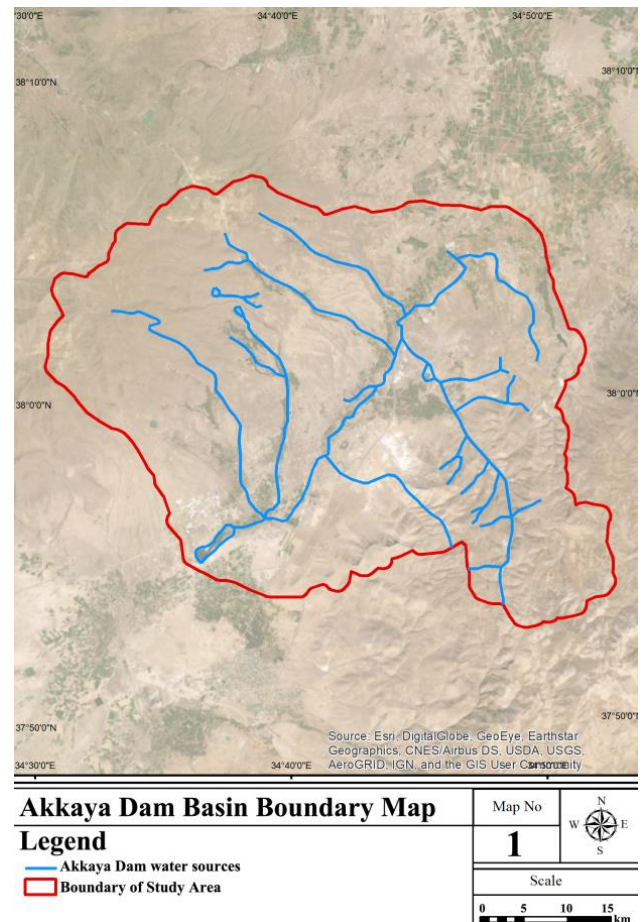


Figure 1. Boundary of study area

Results and Discussion

Within the scope of the study, the natural features of the area were determined.

Geological Structure

Depending on the climatic conditions and bedrock factor, different soil types can be seen in Niğde and its surroundings. Zonal soils which are a ratio of 61.9%, have the widest area among the soil groups which were gathered under 3 groups. This is followed by azonal soils with 37.9% and intrazonal soils with 0.2%. Brown soils (2,158 km²), non-calcareous brown soils (1,198 km²) and zonal, rocky and other areas (1,130 km²) in azonal soils have the largest area in the soil groups (Sever and Kopar 2014). Niğde is located in the central part of the Anatolian land in the Alpine mountain range. The area has various lithological units that similar to mosaic because it is the scene of different geological and geomorphological events by being affected by the internal dynamics (orogenesis, epeirogenesis, block tectonism and volcanism) that shape Anatolia. While the Paleozoic and Mesozoic formations are wider in the southern and eastern part of Niğde, there are volcanic formations in the upper and lower Miocene-quaternary regions. There are plutonic and metamorphic rocks in the eastern and southeast of the Niğde (Sever and Kopar 2014). The plains in Niğde are composed of quaternary alluvium, terrestrial clasts carried from the high masses and volcanic sediment.

Soil

Brown soils have the highest area with 2,158 km² (29.90%) in the study area. Hydromorphic and saline-alkali soils are the least area with respectively 8 km²

(0.10%) and 5 km² (0.06%) (Ministry of Agriculture and Forestry 2017) (Table 1). The Niğde province has been one of the important centres where agricultural activities have been carried out throughout history. When the soil structure of Niğde province was examined according to the land use capability classes, 40.38% (3,147.71 ha) of soils is class VII soils. It is observed that 2,625.77 ha of land which constitutes 33.68% of the province, consists of lands suitable for cultivation (I. II. III. And IV. Classes) (Sever and Kopar, 2014) (Table 2).

Hydrological Structure

Due to the high precipitation and the high mountainous areas, Niğde has a wide river network mostly seasonal. Located in the north of the province, Hasan Mountain, Melendiz Mountain, Göllüdağ, Tabur Mountain in the south, Hurç Mountain in the east, Kösedilin Mountain and Pozantı Mountain and the Hıdır Mountain in the southwest constitute the main distribution centers of the waters. Niğde has three river basins with different sizes and water potentials. The annual water potential of 763.8 hm³ of these basins is provided from the sources within the provincial borders (Olgun, 2018).

Niğde has a total water potential of 1158 hm³, of which 763.8 hm³ is from above ground water sources, and 394 hm³ is underground water source. There are many streams that differ seasonally in terms of the water potential they carry within the city. Among these streams, Çakıt Creek and Ecemiş Creek are the streams with the highest value in terms of their annual water potential. Although Niğde province is not rich in lakes, it has different lakes in terms of formation and development.

Table 1. The surface area and proportions of soil groups in Niğde (Sever and Kopar, 2014)

Classification	Soil Groups	Area (km ²)	Category (km ²)	Percent (%)
Zonal Soil	Brown Soil	2,158	4,566	61.9
	Brown Forest Soil	671		
	Non-calcareous Brown Soil	1,198		
	Non-calcareous Brown Forest	529		
	Terra Sigillata	10		
Intraoral Soils	Hydromorphic Soils	8	12	0.2
	Saline-Alkali Soils	5		
Azonal Soils	Alluvial Soils	710	2,787	37.9
	Colluvial Soils	10		
	Regosol Soils	937		
	Stony Rocky and Other Soils	1,130		
Total		7,366	7,366	100.0

Table 2. Land-capability classification of Niğde (Sever and Kopar, 2014)

Land-Capability Classification	Area (ha)	Percent (%)
Class I soils	456.80	5.86
Class II soils	910.48	11.68
Class III soils	490.32	6.29
Class IV soils	767.83	9.85
Class V soils	17.93	0.23
Class VI soils	1,023.51	13.13
Class VII soils	3,147.71	40.38
Class III soils	980.64	12.58
Total	7,795.22	100.00

In particular, there are circus lakes formed by glacial erosion on Aladağlar and Bolkar Mountains. Akgöl, Alagöl, Çinigöl, Yedigöl, Karagöl are the main circus lakes. While volcanic crater lakes are located on Hasan Mountain and Göllü Mountain, Narlı Lake in the north is formed as a result of volcanic depression. These lakes of volcanic origin have the character of brackish water because the lake basins are composed of volcanic rocks. Narlı Lake is a bitter lake besides having mineral rich waters due to feeding underground hot water sources (Olgun, 2018).

Climate

The typical continental climate of Central Anatolia can be seen in Niğde. In the region where the summers are hot and dry, the winters are cold and snowy, the precipitation is observed in the winter, and the rain in the spring. When the maximum and minimum temperature values of the city of Niğde for 84 years (1935-2019) were examined, it was determined that the highest temperature reached 38.5 °C in July and August, and the lowest temperature in January with -25.6 °C. In addition, it is observed that the highest rainfall decreased in May with an average of 48.7 kg/m² (General Directorate of Meteorology, 2019).

Vegetation and Wildlife

As the Niğde is located at the intersection of the Mediterranean and Central Anatolian climates, it has unique features and diversity in terms of vegetation and wildlife. The province has an important wealth in terms of flora and fauna due to its geographical location. These diversity and features are also seen in the studies carried out for the flora and fauna of the province. There are 1200 species in the province of Niğde and 265 of them are endemic (Görür et al. 2016). When the plant species that are located at the park and road sides in the city center of Niğde are examined; There are coniferous plant species such as *Cedrus libani*, *Cupressus sempervirens L. horizontalis* (Mill.) Gord., *Pinus pinea*, and non-evergreen plant species such as *Fraxinus angustifolia L.* and *Acer negundo L.* are found. Also; There are *Melia azedarach L.*, *Cupressus sempervirens var. Pyramidalis Targioni-Tozzetti*, *Robinia pseudoacacia L. var. umbraculifera DC.*, *Platanus orientalis*, *Aesculus hippocastanum L.*, *Ailanthus altissima* (Mill.) Swingle, *Morus alba L.*, *Ligustrum japonicum Thunb.*, *Morus alba L. var. pendula Dipp.*, *Cercis siliquastrum L.*, *Populus x canescens* (Aiton) Sm., *Malus floribunda*, *Elaeagnus angustifolia* species are plant species located in parks and roadsides in the city of Niğde (Erzurumlu and Kahveci 2017).

The Niğde has endemic species in terms of fauna. Taurus frogs that are endemic in Turkey is only known to exist in the lakes of the Kara and Çinli where they located at the top of the Bolkar Mountains within the boundaries of Ulukışla district. *Dryomys laniger* and a small insectivorous species that are living in Bolkarlar, are among the endemic species of the region. Almost half of 145 species of approximately 160 mammal species in our country, which are terrestrial, have been identified within the borders of the province of Niğde.

In addition, more than half of the 465 bird species found in our country were found within the provincial borders of Niğde (Ministry of Agriculture and Forestry 2013).

Akkaya Dam Lake and its surroundings in the study area is an important area in terms of biodiversity. *Oxyura leucocephala*, which is effective in declaring the area as an International Wetland, lives and nests in this area. There are also two endemic fish species (*Pseudophoxinus anatolicus* and *Aphanius anatoliae*) in the reservoir. This area has important bird areas and important nature areas. Apart from these, it hosts approximately 200 bird species including various heron, flamingo, pelican and various duck species, and 33 endemic plant species increase the importance of the area (Başköse et al. 2012).

Akkaya Dam

Akkaya reservoir lake area was built as a total of 1.40 km² in 1965. Water surface maps produced with MNDWI were prepared for the summer months of 1999, 2009 and 2019 years. The water surface area covered by the reservoir area changed each year. The highest water surface area in the reservoir lake was 2019 year. The year in which the reservoir lake surface was the least was found to be 1965 which is reservoir was built considering the reference surface area in other years, an average increase of 37% was found in the reservoir lake water surface area (Soydan, 2020).

Akkaya Dam SWOT Analysis

Akkaya Dam is of great importance for the province of Niğde. Its natural and cultural features also contribute to the dam in terms of urban use. However, the dam faces many problems and threats, especially pollution.

Eliminating the problems for this and solving the problems found in the dam area will provide benefits in terms of recreational uses. Akkaya Dam SWOT Analysis was given Table 3. Photos that were taken from the area are given in Figure 2. As a result of the analyzes, the biggest problem in the dam was found to be bad smell. In addition, environmental pollution in the dam and its vicinity causes problems. The strongest part of the dam is its endemic species. Especially there are endemic bird species that allow the dam to be identified as a protection area. However, the number of these birds will start to decrease in time due to reasons such as poaching and environmental pollution. At the end of this, bird watching, which has a great importance in terms of recreational activity, will not be possible. It is located in the vicinity of Niğde Province in an area where tourism activities are intensive such as Kayseri, Nevşehir and Adana. In these areas, recreational activities such as skiing, water activities and underground cities are carried out. For this reason, Niğde Province is a bit behind in terms of tourism compared to these cities.

This reduces the reason why Niğde is preferred. Therefore, by protecting and planning such natural structures, the region can also be developed economically. Similar results were obtained in other studies. Çelik (2018) stated that there are environmental pollution problems in the Seyhan dam and that the dam will be preferred more in terms of recreational activities by solving these problems. Gök (2011) stated that the Kozan Dam lake and its immediate surroundings are particularly suitable for recreational activities, but there are environmental problems. Bulut and Ceyhan (2011) stated that the biggest problem is bad smell in their study on the artificial lakes of Niğde region.

Table 3. SWOT analysis of Akkaya Dam

Strengths	Weaknesses
It contains a strong and large flora and fauna.	Bad Smell
Endemic plant species	Indifference
Endemic bird species	Lack of publicity
Endemic fish species	Lack of incentives
Compliance with recreational activities	Insufficient tourism
Compliance with organic farming practices	The majority of the dam is located within the campus and is not open to the public.
Accessibility	
Being natural or close to nature	
Opportunities	Threats
Compliance with recreational activities	Increased pollution of water
Compliance with organic agriculture	Increased bad smell
Increased interest to nature	Environment pollution
Alternative tourism activities	Poaching
Contributing to the local economy through activities	Changes in the Physical and Chemical Properties of Water
New job opportunities	Prevention of Reproduction of Pests and Harmful Creatures
Endemic Species	Threatening Live Life in the Receiving Environment
	Financial Impossibilities
	Shortage of Staff
	Treatment Facilities Not Running Regularly
	Periodic Measurement Failure

While the sewage is poured into the Akkaya Dam by mixing with the natural water in the Niğde Stream, the sewage pipes were laid in the stream recently (8-10 years), and the channel water was separated from the natural water of the Niğde Stream. Niğde sewage wastes pass through the Niğde River bed with these pipes and enter the Niğde Municipality Treatment Facilities before reaching the dam. Waste water is sent to Akkaya Dam after passing this facility. Although sewage water is said to be treated at the treatment plant, it is an indisputable fact that it cannot be as much as the cleaning of natural water.

This situation may threaten the life of these creatures by causing the lake's fish and bird species to suffer from pollution. Apart from these creatures, the main problem is the use of dam waters in the vineyard and garden irrigation of Bor City. As a matter of fact, the fact that the Akkaya Dam water is in the first place among the agricultural problems of Bor Tarım District Directorate shows that water poses a risk for public health. Dam waters that are polluted by many waste materials, affect the fauna species in the lake. It was stated verbally by the researches that there were fish poisonings in the past years due to the heavy metal pollution formed in the dam as a result of the wastes of the Niğde Organized Industry located in the north of the dam. it was also stated in the 2010 report of the related Ministry that this wastewater made changes in the physical and chemical properties of Akkaya Dam water. These changes in the water have also been noticed by the local community. It was observed that excessive green foams were formed inside the water channels coming from the dam. It is stated that channel waters cause some problems such as low productivity in agricultural production, drying of vegetables and even death. There is a water pollution problem in the streams feeding the local dams of the Niğde and Bor. As a matter of fact, according to the results of the Ministry of Environment and Forestry, it has been determined that the primary priority problem in Niğde is water pollution. Some difficulties were

encountered in eliminating these water problems in the region. Although these difficulties were identified, it was also stated in the Akkaya Dam Lake and Environmental Problems Workshop that rational measures were not taken to eliminate deficiencies, ecological problems were increasing day by day, and flora and fauna species were negatively affected by this situation. Apart from ecological problems, the illegal network shot in the dam constitutes another problem. Inadequate controls cause both netting and hunting of rich bird species, especially duck in the lake (Bulut and Ceylan, 2011). Despite all these adversities, the problems in the dam and its immediate vicinity can be minimized by the restoration works to be carried out. In this way, it will be possible to protect the dam ecologically and also include new recreational activities.

Conclusion

Cities with environmental problems are increasing rapidly in our country. On the one hand, cities undergo a significant change with the slums formed by the population flow from rural areas, on the other hand, with large and multi-storey buildings and industrial establishments. In cities where ecological relations are ignored, as a result of the gradual decrease in natural areas, climate and soil conditions are changing, and besides, an artificial living environment is created with harmful substances originating from housing, industry and vehicles. There was not a complete harmony between the living conditions in this artificial city ecosystem and the environment that people seek and long for, causing excessive population growth, air pollution, noise, fatigue and psycho-physiological imbalances in humans. Therefore, people's desire to change the environment pushes them out of the city. In order for people to rest, have fun and renew their minds; forested areas, water and water edges have a very important potential due to their recreational features.



Figure 2. Photos from the study area

Recreation areas have a phenomenon that reflects the image, shape, culture and economy of the city and the country. Therefore, recreation area uses, designs and plans should be formed as a result of very good analysis. If careful planning and designs are not made, large losses and false image perception are created (Gök, 2011). Akkaya Dam Lake has a great potential in terms of recreation. Investments planned to be made in the area should be handled in a way that will have tourism and recreational activities and demands, taking into account the natural, cultural and social structure of the region.

Most importantly, in order for the natural existence of the area to be less damaged, it should be done in accordance with the coastline and wildlife development area. As a result of the analyzes, recreational activities for water that can be performed in Akkaya and its immediate surroundings, are as follows; Swimming, Underwater dives, Bottling, Shovel, Sailing, Water skiing, Angling, Walking, Camping, Picnic, Ride a bike etc. Recreational activities that can be performed according to the natural features of the dam are as follows; Bird watching, Organic agriculture, Plant Production and Protection Areas, Herbarium, Ecology Observation Points.

Problems such as fishing by netting, hunting duck and other bird species are seen in Akkaya Dam. In order to prevent fish and bird catches that are smuggled, a staff assigned to poaching should be allocated by the municipality. Thus, the birds, which are limited in number in the world and in our country, will be preserved and the fish will not be exhausted. Landscape arrangements such as asphaltting the dirt road of the Akkaya Dam, which is entered over the Niğde-Bor highway, pavement, lighting, planting trees on the roads, should be made to evaluate this area for recreational activities. Alternative tourism possibilities of this wetland should be increased by opening up to 194 bird species nature eco-tourism and bird watching in Akkaya wetlands. Besides, sewage waters that

are coming to the dam, should be prevented. Although sewage water reaches the dam after the treatment facilities, it causes pollution. Environmental pollution that are occurring in the dam and its vicinity, should be prevented. In this way, living things in the dam and its vicinity will have more living spaces. The use of the dam in terms of agricultural activities should be limited. As a result of agricultural activities, dam water decreases, and heavy metals occur in the dam due to pesticides. Contribution will be made to the ecological cycle of living things in the dam by preventing this. More attention should be given to the promotion of the region. Only the works to be carried out in the Akkaya dam and its immediate surroundings will not be sufficient.

In order to make the area more preferred, the city of Niğde should have more tourism activities. As a result of the study, it was determined that there are problems at the Akkaya dam, but there are more opportunities than the threats. Accordingly, the weaknesses and threats should be reduced, and the use of the dam in terms of recreational activities should be ensured. Besides, the strengths and opportunities of the dam should be considered, and decisions should be made accordingly.

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