

A Pioneering Study on the Completed Dam Lakes and Their Benefits in Sivas Province (Turkey)

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ABSTRACT

This study examines the completed dam lakes within the borders of Sivas province in Turkey, their benefits, and includes some recommendations. These dam lakes serve various purposes. In Sivas province, dam lakes play a significant role, particularly in agricultural irrigation, energy production, and meeting drinking water needs. Agricultural irrigation holds a prominent place among these uses. The first dam lakes in Sivas were commissioned in 1977 to meet irrigation needs. This initiative, starting with the Maksutlu and Yapıaltın dam lakes, was followed by the Gölova, Kılıçkaya, and Sarıçal dam lakes, completed in 1988, 1989, and 1990, respectively. Most recently, the Kartalkaya and Baharözü dam lakes were completed in 2024. The Çamlığöze and Kılıçkaya dam lakes, completed in the Suşehri district of Sivas province, provide a total of 434 GWh of hydroelectric energy annually. The Dört Eylül dam lake is used solely for drinking water purposes. The Kanak and Mursal dam lakes are used for both drinking water and irrigation. A total of 19,590 hm³ of drinking water is supplied annually from the Dört Eylül, Kanak, and Mursal dam lakes in Sivas province. With the completion of 33 dam lakes, drinking water, energy production, and irrigation opportunities have increased in Sivas province, and a large portion of floods have been brought under control. Considering the irrigation, drinking water, and hydroelectric energy production of the completed dam lakes, Sivas province holds an important position for Turkey. It is recommended that the inspections and monitoring that began during the construction phase of the dam lakes in Sivas province be continued regularly throughout the lifespan of the dam lakes. In this context, the protection of the dam lakes in Sivas province and their preservation for future generations is of great importance.

Keywords: Benefit; Dam Lakes; Drinking Water; Energy; Irrigation; Monitoring; Water Resources; Sivas Province.

1. Introduction

Water, the source of life, has been needed by humans and all living beings from the past to the present. Humans need water for irrigation, drinking water, and to increase livestock farming. Water is also used in sanitation, energy, and industry. Today, societies with high levels of prosperity are generally those located near water sources. The need for water, which is of great importance for life, is increasing day by day, and the need for water storage is arising. One of the methods of water storage is the construction of dams. A dam is defined as a barrier built on a river between two banks of a valley to store water or create a reservoir. The reason for water storage is to store water for use when it is insufficient for its intended purpose and to control excess water from floods. It is believed that the first dam in history was built around 4000 BC to meet irrigation and drinking water needs. Dams, with their long history, contribute to the supply of drinking water, electricity generation, livestock farming, agricultural activities, and industrial activities, as well as flood control in streambeds and the formation of national defense lines due to their construction in strategic locations [1]. Furthermore, dam lakes, constructed in various types and heights, have economic, social, and cultural benefits both nationally and regionally in areas such as fishing, aquaculture, recreational areas, water sports, and similar fields.

With the rapid increase in population, the need for water has increased even more in recent years. The rapid increase in the world's population has led people to increase the use of existing resources. Utilizing streams is at the forefront of these efforts. As a result, agriculture can be practiced in much larger areas, far from streams, even during the driest season of the year. Dam lakes are of great importance for agricultural areas. Especially in arid and semi-arid climate zones where water scarcity is high, dam lakes are absolutely necessary for irrigated agriculture.

Irrigated agriculture is practiced all over the world to increase agricultural production or at least maintain it, and dam lakes are used as the most important natural resource in this production. Furthermore, the need for drinking water and electricity throughout the year, and the increasing demand due to industrialization, further increases the importance of streams. Streams are one of the most important factors shaping the earth's surface. For these reasons, efforts have accelerated to both reduce the negative impacts that streams can have on the environment and to increase agricultural production by controlling irrigation, along with providing drinking water and energy. Throughout the world, dam construction has gained importance as the most intensive way to utilize streams. A dam lake is formed when a dam is built across a stream valley at its narrowest point, and the water accumulates in the large areas behind this dam. The size of these dam lakes depends on factors such as the stream's regime, the amount of water it carries, and the size of its basin [2].

1.1. Objectives of the Study

This study examines the benefits of the dam reservoirs completed by the General Directorate of State Hydraulic Works in Sivas province of Türkiye in terms of irrigation, energy and drinking water supply, and includes some recommendations. The specific objectives are: (i) to evaluate the current status of the dam reservoirs completed in Sivas province, (ii) to reveal their benefits and potentials, (iii) to examine the main problems in their development, (iv) to evaluate what needs to be done for their sustainability, and (v) to offer possible suggestions for their future direction.

2. Materials and Methods

This study focuses on the completed dam lakes within the borders of Sivas province as the research area. Turkey is among the Eastern Mediterranean countries. Sivas province is located in the Central Anatolia Region of Turkey. Sivas province is situated between 36° and 39° east longitudes and 38° and 41° north latitudes. Sivas province is bordered by Erzincan province to the east, Malatya and Kahramanmaraş provinces to the south, Kayseri province to the southwest, Yozgat province to the west, Tokat and Ordu provinces to the north, and Giresun province to the northeast. Sivas province, with a surface area of 2.853.207 hectares, has 17 districts. The districts of Sivas province are: Zara, Akıncılar, Yıldızeli, Altınyayla, Ulaş, Suşehri, Divriği, Doğanşar, Şarkışla, Merkez, Gemerek, Koyulhisar, Gölova, Kangal, Gürün, İmranlı, and Hafik. The districts of Sivas province are presented in Figure 1. Sivas province has an average altitude of 1285 meters. 47.6% of the province is covered by plateaus, 46.2% by mountains, and 62.0% by plains. The province, which begins on the high plateaus of Central Anatolia and rises towards the east, ends in a mountainous and rugged section in the north, east, and southeast. The province includes the Köse Mountains, an extension of the North Anatolian mountain range, the Tecer Mountains and İncebel Mountains, northern branches of the Taurus Mountains, the Akdağlar Mountains, and the Yama Mountain. The Uzunyayla and Meraküm plateaus, as well as the Kızılırmak, Kelkit, and Çaltı valleys, are important geographical formations. The important rivers are the Kızılırmak, Kelkit Stream, Tozanlı Stream, Çaltı Stream, and Tohma Stream. A large part of Sivas province is under the influence of a continental climate with hot and dry summers and cold and snowy winters. However, the climate is influenced by the Black Sea region in the north and the high-altitude region of Eastern Anatolia in the east [3].

Sivas province, where the average rainfall is 40 kg per square meter, predominantly experiences a continental climate. The province's surface water potential is 10.300 hm³/year, and its groundwater potential is 902 hm³/year, for a total of 11.202 hm³/year [4]. According to the Address-Based Population Registration System results, the total population of Sivas province in 2024 was 637 thousand 7 people. Approximately 50% of this population resides in the central district.



Figure 1. Sivas province and its districts

The sample areas of this study consist of completed dam lakes located in Sivas province. To identify these completed dam lakes and their benefits in Sivas province of Turkey, data shared online by the General Directorate of State Hydraulic Works of the Republic of Turkey was used [5]. The characteristics of these dam lakes, such as the districts where they are located, their completion years, intended uses, gross irrigation areas, installed power, average annual energy production, and annual drinking water volumes, were examined comparatively.

3. Results and Discussion

In Sivas province, there are 33 dam lakes completed by the General Directorate of State Hydraulic Works of the Republic of Turkey. These are Gölova, Sarıçal, Kemeriz, Deliilyas, Delice, Yıldız, İmranlı, Kızılcakışla, Kanak, Kaman, İncesu, Güneykaya, Cizözü, Demiryazı, Akören, Yumağın, Karaşar, Güresin, Maksutlu, Yapıaltın, Kılıçkaya, Mursal, Gazibey, Çamlıgöze, Dört Eylül, Karacalar, Pusat-Özen, Nevruz, Kocakurt, Örenlice, Elbeyli, Kartalkaya and Baharözü dam lakes. Data on the name, district, completion year, purpose of use, gross irrigation area, installed power, average annual energy production amount and annual drinking water volume of the completed dam lakes in Sivas province are presented in Table 1.

Table 1. Dam Lakes Constructed in Sivas Province and Their Benefits

S.No.	Dam Lake Name	District	End Date	Benefits	Gross Irrigation Area (ha)	Installed Power (MW)	Average Energy (GWh/year)	Drinking Water (hm ³ /year)
1	Gölova	Gölova	1988	I	6.300	-	-	-
2	Sarıçal	Yıldızeli	1990	I	217	-	-	-
3	Kemeriz	Zara	1992	I	428	-	-	-
4	Deliilyas	Altınyayla	1993	I	398	-	-	-
5	Delice	İmranlı	1993	I	267	-	-	-
6	Yıldız	Yıldızeli	1997	I	1.723	-	-	-

7	İmranlı	İmranlı	2003	I	9.687	-	-	-
8	Kızılcakışla	Şarkışla	2009	I	504	-	-	-
9	Kanak	Şarkışla	2013	I+D	2.313	-	-	4,600
10	Kaman	Yıldızeli	2015	I	450	-	-	-
11	İncesu	Gürün	2016	I	206	-	-	-
12	Güneykaya	Yıldızeli	2016	I	3.558	-	-	-
13	Cizözü	Yıldızeli	2018	I	213	-	-	-
14	Demiryazı	Merkez	2018	I	669	-	-	-
15	Akören	Zara	2019	I	916	-	-	-
16	Yumağın	Gemerek	2022	I	727			
17	Karasar	Ulaş	2022	I	577			
18	Güresin	Divriği	2023	I	362			
19	Maksutlu	Şarkışla	1977	I	450	-	-	-
20	Yapıaltın	Şarkışla	1977	I	2.600	-	-	-
21	Kılıçkaya	Suşehri	1989	E	-	124	332	-
22	Mursal	Divriği	1991	I+D	2.370	-	-	1,990
23	Gazibey	Şarkışla	1992	I	2.537	-	-	-
24	Çamlıgöze	Suşehri	1997	E	-	32	102	-
25	Dört Eylül	Merkez	2004	D	-	-	-	13,000
26	Karacalar	Ulaş	2008	I	4.100	-	-	-
27	Pusat-Özen	Hafik	2009	I	10.599	-	-	-
28	Nevruz	Yıldızeli	2015	I	5.479	-	-	-
29	Kocakurt	Kangal	2017	I	2.831	-	-	-
30	Örenlice	Ulaş	2020	I	1.349	-	-	-
31	Elbeyli	Merkez	2021	I	244	-	-	-
32	Kartalkaya	Gemerek	2024	I	3.799			
33	Baharözü	Ulaş	2024	I	223			
	Total				66.096	156	434	19,590

Use Purpose: I (Irrigation), D (Drinking Water), E (Energy).

In the Central district of Sivas province, there are Demiryazı, Dört Eylül, Elbeyli and Gazibey dam lakes. In Altınyayla district, there is the Deliilyas dam lake; in Hafik district, the Pusat-Özen dam lake; in Gürün district, the İncesu dam lake; in Kangal district, the Kocakurt dam lake; in Divriği district, the Mursal and Güresin dam lakes; in İmranlı district, the İmranlı and Delice dam lakes; in Suşehri district, the Çamlıgöze and Kılıçkaya dam lakes; in Şarkışla district, the Maksutlu, Yapıaltın, Kızılcakışla, and Kanak dam lakes; in Yıldızeli district, the Nevruz, Sarıçal, Yıldız, Kaman, Güneykaya, and Cizözü dam lakes; in Ulaş district, the Karacalar, Örenlice, Karasar, and Baharözü dam lakes; and in Zara district, the Kemeriz and Akören dam lakes (Table 1).

Accordingly, the highest number of dam lakes are located in Yıldızeli district of Sivas province. There are a total of 6 dam lakes in Yıldızeli district. Yıldızeli district has a total of 4 dam lakes, followed by Merkez, Şarkışla, and Ulaş districts. Altınyayla, Gölova, Gürün, Hafik, and Kangal districts each have 1 dam lake. Akıncılar, Doğanşar, and Koyulhisar districts of Sivas province do not have any completed dam lakes. The distribution of completed dam lakes by district in Sivas province is most concentrated in Yıldızeli, Merkez, Şarkışla, and Ulaş districts, respectively (Table 1). The total agricultural land in Yıldızeli, Merkez, Şarkışla, and Ulaş districts is larger than in other districts. Since flat and gently sloping irrigated agricultural lands are concentrated in Yıldızeli, Merkez, Şarkışla, and Ulaş districts, these lands can be irrigated by the dam lakes located in these areas.

In this study, completed dam lakes located in Sivas province were determined as sample areas. The completion dates of the completed dam lakes in Sivas province vary between 1977 and 2024 (Table 1). The first dam lakes in

Sivas province, completed in 1977, are Maksutlu and Yapıaltın in Şarkışla district. The Gölova dam lake in Gölova district was completed in 1988. These dam lakes are followed by the Kılıçkaya dam lake in Suşehri district, completed in 1989. Sivas province's dam lake construction adventure, which began in 1977, continued with the construction of the Sariçal dam lake in 1990. The Mursal dam lake was built in 1991. The Gazibey and Kemeriz dam lakes were completed in 1992. The Delice and Deliilyas dam lakes were completed in 1993. The construction of the Çamlığöze and Yıldız dam lakes was completed in 1997. The İmranlı dam lake was constructed in 2003. The Dört Eylül dam lake was constructed in 2004. The Karacalar dam lake was constructed in 2008.

The Pusat-Özen and Kızılcakışla dam lakes were completed in 2009. The Kanak dam lake was constructed in 2013. The Nevruz and Kaman dam lakes were completed in 2015. The İncesu and Güneykaya dam lakes were completed in 2016. The Kocakurt dam lake was completed in 2017. The Cizözü and Demiryazı dam lakes were completed in 2018. The Akören dam lake was constructed in 2019. The Örenlice dam lake was constructed in 2020. The Elbeyli dam lake was constructed in 2021. The Yumağın and Karaşar dam lakes were constructed in 2022. The Güresin dam lake was constructed in 2023. In Sivas province, the Kartalkaya dam lake in Gemerek district and the Baharözü dam lake in Ulaş district were most recently completed in 2024. (Table 1). Accordingly, it can be stated that the completion dates of the dam lakes located in Sivas province show a generally regular distribution between 1977 and 2024.

The completed dam lakes in Sivas province are used for irrigation, energy production, and drinking water purposes (Table 1). The Çamlığöze and Kılıçkaya dam lakes are used solely for energy production. The Dört Eylül, Mursal, and Kanak dam lakes are used for drinking water purposes. The other 30 completed dam lakes in Sivas province are used for agricultural irrigation. Of the completed dam lakes in Sivas province, only the Kanak and Mursal dam lakes are used for both irrigation and drinking water purposes. The importance of dam lakes for agricultural areas is immense. Especially in Sivas province, located in an arid and semi-arid climate zone with water scarcity, dam lakes are absolutely essential for irrigated agriculture. The construction of dam lakes has become crucial, particularly in areas where irrigated agriculture is practiced, to prevent agricultural production from being affected by changing climate events. In Sivas province, the following dam lakes, whose construction has been completed, are used for irrigation purposes: Gölova, Sariçal, Kemeriz, Deliilyas, Delice, Yıldız, İmranlı, Kızılcakışla, Kaman, İncesu, Güneykaya, Cizözü, Demiryazı, Akören, Yumağın, Karaşar, Güresin, Maksutlu, Yapıaltın, Kılıçkaya, Gazibey, Çamlığöze, Karacalar, Pusat-Özen, Nevruz, Kocakurt, Örenlice, Elbeyli, Kartalkaya, and Baharözü. The gross irrigation areas of the 30 dam lakes located in Sivas province and whose construction has been completed range from 206 hectares to 10.599 hectares (Table 1). The Pusat-Özen dam lake has the largest gross irrigation area with 10.599 hectares. This is followed by the İmranlı dam lake with 9.687 hectares. The İncesu dam lake has the smallest gross irrigation area with 206 hectares. Sivas province, with an area of 2.853.207 hectares, consists of 41% agricultural land, 28% meadows and pastures, 17.5% forests, and 13.5% settlements [3]. The gross irrigation area of completed dam lakes in Sivas province has reached 66,096 hectares. This gross irrigation area of completed dam lakes in Sivas province has been determined to cover approximately 2.32% of the province's total area. Therefore, dam lake construction works are still ongoing in Sivas province.

One of the most significant problems in agriculture in Sivas province is the irrigation shortage. Dam lakes built on streams play an important role in solving this problem. In Sivas province, which has a continental climate and a pronounced summer drought, 33 dam lakes have been constructed to solve the irrigation problem in agriculture. 32 of these dam lakes are used to irrigate a total of 66.096 hectares of agricultural land in Sivas province. This total irrigated area covers 2.32% of the province's surface area.

Accordingly, the completed dam lakes irrigate 2.32% of Sivas province's total area. Therefore, new dam lake construction projects are still ongoing in the province. The completed dam lakes in Sivas province significantly impact both agricultural activities and the crops grown in their surrounding areas. As in many regions of Turkey, irrigation problems are a major issue in Sivas province. The completed dam lakes in Sivas province largely solve this irrigation problem. The importance of the completed dam lakes to agriculture in Sivas province is undeniable. Therefore, to ensure the sustainability of these dam lakes and prevent water quality degradation, it would be highly beneficial for relevant organizations to provide farmers with training on preventing excessive pesticide and fertilizer use in agricultural areas and promoting more sustainable water use.

The role of hydroelectric power generation is very significant in terms of the economic utilization of water resources. The Çamlığöze and Kılıçkaya dam lakes, completed in Sivas province, are used solely for energy production. The installed capacity of the Çamlığöze dam lake is 32 MW, while the Kılıçkaya dam lake has an installed capacity of 124 MW. However, the Çamlığöze dam lake has an average energy production of 102 GWh/year, while the Kılıçkaya dam lake has an average energy production of 332 GWh/year (Table 1). Accordingly, the Kılıçkaya dam lake produces approximately 3.5 times more energy than the Çamlığöze dam lake, both in terms of installed capacity and average annual energy production. The total amount of hydroelectric energy obtained from the Kılıçkaya and Çamlığöze dam lakes completed in Sivas province has been determined as 152 MW of installed capacity and an average annual production of 434 GWh.

With the increasing population and rising living standards, the demand for drinking and utility water in settlements is also increasing. In Sivas province, the Dört Eylül, Mursal, and Kanak dam lakes, which have been completed, are used for drinking water purposes. The Dört Eylül dam lake provides 13,000 hm³ of drinking water annually, the Kanak dam lake provides 4,600 hm³, and the Mursal dam lake provides 1,990 hm³ annually (Table 1). The Kanak dam lake was constructed to irrigate 2313 hectares of agricultural land and to solve the drinking water problems of the Gürçayır and Cemel towns in the Şarkışla district of Sivas province [6].

However, the Dört Eylül dam lake is one of the most important sources of drinking and utility water for Sivas province. The planned drinking and utility water capacity of the Dört Eylül dam lake is 33 hm³/year, and together with the drinking water treatment plant built in addition to the storage facility, it provides drinking and utility water to the city of Sivas in accordance with the relevant standards. The water storage facility was completed in 2004 and the water treatment plant in 2007 by the General Directorate of State Hydraulic Works and transferred to Sivas Municipality. Following the completion of the drinking water treatment plant, the commissioning of the Dört Eylül dam lake in 2007 provided 50% of Sivas city with treated water [7]. The total amount of drinking water supplied

annually from the Dört Eylül and Kanak dam lakes in Sivas province is 19,590 hm³. In particular, a large portion of the drinking water needs of the Central district of Sivas province is met from the Dört Eylül dam lake.

When dam lakes begin to collect water, an artificial lake is formed behind the dam wall. This artificial lake is expected to cause some minor changes in the microclimate characteristics and ecosystem of its surroundings. A new base level is formed for the stream flowing into this artificial lake. As a result of this new base level, many changes will occur in erosion and deposition activities, primarily erosive activity [2]. Sedimentation is one of the most important problems encountered during the operation of water resource systems. Dam lakes are structures where sedimentation problems are most frequently encountered. Sedimentation shortens the operating life of dam lakes and causes operational problems [8]. Dam lakes that fill up before their economic lifespan become unusable for their intended purpose. Dam lakes completed in Sivas province for irrigation, energy, and drinking water purposes are also under threat from sedimentation. The fact that dam lakes, which are economically important for the Sivas province due to their high costs and intended uses, cannot be fully operated due to sedimentation and that their lakes fill up, shortening their usage periods, constitutes an undesirable situation. Sediment flow into the dam lakes completed in Sivas province should be slowed down. In order to minimize the problems that may arise from sedimentation in the dam lakes completed in Sivas province, the amount of sedimentation in the dam lakes should be monitored regularly. Accordingly, the operation method of the dam lakes should be determined.

Another significant problem facing the completed dam lakes in Sivas province is the risk of the lakes filling up due to erosion around them. Especially in dam lakes with sparse and heavily damaged vegetation, the accumulation of alluvial deposits carried by floods and rainwater can cause the dam lakes to fill. This situation reduces the estimated lifespan of the completed dam lakes in Sivas province, negatively impacting their sustainable use. The risk of the dam lakes filling up can be minimized through erosion control measures. By improving the slopes around the dam lakes, materials carried from the slopes can be retained. Improving land use around the dam lakes can control the amount of material and reduce damage. Furthermore, efforts to prevent the destruction of trees and vegetation around the completed dam lakes in Sivas province would be highly beneficial. Similarly, planting trees with suitable species around the completed dam lakes in Sivas province would also be very appropriate. Afforestation and erosion control efforts should be completed in the short term around the dam lakes that have been completed in Sivas province.

Dam lakes, which ensure the optimal use of existing water resources, are important engineering structures whose construction is decided upon after long-term studies, realized with large investments, and expected to serve for a very long time. Dam lakes make significant contributions to human life. They are enormous structures that greatly benefit a country's economic, industrial, agricultural, social, and cultural development. On the other hand, dam lakes are a potential danger. Dam accidents, examples of which have occurred in the past and are likely to occur in the present, are a significant threat to life and property safety. Dam lakes are important structures that must be kept safe and their inspection is mandatory [9]. Furthermore, Turkey is located in a first-degree earthquake zone tectonically. In the event of an earthquake, if the dams are destroyed, the settlements and agricultural areas located in the lower sections of the dam lakes could suffer great damage. For these reasons, it is necessary to continuously

inspect the dam lakes completed in Sivas province for safety, both during construction and throughout their operational life. It is essential to be prepared to predict potential accidents in advance, prevent them if possible, and avoid being affected by them. The data obtained must be carefully analyzed. Even if the analysis and evaluation of the data reveal no danger, monitoring and observation should continue diligently. The collected data, evaluations, and results obtained must be very well protected and preserved in meticulously archived records.

In Sivas, Turkey's second largest province in terms of surface area, the completion of these dam lakes has led to changes in its unique geography, vegetation, and humidity distribution. This change has also brought about development. In large-scale projects like the completed dam lakes in Sivas province, ensuring sustainability, minimizing anthropogenic pressures, and guiding future planning are paramount responsibilities. Energy production is planned considering national needs rather than just regional needs. Globally, producing one's own energy is becoming a necessity. Considering global warming and drought, the importance of water management studies and the need for careful consideration of all details during the planning phase become evident. In large-scale planning projects like dam lakes in Sivas province, minimizing anthropogenic impacts is essential. Holistic basin planning should be undertaken to ensure the sustainability of ecologically valuable areas like dam lakes. Participation from various professional disciplines, local people, and government institutions should be ensured. Potential differences should be clearly explained to the public, their expectations understood, and measures taken to improve their well-being. Planning should be done in accordance with traditional lifestyles, and opportunities for resource utilization should be created. The cultural fabric should be adapted to change with minimal damage. Alternative plans and disaster management plans should be created for any potential damage from miscalculations or natural causes. Conservation and planning decisions should be made at the local level to prevent the destruction of the natural and cultural landscape. Ecological plans specific to each dam lake should be developed to ensure that wildlife is not negatively affected by changes during and after the project phases.

Tourism is an alternative solution for increasing the welfare of the people. Opportunities for tourism activities should be created along the shores of the completed dam lakes in Sivas province. Especially for dam lakes completed for irrigation purposes, additional measures should be taken for agricultural production in the surrounding agricultural areas, taking into account the soil structure. To enable the opening of new agricultural areas and agricultural production after the dam lakes, reclamation work should be carried out to make the land productive. Boat tour routes should be created in suitable dam lakes, and tourism potential should be evaluated. Certain areas of the completed dam lakes in Sivas province should be transformed into regionally attractive areas through landscape design studies. Preserving these completed dam lakes in Sivas province and passing them on to future generations is extremely important.

4. Conclusion

In Sivas province, the General Directorate of State Hydraulic Works of the Republic of Turkey has constructed dam lakes in various districts, and the construction of new dam lakes continues. This study evaluates the dam lakes completed by the General Directorate of State Hydraulic Works in Sivas province and their benefits. The 33 dam lakes completed by the General Directorate of State Hydraulic Works are extremely important for agricultural

irrigation, energy, and drinking water supply in Sivas province. The presence of these important water structures, which are part of the water culture, in Sivas highlights the importance and value of the province. The inspections and monitoring that begin during the construction phase of the dam lakes in Sivas province should continue without compromise throughout the lifespan of the dam lakes. These inspections and monitoring should be carried out both periodically and, in extraordinary circumstances, without being bound by periodic schedules. Today, rapid population growth and industrialization are causing various problems. The most important of these problems is the disruption of ecosystem balances. These imbalances in the ecosystem directly or indirectly affect humans. Global warming, climate change, environmental pollution, erosion, and the problems they create are some examples. Therefore, rational planning, taking into account the pressures on dam lake ecosystems, is of great importance both for the protection of Sivas province's natural resources and for the preservation of these dam lakes for future generations.

Declarations

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The author has declared that no competing financial, professional or personal interests exist.

Consent for publication

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Availability of data and material

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