

A Study on the Investigation of Some Quality Parameters of Atikhisar Dam Lake in Çanakkale

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ABSTRACT

This study was carried out seasonally to determine some nutrient load concentrations in the Atikhisar Dam Lake, which provides drinking water to the city center of Çanakkale and also serves the purpose of protection from floods. For this purpose, water samples were taken from 3 sampling points in Atikhisar Dam Lake. 5 parameters (nitrate, nitrite, ammonium, phosphate and suspended solids) were examined in the water samples taken. At the end of the study, it is understood that the dam has a good water quality and there is no significant pollution problem. To ensure the sustainability of water resources, dam waters, which contain a significant part of natural resources, should be monitored regularly.

KEYWORDS: dam; Atikhisar; chemical, water quality

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INTRODUCTION

Dams are usually built between the mountains to control the river waters by cutting the path of the river waters and creating a lake behind it. Dams can be earth fill, rock fill or concrete. In addition, they are structures designed to provide drinking and utility water and electrical energy, as well as protection from floods (Salman et al., 2002; Samad et al., 2022). Stagnant waters or reservoir habitats formed upstream of dams are not as large or deep as storage dam reservoirs and resemble lake systems. They provide different advantages such as the development of fisheries and the protection of living things. Dams maintain constant water levels throughout the dry season and can therefore function as hydrological shelters or temporary habitats for some freshwater species (Sousa et al., 2019, Samad et al., 2022) However, dams constructed without adequate feasibility studies are for ecology, thus It can also cause extremely dangerous consequences for living things (Agiralioglu, 2004).

Physico-chemical and biological factors are the criteria that determine the pollution in aquatic

ecosystems. Water quality is of great importance in terms of protecting the biodiversity of living creatures in the aquatic environment. For this reason, water quality parameters should be constantly monitored, and changes should be examined periodically. In this study, some water quality parameters in Atikhisar dam lake were examined seasonally and contributed to the literature.

In addition, it is aimed to evaluate the measures that may be necessary to ensure the sustainability of water resources by examining the quality parameters of the lake.

MATERIAL AND METHOD

Atikhisar Dam, chosen as the study area, is in Çanakkale province. The body volume of the dam, which is an earth body fill type, is 1.990.000 m³, its height from the riverbed is 43.00 meters, the lake volume at normal water level is 40 hm³, and the lake area at normal water level is 3.30 km². It provides irrigation service to an area of 5200 hectares. 3 stations have been determined in Atikhisar dam lake.

The geographical information of the stations is given in Table 1 and the map of the study area is given in Figure 1.

During the seasonal field studies between June 2021 and May 2022, water samples were taken from all stations in 1-liter polypropylene sample bottles for analysis. Water samples for nitrate (NO₃), nitrite (NO₂), ammonium (NH₄), total phosphate (TP), and Suspended Solids from Nutrient concentration analyzes were transferred to GEMAR laboratories (GEMAR, Environmental Measurements and Analyzes Laboratory - Environmental Measurement and Analysis Laboratory, Canakkale-Turkey). In laboratory, spectrophotometric analyzes were performed according to ISO, EN, TS and EPA standards using methods EPA 352.1 for NO₃, SM 4500-NO2 B for NO₂, SM 4500-NH3 B SM 4500-NH3 F for NH₄, SM 4500-P B SM 4500-P E for TP, SM 2540 D Suspended Solid Material. Nutrient units are calculated in mg/L. The data determined in the water samples taken from the Atikhisar dam lake; Turkish Surface Water Quality Regulation (SWQR) has been compared with the reported limit values.

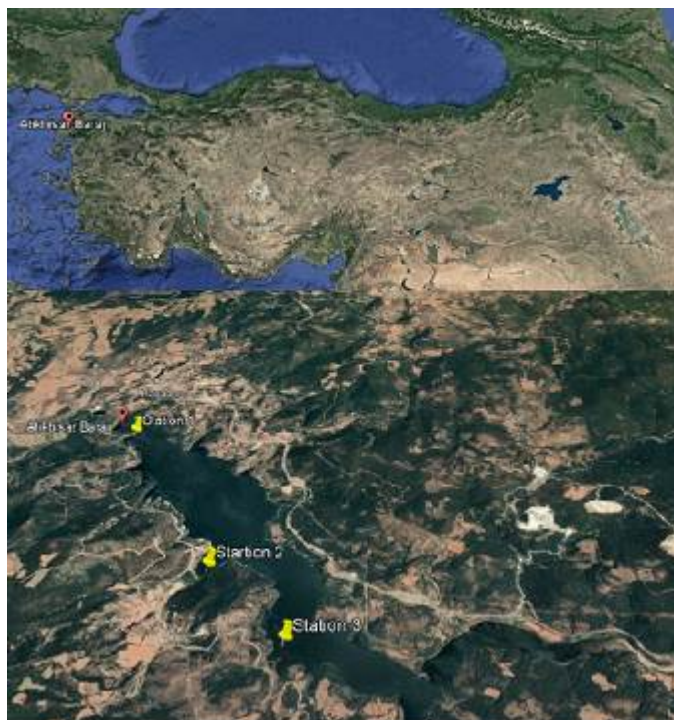


Figure 1 Stations of Atikhisar Dam Lake

Table1. Coordinates of the study area

Stations	Geographical Coordinates
Station 1	40 08 754 N 26 51 806 E
Station 2	40 09 875 N 26 51 850 E
Station 3	40 12 131 N 26 52 259 E

RESULT AND DISCUSSION

This study was carried out to examine some seasonal chemical water quality parameters in Çanakkale Atikhisar dam lake. The chemical analysis (nutrient content) results of the surface water samples taken seasonally in the dam reservoir during June 2021 and May 2022 periods are given in Table 2. Descriptive results for the water quality parameters are presented in Table 2.

The values of the measured parameters were evaluated according to the Surface Water Quality Regulation and Turkish regulations. According to the regulation, Class I water means “High quality water” and “Very Good” water status. II. Class water refers to “Low polluted water” or “Good” water status. III. Class water refers to contaminated water or “Medium” water status. IV. Class denotes “Very polluted water” or “Poor” water condition

The nitrate range of surface inland waters declared by the national regulation is between 5-20mg/L and the nitrate of this study ranges from 0.1 to 0.61. This means that the reservoir water has first class quality.

Nitrite is an intermediate between nitrate and ammonium and is not stable compared to other nutrients. In well-oxygenated waters, the nitrite ratio is determined at low levels. It increases as a result of the discharge of ammonium-rich wastewater into receiving environments, and due to this feature, it is used as a pollution indicator in water (Hauraki District Council, 2003).

						Turkish Regulations Water Quality Classes [5,6,7]			
		Summer	Autumn	Winter	Spring	I.	II.	III.	IV.
NO ₃ (mg/L)	S 1	<0,1	<0,1	0,61	<0,01	<5	10	20	>20
	S 2	<0,1	0,1	0,51	<0,1				
	S 3	<0,1	<0,1	0,57	<0,1				
NO ₂ (mg/L)	S 1	<0,002	<0,002	0,007	0,04	< 0,01	0,06	0,12	> 0,3
	S 2	0,008	<0,002	0,01	0,03				
	S 3	<0,002	<0,002	0,013	0,03				
NH ₄ (mg/L)	S 1	0,04	0,03	0,02	0,1	< 0,2	1	2	> 2
	S 2	0,14	0,04	0,02	0,08				
	S 3	0,03	0,04	0,02	0,1				

TP	S 1	<0,01	<0,01	<0,01	0,01	< 0,08	0,2	> 0,2	< 0,08
	S 2	<0,01	<0,01	<0,01	<0,01				
	S 3	<0,01	<0,01	0,05	<0,01				
SSM*	S 1	10	<10	21,5	<10	Nature reserve and recreation= 5			
	S 2	<10	<10	<10	<10				
	S 3	2458	80,1	30,8	61,3				
SSM*:Suspend Solid Material									
TP:Total Phosphate									

Table 2 Seasonal variation of nutrient content

According to the results of this study, as similar to the present study, the investigated reservoirs were found to be as highly contaminated by suspended Solid Material parameter in general. Allan (1995) and Lewis et al. (2002) reported that the amount of suspended solids decreased and increased with the decrease and rise of the stream flow and the differences in the amount of suspended solids were due to the slope, geology, soil structure, plants and land use of the basin. Suspended solids increase the turbidity of the water and reduce the light transmission. This prevents the sun's rays from reaching the plants in the water and affects photosynthesis, causing a decrease in the amount of dissolved oxygen in the water (Ünlü et al., 2008). Suspended solids dissolve to the bottom, negatively affecting the lives of benthic creatures. Suspended solids are the effects of human waste and the transport of streams. Suspended solids load can be reduced to some extent by preventing human-induced inputs.

It has been determined that the sampling points followed in the study have I. Class Water Quality. With this characteristic, it has been concluded that the dam has a high potential to be used for drinking water supply and can be used for recreational use, trout farming and animal production.

References

- [1] Salman, M. A. S., & Uprety, K. (2002). Conflict and Cooperation on South Asia's International Rivers: A Legal Perspective (Washington DC: The World Bank).
- [2] Samad, I., Kelkar, N., & Krishnaswamy, J. (2022). Life at the borderline: Responses of Ganges river dolphins to dry-season flow regulation of river and canal habitats by the Farakka barrage. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 32(2), 294-308.
- [3] Sousa, R., Teixeira, A., Benaissa, H., Varandas, S., Ghamizi, M. & Lopes-Lima, M. (2019). Refuge in the sāqya: Irrigation canals as habitat for one of the world's 100 most threatened species. *Biological Conservation*, 238, 108209. <https://doi.org/10.1016/j.biocon.2019.108209>
- [4] Ağırlioğlu, N. (2004) Baraj ve Planlama Tasarımı Cilt I, Su Vakfı Yayınları İstanbul, Özener Matbaacılık.
- [5] Turkish Regulations. Regulation on Surface Water Quality Management. Official Gazette Dated December 31, 2004. Number: 25687, <http://suyonetimormansu.gov.tr>.
- [6] Turkish Regulations. Regulation on Surface Water Quality Management. Official Gazette Dated April 15, 2015. Number: 29327, <http://suyonetimormansu.gov.tr>.
- [7] SKKY (Su Kirliliği Kontrol Yönetmeliği). Water Pollution Control Regulation. Published Official Journal; Date: 31.12.2004, Number: 25687, 2004
- [8] Hauraki District Council, (2003). Water Quality Parameters: Chemical and Physical Factors Influencing Water Quality in Rivers and Streams. New Zealand: Hauraki District Council.
- [9] Allan, J.D. (1995). Stream ecology structure and function of running waters. London: Kluwer Academic Publishers.
- [10] Lewis, D.J., Tate, K.W., Dahlgren, R.A. & Newell, J. (2002). Turbidity and total suspended solid concentration dynamics in stream flow from California oak woodland watersheds. United States Department of Agriculture Forest Service, General Technical Reports PSW-GTR-184, 107-118.
- [11] Ünlü, A., Çoban, F. ve Tunç M. S. (2008) Hazar Gölü su kalitesinin fiziksel ve inorganik kimyasal parametreler açısından incelenmesi, Gazi Üniversitesi Mühendislik-Mimarlık Fakültesi Dergisi, 23(1), 119-127.