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CURRENT SITUATION OF RECREATIONAL FISHERIES IN KEBAN DAM LAKE (ELAZIĞ-TÜRKİYE)

ABSTRACT

Between July and November 2023, a total of 184 face-to-face surveys were conducted three times a month in the fishing cooperatives of Ağın, Aydıncık, Çemişgezek, Keban, Kemaliye, Pertek, Uzunova, and Yurtbaşı, located around Keban Dam Lake. The ages of amateur fishermen ranged from 25 to 72, with an average age of 48.2±11. Most participants were aged between 55–60. Of the surveyed anglers, 52.5% held an amateur fishing license, while 47.5% did not. University graduates made up the largest educational group (57.9%), followed by high school graduates (24.6%). A statistically significant relationship was found between education level and possession of a fishing license ($p<0.05$). In terms of experience, 44.2% of participants had been fishing for 25–30 years, and 12.3% had 15–20 years of experience. Regarding regulatory oversight, 76.0% reported being inspected by institutions during fishing activities, while 24.0% had never been inspected. The Gendarmerie was the most common inspecting authority (56.8%), followed by the Ministry of Agriculture and Forestry (14.8%). Among those inspected, 95.4% stated they had never been penalized. These findings highlight the significant recreational and tourism potential of recreational fisheries in Turkey’s inland waters. To support sustainable fishing practices, further research and policy development in recreational fisheries are recommended.

Keywords: Recreational Fisheries, Keban Dam Lake, Sustainable Fishing, Control Status,

1. INTRODUCTION

Fishing has always taken place in every area of the world in the development process extending from the ancient times to the present and has been an important food source evaluated both in the economic sector and as a food source. From the ancient times to the present, natural resources available in the marine and inland waters have been used for purposes such as fishing, aquaculture, amateur fishing and fishing tourism [1]. The most important condition for benefit from a wide variety of aquatic products found in the marine and inland waters in sufficient quantities is the development and implementation of appropriate economic fishing methods. The increasing importance of aquatic products as human food in the world and in our country and the desire for a balanced, healthy diet with the increasing population necessitate the catching, obtaining and consumption of aquatic

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products and the necessity of continuously benefit from this rich protein source in a sustainable manner has become mandatory [2].

Within natural resources management, recreational fisheries are considered one of the most difficult areas. The complexity of the ecological and socio -economic effects of natural resources makes the management of this area quite difficult. In recent years, there have been increasing concerns about sustainability and recreational fisheries management as well as the protection of natural fish stocks. Efforts to achieve maximum efficiency by restricting fishing efforts for the purpose of managing recreational fisheries areas and fishing gear have become widespread [3].

As people's level of well-being increases, they spend more time and money on entertainment, leisure activities, and sports. Amateur fishing, practiced in harmony with nature, is among the most popular recreational activities in many coastal countries [4 and 5].

Despite the increasing interest of amateur anglers, studies on the effects of recreational fisheries in marine and freshwater on aquatic environments have been limited. However, in developed countries, it makes significant contributions to the economy as well as the social structure. It is estimated that there are approximately 700 million amateur anglers in the world. In this context, better understanding and management of the effects of amateur fishing is of critical importance for the development of sustainable fisheries policies [2 and 5].

Recreational fisheries has become an important tourism market that provides economic, environmental and social benefits [1, 6, 7 and 8]. These benefits include job creation, income generation from fishermen's expenses, and protection of aquatic diversity through the catch-and-release fishing technique that allows more fish to survive [4].

According to studies conducted worldwide, it is known that problems originating from recreational fisheries as well as commercial fishing occur in aquatic environments. Laws previously made on commercial fishermen have recently been made on recreational fisheries. There are problems originating from commercial and recreational fisheries, which significantly affect aquatic life in both marine environments and fresh waters. While significant progress has been made in our country regarding commercial fishing in terms of both legal and operational aspects, studies on newly developing recreational fisheries have been limited [5].

In this study, it was aimed to determine the current status, potential, socio-demographic characteristics and problems of recreational fishing.

2. RESEARCH SIGNIFICANCE

This study provides a comprehensive analysis of the socio-demographic characteristics, fishing practices, and regulatory awareness of amateur anglers in the Keban Dam Lake region. By surveying 184 individuals across eight fishing cooperatives, the research offers statistically robust insights into the current state of recreational fisheries in inland waters of Türkiye. The findings reveal significant correlations between education level and possession of fishing licenses, as well as between fishing experience and travel behavior, contributing to a deeper understanding of recreational fishing dynamics. Given the limited number of studies focusing on freshwater recreational fisheries in Türkiye, this research fills a critical gap in the literature. It highlights the economic and tourism potential of amateur fishing and underscores the need for sustainable management practices. The study also emphasizes the importance of

regulatory oversight and public awareness, suggesting that increased education and policy development could enhance compliance and conservation outcomes. These insights are valuable for shaping future fisheries policies and promoting sustainable recreational fishing in inland ecosystems.

Highlights

- A total of 184 amateur anglers were surveyed across eight cooperatives in Keban Dam Lake, providing a statistically significant sample.
- University graduates represented the largest educational group (57.9%), with a strong correlation to license ownership ($p<0.05$).
- The majority of anglers had 25–30 years of fishing experience, indicating long-term engagement with the activity. 76% of participants reported being inspected during fishing, with 95.4% stating they had never been penalized, reflecting high compliance.

3. MATERIALS AND METHODS

3.1. Place of Research

This study was conducted in the Keban Dam Lake in Ağın, Aydıncık, Çemişgezek, Keban, Kemaliye, Pertek, Uzunova and Yurtbaşı fishing cooperatives, three times a month, for a total of 15 questions face-to-face surveys between July 2023 and November 2023. The fishing areas where the research was conducted are given in Figure 1.

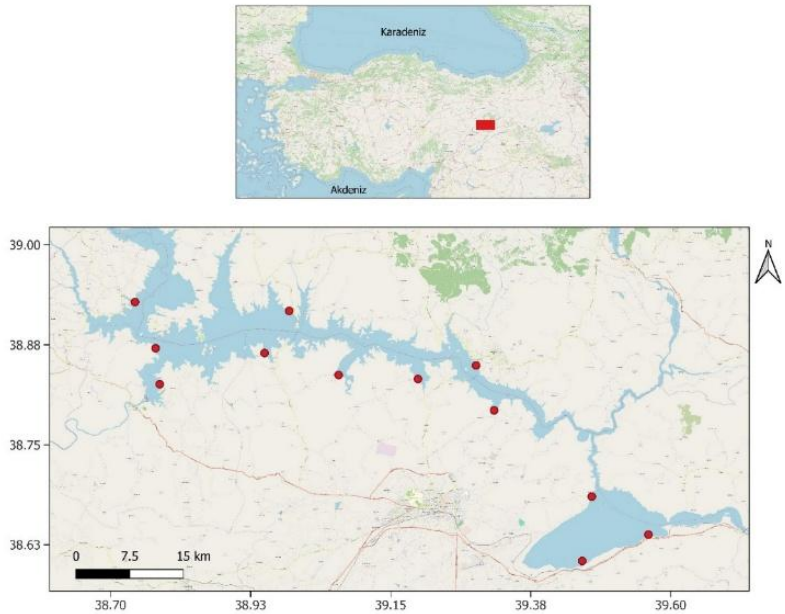

Figure 1. Keban Dam Lake where the research was conducted

3.2. Research Model

The sample of the study was a voluntary survey conducted with amateur anglers on the shores of Keban Dam Lake. Since amateur fishermen usually catch on weekends, weekends were generally chosen as working days. The number of surveys conducted was calculated with the formula below, with a 90% confidence level and a 10% margin of error and a 50% incidence rate.

$$n = (\llbracket Nt \rrbracket ^2 pq)/(d^2 (N-1)+t^2 pq)$$

n: Number of Individuals to be Sampled
p : Frequency of the Event (50%)
q : Frequency of Omission of the Event (50%)
t : 1.96
d : 0.05 sampling error
N: The number of individuals with amateur fishing licenses in Keban Dam Lake.

It constituted the main population. In determining the main population, the official records of the Elazığ and Malatya Provincial Directorates of the Ministry of Agriculture and Forestry of the provinces bordering the Dam Lake were taken as basis. The study was structured based on 2500 people obtained from official records. In this context, the minimum number of surveys to be conducted within the foreseen confidence intervals was calculated as 67.

3.3. Current Status

Questions such as the number of amateur fishermen, fishing license status, fishing gear and equipment used for catching, bait preferences, catching time and duration, type of fishing, motivation for starting amateur fishing, and fishing experience were asked.

3.4. Socio Demographic Characteristics

It includes questions such as the province where the amateur fisherman lives, gender, age, marital status, education, profession, monthly income, number of children and household members, social security, problems/expectations related to recreational fisheries, etc.

3.5. Collection of Data

In the survey and field data collection, a total of 15 field studies were conducted in Keban Dam Lake between July 2023 and November 2023, 3 times a month. Since amateur fishermen usually catch on weekends, working days were generally selected as weekends. After applying the random sampling method, information about the socio - demographic structure of amateur fishermen was also obtained.

3.6. Analysis and Evaluation of Data

During the research process, the obtained data were first subjected to descriptive statistical evaluation, and categorical variables were presented as numbers and percentages, and continuous variables were presented as minimum, maximum and mean (± standard error) values in tables and figures. The Shapiro-Wilk test was used to determine whether the data were normally distributed. The t-test was used in one-to-one comparisons of data showing normal distribution, and the Wilcoxon test was used for those not showing normal distribution. Chi-square and Fisher's exact tests (in case the number of observations was insufficient) were used to compare categorical variables with each other. All statistical values were analyzed at a significance level of $p<0.05$ in [6].

4. FINDINGS

4.1. Age Distribution of Amateur Fishermen

Range of amateur anglers was determined as 25-72 and the average age was calculated as 48.2±11. It was observed that the highest number of fishermen were in the 55-60 age group. The fact that all of the participants were male shows that amateur anglers are mostly preferred by men. In terms of education level, it was determined that 57.9% of the participants were university graduates. 88% of the fishermen participating in the study were married and the highest occupational

group was private sector employees (51.4%). A statistically significant difference was found between education level and amateur fishing license holder ($p<0.05$), and it was observed that the rate of having a license increased as the level of education increased (Figure 2 and Table 1).

4.2. Gender Distribution of Amateur Fishermen

Included in the study were men.

Table 2. Socio-demographic characteristics of amateur anglers who participated in the survey

City	N	Percentage (%)	Job	N	Percentage (%)
Adiyaman	2	1.1	Lawyer	1	0.5
Ankara	1	0.5	Retired	36	19.7
Diyarbakir	14	7.7	Officer	52	28.4
Elazig	110	60.1	Private Sector	94	51.4
Gaziantep	3	1.6	Number of Children	N	Percentage (%)
Kayseri	2	1.1	0	33	18.0
Malatya	45	24.6	1	15	8.2
Sivas	6	3.3	2	75	41.0
Marital Status	N	Percentage (%)	3	38	20.8
Married	161	88.0	4	14	7.7
Single	22	12.0	5 and above	8	4.4
Educational Status	N	Percentage (%)	Vehicle Owner	N	Percentage (%)
Primary education	17	9.3	Yes	148	80.9
High school	45	24.6	No	35	19.1
Literate	11	6.0	Home owner		
Middle school	4	2.2	Yes	127	69.4
University	106	57.9	No	56	30.6
Social Security	N	Percentage (%)	Boat Lengths (cm)	N	Percentage (%)
Bag-Kur	19	10.4	330	10	13.3
Retired	14	7.7	360	16	21.1
Pension fund	44	24.0	400	2	2.6
SSK	106	57.9	430	1	1.3
Catching by Boat	N	Percentage (%)	460	9	11.8
Yes	99	54.1	495	35	46.1
No	84	45.9	500	3	3.9
Boat Owner	N	Percentage (%)	Annual catching day	N	Percentage (%)
Friend or family	49	64.5	2	16	8.7
His Own Boat	27	35.5	5	10	5.5
			10	69	37.7
			12	2	1.1
			15	36	19.7
			16	10	5.5
			20	14	7.7
			25	18	9.8
			60	8	4.4

Table 3. Socio-economic indicators of amateur anglers who participated in the survey

Document Status	N	Percentage (%)	Association Membership	N	Percentage (%)
Yes	96	52.5	Yes	72	39.3
No	87	47.5	No	111	60.7
Should Licensing Be Mandatory?	N	Percentage (%)	Notification Information	N	Percentage (%)
Yes	58	31.7	Yes	133	72.7
No	125	68.3	No	50	27.3
Is the Circular Sufficient?			Has the circular been read?	N	Percentage (%)
Yes	16	8.7	Yes	143	78.1
No	26	14.2	No	31	16.9
I have no idea	141	77.0	Partially	9	4.9
Catching contrary to the circular	N	Percentage (%)	Reasons for doing amateur fishing?	N	Percentage (%)
Yes	15	8.2	To relax	37	20.2
No	168	91.8	Hobby	55	30.1
What to do with the caught fish?	N	Percentage (%)	Sporty	67	36.6

I Just Consume	123	67.2			
Consumption and Catch and Release	52	28.4	Audit Status	N	Percentage (%)
Just Catch and Release	8	4.4	Yes	139	76.0
Consumption	24	13.1	No	44	24.0
Supervisory Authority	N	Percentage (%)	Penalty status	N	Percentage (%)
No	44	24.0	Yes	8	4.6
Gendarme	104	56.8	No	167	95.4
Police	8	4.4			
Ministry of Agriculture and Forestry	27	14.8			
Curiosity Result	34	18.6	How many people do you catch with?	N	Percentage (%)
For consumption purposes	16	8.7	1	5	2.7
Group members			2	16	8.7
Relative	8	4.4	3	75	41.0
Friends	156	85.2	4 and above	87	47.6
Family and friends	19	10.4	Do you catch at sea?	N	Percentage (%)
Private Game Reserve Request	N	Percentage (%)	Yes	24	13.1
Yes	176	96.2	No	141	77.0
Partially	7	3.8	Partially	19	9.8
Catching Style			Catching Time	N	Percentage (%)
Shore	102	55.7	Mid-week	25	13.7
Boat	81	44.3	Weekend	143	78.1
The most efficient technique	N	Percentage (%)	Always	15	8.2
Shore	120	65.6	Catch Time	N	Percentage (%)
Boat	63	34.4	Evening	53	29.0
Gear choice			Night	16	8.7
Spoon- Spinner	125	68.3	Every hour	15	8.2
Shaking (Pulley)	58	31.7	Morning	99	54.1
Food preference	N	Percentage (%)	Target Species	N	Percentage (%)
Natural Feed	31	16.9	*Oncorhynchus mykiss*	9	4.9
Artificial Bait	152	83.1	*Cyprinus carpio*	86	47.3
Catching time during the day	N	Percentage (%)	*Arabibarbus grypus*	24	13.2
2	14	7.7	*Luciobarbus esocinus*	63	34.6
3	13	7.1	Fisherman in the Family	N	Percentage (%)
5	19	10.4	Father	9	5.7
6	13	7.1	Children	25	15.7
9	16	8.7	Other	51	32.1
10	74	40.4	Wife	74	46.5
12	22	12	Travel Status	N	Percentage (%)
16	7	3.8	Daily	66	37.5
20	3	1.6	With accommodation	110	62.5
48	2	1.1			

In this study, the highest numbers of participants among the amateur fisheries in Keban Dam Lake were from Elazığ province (60.1%), while Malatya province was in second place (24.6%) (Table 1). Among individuals with a high school education, the majority are in the 25–40 age group, totaling 35 people. This suggests that high school graduates are predominantly younger adults. A smaller number, 10 individuals, fall into the 41–60 age range, and none are aged 61–75, indicating that this education level is less common among older participants. Those with a middle school education are very few in number. Only 3 individuals are aged 25–40, and just 1 is aged 61–75. This limited representation may reflect either a smaller population with this education level or a trend toward higher education in

younger generations. Participants with primary school education are mostly older. A significant portion—20 individuals—are in the 61–75 age group, while 8 are aged 41–60. There are no individuals in the 25–40 group, highlighting a generational shift where younger individuals tend to have more formal education.

The largest and most diverse group is those with a university education. Most university graduates are in the 41–60 age group, with 92 individuals, followed by 13 in the 25–40 group, and only 1 in the 61–75 group. This distribution reflects the widespread attainment of higher education among middle-aged adults and a growing trend among younger individuals (Figure 3).

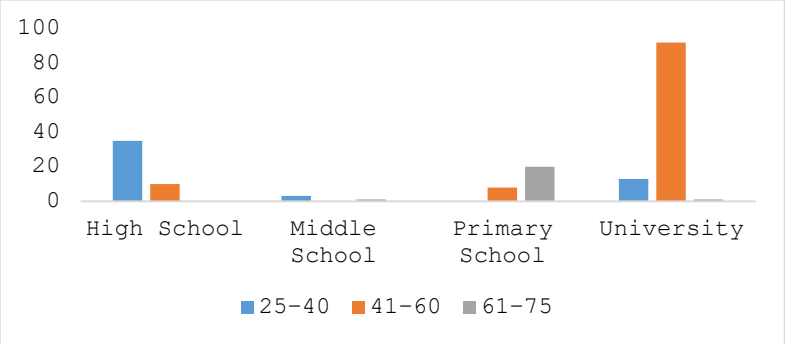

Figure 2. Educational status of amateur fishermen

Individuals with 0–10 years of fishing experience are primarily in the 41–60 age group, with 15 people, and only 2 in the 25–40 group. Interestingly, there are no individuals aged 61–75 in this category. This suggests that amateur fishing is often taken up during middle age, and fewer older individuals are new to the activity. In the 11–20 years' experience category, the distribution is more balanced. There are 16 individuals aged 25–40, 21 aged 41–60, and 7 aged 61–75. This indicates that many people who begin fishing continue the hobby for at least a decade or two, spanning across all age groups. The 21–30 years' experience group is the largest and most diverse. It includes 33 individuals aged 25–40, 48 aged 41–60, and 8 aged 61–75. This reflects that fishing is a long-term pursuit for many, especially among middle-aged adults, and that some younger individuals have already accumulated substantial experience. Fishers with 31–40 years of experience are mostly in the 41–60 age groups, with 26 individuals, and 2 in the 61–75 groups. There are no individuals in the youngest age group, which is expected given the length of experience. This group represents seasoned hobbyists who have maintained their interest over decades. Finally, those with more than 40 years of experience are exclusively in the 61–75 age group, with 5 individuals. This highlights a small but dedicated group of lifelong anglers who have been practicing amateur fishing for most of their lives (Figure 4).

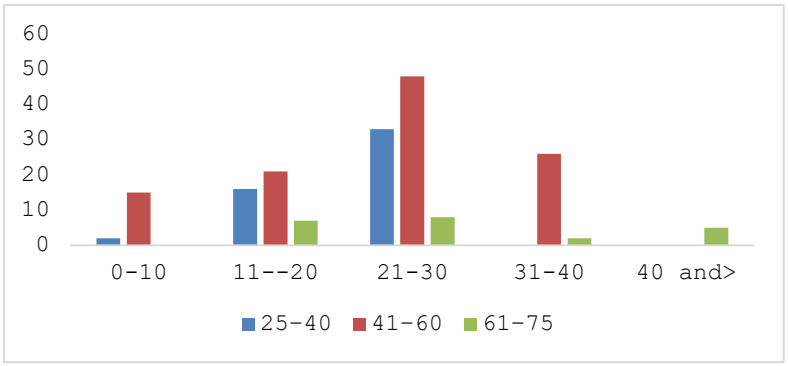

Figure 3. Fishing experience of amateur fishermen (years)

Participants with less fishing experience (0–10 years) tend to prefer shorter trips, with most reporting day trips rather than overnight stays. This pattern suggests that newer anglers may be exploring the hobby casually or locally, without committing to extended travel. As fishing experience increases to the 11–20-year range, there is a noticeable shift toward more frequent overnight stays, indicating a deeper engagement with the activity and possibly travel to more distant or specialized fishing locations. In contrast, those with 21–30 years or more of experience show a strong preference for overnight fishing trips, often combining their hobby with travel and extended stays. This trend continues among the most experienced anglers (31–40 years and above), who almost exclusively report overnight travel, reflecting a lifestyle where fishing is not just a pastime but a well-integrated part of their routine. These findings highlight how fishing experience correlates with travel habits, with seasoned fishers more likely to invest time and resources into longer, more immersive fishing excursions (Figure 5).

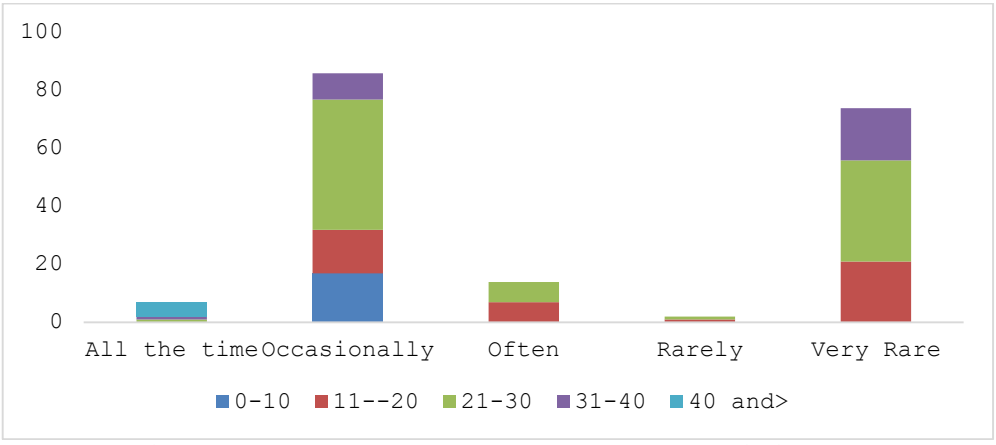

Figure 4. Travel status of survey participants

5. DISCUSSION AND CONCLUSION

Fieldwork was conducted three times per month, totaling 15 sessions, between July and November 2023. The surveys were carried out in the fishing cooperatives of Ağın, Aydıncık, Çemişgezek, Keban, Kemaliye, Pertek, Uzunova, and Yurtbaşı, all located around the Keban Dam Lake. Using a random sampling method, data were collected to assess the social and demographic characteristics of recreational anglers. The study is grounded in the principle that fish caught through recreational fisheries are not sold and that there is no commercial intent. Although numerous studies on recreational fishing

exist globally, this research contributes to the understanding of the local context. [3, 4, 12 and 13], studies on its economy in our country are limited [8, 14 and 15].

While the studies conducted were conducted on recreational fisheries in the sea, studies in freshwater were limited [14, 16 and 17]. As a result of the field studies, a total of 184 people were surveyed, and this number is quite high within the determined confidence intervals and is quite good in terms of the reliability of the results. Compared to similar studies, a significant number of people were reached [14, 18 and 19].

The socio -demographic characteristics of amateur anglers in Çanakkale province and their knowledge about amateur fishing using a 63-question face-to-face survey. As in other studies, 85 percent of amateur anglers were determined to be male. 58 percent of the participants were between the ages of 26-35 [5]. In this study, a similar percentage (62%) was between the ages of 26-35. Again, in the study conducted in Çanakkale province [5], while 48% of amateur anglers graduated from high school, this study found that 57.9% were university graduates. The high rate of university graduates over the years is thought to indicate an increase in interest in recreational fisheries with the university graduation rate in our country. Again, in the study conducted in Çanakkale province [5], while the amateur anglers' amateur angler certificate status was 22%, in this study, the percentage of those who had a certificate was 52.5%. It is thought that there is an increase in educational status with amateur angler certificate status. In the study conducted in Çanakkale province, 48% of the graduates were at high school level and 78% did not have an amateur angler certificate [5]. In this study, all of the participants were male and 62% were between the ages of 26-35.

Table 4. A comparative analysis of individuals participating in recreational angling based on various variables

Parameters	[10]	[11]	[7]	[12]	[8]	This study
N	50	100	74	2045	95	184
Research Area	Yalova	Izmir Bay (Sea)	Elazig	Turkey Inland Waters (Online)	Tunceli	Keban Dam Lake
Gender	-	Male (94%)	Male (94.6%)	Male (99.9%)	Male (87%)	Male(100%)
Age range	Over 51 years old (45%)	25-50 (64%)	21-40 (62.2)	25-35 (39.2%)	26-30 (39.1%)	55-60 (15%)
Marital Status	-	Married (76%)	Married (67.6)	Married (76.7%)	-	Married (88%)
Educational Status	-	University (38%)	University (43.2%)	High School (40.6%)	Secondary education (57.7%)	University (57.9%)
Reason for Choosing Fishing	-	Amateur (50%)	Hobby (95.9%)	-	-	Sporty (52.5%)
Document status	100%	(32%)	5.4%	-	-	52.5%
Fishing experience	-	Less than 60 months (32%)	49 months and above (40.5%)	4-7 years (19.7%)	10 years and below (76.2%)	25-30 (44.2%)

In a study conducted online nationwide [12], it was reported that 50.2% of the fishing species were caught with bottom fishing rods, while in this study, it was reported that 68.3% were caught with spoon - spinners . It is thought that the increase in the rate of those who catch with spoons and spinners from bottom fishing rods over

time is due to a more enjoyable form of fishing. Accordingly, recreational fisheries in our country's inland waters has an important tourism potential both economically and socially. There is a need to record information on how much fish is caught from the stock along with economic indicators. In terms of sustainable fishing, studies on recreational fisheries in our country's waters should be increased.

This study has provided important data on the socio -demographic structure, fishing methods and usage patterns of the fish caught by amateur anglers as a result of the surveys conducted in Keban Dam Lake. The results of the study fill an important gap in this field, considering that the research conducted on freshwater fishing in Turkey is limited. When compared to other studies conducted throughout the country, it is seen that the rate of obtaining an amateur angler certificate increases as the level of education increases. In addition, the preference for sportier methods such as spoons and spinners instead of bottom fishing rods over time shows that fishing habits have changed. In addition, it is revealed that recreational fisheries should be further investigated and managed in Turkey in terms of economic and tourism potential.

In this context, more scientific studies should be conducted on recreational fisheries in freshwater ecosystems to ensure sustainable fishing. Education programs and awareness campaigns should be organized to raise awareness among amateur fishermen and minimize their impact on the ecosystem. In particular, encouraging policies should be developed to control invasive species and recorded fishing data should be collected regularly. In addition, more comprehensive economic analyses should be conducted to determine the economic contribution of freshwater fisheries and the benefits of amateur fishing to the local economy should be examined in detail. In this context, policies that will increase both environmental sustainability and economic contribution should be developed to ensure better management of freshwater fisheries in Türkiye.

NOTICE

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CONFLICT OF INTEREST DECLARATION

The authors declare that they have no known financial interests or personal relationships that could have influenced this work.

AUTHOR CONTRIBUTIONS

The study design, literature review, and data analysis were jointly done by Orhan FULİN and Tuncay ATEŞŞAHİN. Both authors approve the final version of the manuscript.

ETHICAL APPROVAL STATEMENT

The survey study was approved by the Fırat University Social and Human Sciences Research Ethics Committee 2022/12.

DATA AVAILABILITY DECLARATION

The data used in this study are available upon reasonable request from the corresponding author.

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