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A SOCIO-ECONOMIC ANALYSIS OF FISHERMEN IN IŞIKLI LAKE, DENİZLİ, TURKEY

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ABSTRACT

This study was carried out with 3 fishery cooperatives in order to investigate socio-economic conditions of fishermen and to make an economic analysis of fisheries in Işıklı Lake, Denizli, Turkey. Data of study were obtained using a questionnaire that composed of open-ended questions and was applied to the fisherman during 2011 fishing season. The questionnaire included questions about physical and technical properties of fishing boats, socio-economic structures of the fishermen, their opinions and expectations as well as economic parameters of the activity. Lengths and ages of fishing boats used varied between 5.00 and 7.30 m, and between 2 and 25 years, respectively. Average age of fishermen was 43 years. Average expense and gross income per fisherman were ₺6 498.00 and ₺16 105.00, respectively. Average annual income was calculated as ₺9 605.00.

Key words: Işıklı Lake, fisheries, socio-economic analysis, fishermen

IŞIKLI GÖLÜ (DENİZLİ/TÜRKİYE) BALIKÇILARININ SOSYO-EKONOMİK ANALİZİ

ÖZET

Bu çalışma, Işıklı Gölü balıkçılarının sosyo-ekonomik durumlarını ortaya koymak ve göldeki balıkçılığın ekonomik analizi amacı ile yapılmıştır. Çalışmada Işıklı Gölünde faaliyet gösteren 3 kooperatife üye balıkçılar ile görüşülerek elde edilen veriler değerlendirilmiştir. Ankette balıkçı teknelerinin fiziksel, teknik özellikleri ve balıkçıların sosyo-ekonomik yapılarına yönelik sorular yer almıştır. Işıklı gölünde avcılıkta kullanılan teknelerin boyları 5 m ile 7,3 m, yaşları 2-25 yıl arasında değişiklik göstermektedir. Işıklı Gölü'ndeki balıkçıların ortalama yaşı 43 olarak tespit edilmiştir. Işıklı Gölü'nde brüt hâsıla balıkçı başına 2011 yılında ortalama 16 105.00₺, toplam işletme masrafları ortalama 6 498.00₺ ve saf hâsıla ortalama 9 605.00₺ olarak hesaplanmıştır.

Anahtar kelimeler: Işıklı Gölü, balıkçılık, sosyo-ekonomik analiz, balıkçı

INTRODUCTION

Fisheries have an important place in the country economy with a contribution to healthy nutrition and employment creation, and high added-value. The primary resource of production in the fisheries sector that has a dynamic structure is the fishing (Çelikkale et al. 1999, Dartay et al. 2009). An increasing efficiency of fishing gears thanks to technological advances has led to an elevation of supply of fishery products with a cheap source of protein for human. However, recently it is acknowledged that a sustainable use of this resource is necessary since a considerable fishing pressure and treats of pollution and habitat change are evident. Until recently, fisheries management have been perceived as only conservation of fish stocks, but now it is expanded to include economic, social and environmental perspectives. A more comprehensive fisheries management includes several goals such as protection of fish resources and marine ecosystems, maximization of economic benefits derived from fishing and boost of crew wages (King 1995, Ünal 2011). These, however, necessitate investigating and monitoring biological and ecological characteristics of fisheries and socio-economic characteristics of the activity (Ünal 2011). The socio-economic characteristics of fisheries have been extensively

studied around the world, but there is a limited research in Turkey (Taşdan et al. 2010). Moreover, since a significant part of this limited effort has been directed to marine, investigation of socio-economic characteristics of inland fisheries is extremely scarce. Therefore this study was planned to determine social situations of fishermen and to make an economic analysis of fisheries in Işıklı Lake, Denizli, Turkey.

MATERIALS AND METHODS

Işıklı Lake is an aquatic area located in the boundaries of Çivril, Denizli. The lake is in the form of a dam lake as a result of infrastructure works by State Hydraulic Affairs (DSI). The lake covers an area of 64.53 km^2 with a maximum depth of 7 m and an altitude of 821 m. The Lake is fed primarily by its own groundwater sources, Akçay and Işıklı sources, two large branches of Gökgöl and Büyük Menderes River in the upper basin (Aygen and Balık 2005). Economic fish species of the lake are carp (*Cyprinus carpio* L. 1758), pike (*Esox lucius* L. 1758), silver crucian carp (*Carassius gibelio* Bloch 1782), *Chondrostoma meandrense* (Sense Elvira 1987), tench (*Tinca tinca* L. 1758) and chub (*Squalius cephalus* L. 1758) (Uysal et al. 2008). The face-to-face interviews were made with the fishermen using previously prepared questionnaire forms in 2011 fishing season. In order to increase interest in the survey, small promotional items were distributed to the respondents. A total of 64 fishermen who were member of 3 fisheries cooperatives were the main target people for the study. With 90% confidence interval and 10% error margin, total sampling number was determined using the following formula (Elbek et al. 2006).

$$n=\frac{N.t^2.p.q}{d^2.(N-1)+t^2.p.q}$$

$$n=\frac{147.1{,}645^2.0{,}50.0{,}50}{0{,}10^2.(147-1)+1.645^2.0{,}50.0{,}50}=32$$

Where, N is the main people, d is the sampling variance, t is t table value for 0.10 (1.645), p is likelihood (0.50) and q is unlikelihood (0.50). Data collected were arranged using the worksheets of MS Office 2007 Excel. All statistical analysis including indices, frequency distribution, arithmetic means and descriptive statistics were conducted with a statistical software of IBM® SPSS® Statistic Version 20.

RESULTS

All of members of the 3 fisheries cooperatives were man. More detailed evaluation will be made further.

Technical Properties Fishing Gears

Lengths of boats used in fisheries ranged from 5.0 to 7.3 m. But much of the boats with 43.75% varied between 6.6 and 7.0 m (Table 1). All of the fishing boats were made of wood- fiberglass. It was determined that the boat ages were between 2 and 25 years. In the lake 78.12% of the boats were under 15 years. The oldest group of the boats with 6.25% was within an age range of 21-25. All of boats used in the lake consisted of an engine. Engine powers of the boats were between 9.00 and 13.00 HP. Engines of 59.38% of the fishing fleet were 9-10 HP. Properties of the fleet are given in Table 1.

Table 1. Technical properties of fishing fleet in Işıklı Lake

Properties of fishing fleet	Class Interval	Frequency	Percentage
Length (m)	5.0-5.5	4	12.50
	5.6-6.0	3	9.38
	6.1-6.5	2	6.25
	6.6-7.0	14	43.75
	7.0-7.5	9	28.13
Age (year)	0-5.0	7	21.87
	6-10	6	18.75
	11-15	12	37.50
	16-20	5	15.63
	21-25	2	6.25
Engine power (HP)	9	6	18.75
	10	13	40.63
	12	2	6.25
	13	11	34.38

Types of the nets that the fishermen used were trammel and gill-nets. Total lengths of the active nets per fisherman changed between 1 600 m and 7 500 m with an average value of 3 610 m. Average cost of the net was calculated as ₺6 309.00. Majority of the net sizes of the fishermen (56.26%) was shorter than 3500 m (Table 2).

Table 2. Distribution of the nets lengths used by the fisherman in Işıklı Lake (%)

Total net length (m)	Frequency	Percentage
1 500-2 500	9	28.13
2 501-3 500	9	28.13
3 501-4 500	6	18.75
4 501-5 500	5	15.63
5 501-6 500	1	3.13
6 501-7 500	2	6.25

Socio-Economic Properties of the Fishermen

Looking at the age distribution of the fishermen revealed that despite a highly common activity for all age classes considered, middle age groups appeared to be more involved in fisheries. The fishermen ages varied between 26 and 64 with an average of 43 years old. Majority of the fishermen (50.01%) were between 31 and 40 years old. It was found that 93.75% of the fishermen were married. The proportion of divorced fishermen was 3.12%. Fisheries were the main source of livelihood of the fishermen with 81.25%. Additional occupations were agriculture (37.5%) and agricultural laborer (9.38%). However, 53.12% of the fishermen had no another activity aside from fishing. Education level of fishermen was very low, 68.75% graduated from primary school, 25% from secondary school and 6.25% from high school. It was determined that while 66.67% of fishermen's wives were housewife, the remaining 13.33% were agricultural laborer. Majority of the wives (86.66%) were graduated from primary school. Number of the children ranged between 0 and 5 with a mean of 2.19. The highest class of children

Table 3. Demographic properties of fishermen in Işıklı Lake (%)

Demographic Properties	Class Interval	Frequency	Percentage
Fishermen ages (year)	26-35	10	31.26
	36-45	9	28.13
	46-55	8	25.00
	56-65	5	15.63
Education level	Primary school	22	68.75
	Secondary school	8	25.00
	High school	2	6.25
Fishermen's wife ages* (year)	21-30	5	16.67
	31-40	10	33.34
	41-50	10	33.34
	51-60	3	10.00
	61-70	2	6.67
Fishermen's wife educational level*	Primary school	26	86.67
	Secondary school	2	6.67
	High school	2	6.67
Number of children *	0	1	3.23
	1	7	22.57
	2	12	38.71
	3	8	25.81
	4	2	6.45
	5	1	3.23
Fishermen's children educational situation*	Preschool	9	13.24
	Primary school (Continued)	17	25.00
	Primary school (Graduated)	12	17.65
	Secondary school	7	10.29
	High school	22	32.35
	University	1	1.47

*Single fishermen were excluded

number was 2 with 38.71% whereas the least was 0 with 3.23%. Educational status of the fishermen's children was found as 13.24% preschool student, 25.00% primary school student, 17.65% graduated from primary school, 10.29% from secondary school, 32.35% from high school and 1.47% from university. Demographic properties of the fishermen are given in Table 3. Car and hours ownership percentages were 46.88% and 65.62% respectively. Having a social security system was common among the fishermen with 78.12%. From professional experience perspective in fisheries, 87.50% of the fishermen had more than 10 years (Table 4). Most of the fishermen (56.25%) had a previous job outside of fisheries, but 43.75% did not.

Table 4. Experience of the fishermen in Işıklı Lake (year) and (%)

Professional Experience (year)	Frequency	Percentage
0-9	4	12.50
10-19	13	40.62
20-29	9	28.13
30+	6	18.75

When it comes to reasons of selection of fishing as a profession, 56.25% stated there was no other option, 12.50% referred to father's profession, 25% pointed to sympathy and hobby for fishing and finally 6.25% noted a better gain (Table 5). Interestingly, although 93.75% of the fishermen did not have a plan to leave fisheries in future, almost all of them (96.88%) did not want their children to be a fisherman. Of the fishermen, 93.75% bought their boats with their own capital and the remaining 6.25% used a loan.

Table 5. Reasons for choosing fishing in Işıklı Lake (%)

Reasons for choosing fishing	Frequency	Percentage
Father's profession	4	12.05
No another option	18	56.25
Sympathy and hobby	8	25.00
Better gain	2	6.25

Economic Analysis of the Activity

Annual gross output of Işıklı Lake fishermen changed between ₺8 750.00 and ₺32 812.00 with an average of ₺16 105.00. Of the average gross output, 62.42% were gained from carp, 24.62% from pike and 12.96% from tench. In calculation of the operating costs, fixed and variables expenses of the fishermen were taken into account. The fixed costs included boat and tools depreciations and annual cooperative payments. The variable costs included annual boat and other vehicle fuel expenses, total annual food and beverage expenses, annual boat maintenance costs and renovation costs of the nets. Percentages of the operating costs are given in Table 6. A closer look at the costs showed that 78.79% of total expenses were variable and 21.21% were fixed. The largest share in the total costs was boat fuel (23.42%) whereas the lowest was boat amortization with 2.07% (Table 6).

Table 6. Distribution of annual expenditures of fishing boats in Işıklı Lake (%)

Expense Types	Expense amount (₺)	Percentage (%)
Fixed Costs	1 598	21.21
Net amortization	1 051	16.18
Boat amortization	135	2.07
Annual cooperative fee	192	2.96
Boat maintenance	220	3.39
Variable Costs	5 120	78.79
Renovation of the nets	1 484	22.84
Food and beverages	1 092	16.81
Other vehicles fuel costs	802	12.33
Annual boat fuel	1 522	23.42
Total Costs	6 498	100

Average fishing capital was ₺9 004.00 with a range of ₺4 100.00 and ₺15 500.00. Of the average fishing capital, 69.63% belonged to the nets and 30.37% to boat. Average net output was found as ₺9 605.00 with minimum ₺4 300.00 and maximum ₺24 041.00.

Thoughts and Expectations of Fishermen for Fisheries

When asked to the fishermen about what would be the future status of fishing, 68.75% expected a decrease, 25% no change and 6.25% an increase (Figure 1). The causes for a decrease in production amount were listed as 59.09% water pollution, 25.76% over fishing and 13.64% violation of fishing ban (Figure 2). The responses of the fishermen to what methods are more proper for preventing the reduction of catch amount were variable; 14.29% were in favor of decreasing the number of fishing days, 3.57% in favor of limitation of boat size, 60.71% in favor of reduction of the net amounts and 21.43% in favor of decreasing the number of fishermen (Figure 3). Answers to a question "what would you like to do if you are not a fisherman" were listed as trade (38.46%), public officer (33.33%), farmer (17.95%) and other profession (10.26%). In case of a suitable loan, 84.38% were willing to make an investment to the boat and nets. The respondents' views about the problems of the fisheries sector are presented in Table 7 and 8.

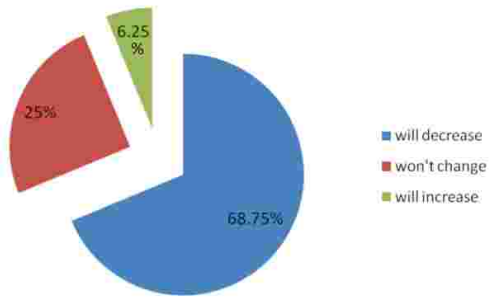

Figure 1. Expectations of the fishermen regarding amount of fisheries production (%)

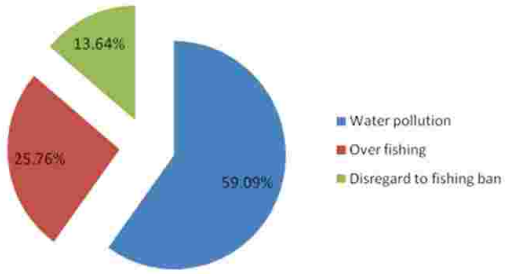

Figure 2. Expected reasons of lower amount of catch (%).

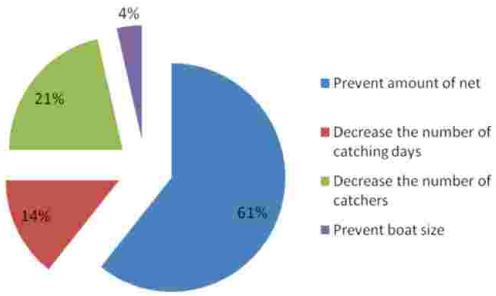

Figure 3. Suggestions by the fishermen for preventing of the production amount (%)

Table 7. Views of the fishermen about the sector problems (%)

Problems	Very important	Important	No idea	Unimportant	Negligible
Decrease of fish stocks due to overfishing	26.40	36.80	-	36.80	-
Organizational problems	31.25	34.38	-	34.38	-
Lake pollution and coastal constructions	56.25	18.75	15.63	9.38	-
Short fishing season	18.75	28.13	6.25	43.75	-
Low fish consumption	18.75	40.63	3.13	34.38	3.13
Unstable prices	65.63	21.88	3.13	9.38	-
Strong broker initiative in marketing	53.13	31.25	-	15.63	-
Ineffective co-operations	40.63	31.25	3.13	25.00	-
Insufficiency of fisheries sector	34.38	50.00	9.38	6.25	-
Transportation problems	21.88	9.38	-	68.75	-

Table 8. Regulational requests by the fishermen in terms of fisheries (%)

Regulations	Very important	Important	No idea	Unimportant	Negligible
Prevention of lake pollution	65.63	28.13	3.13	3.13	-
Prohibition of harmful fishing methods	50.00	37.50	-	9.37	3.13
Dissemination of social security in fisheries	75.00	25.00	-	-	-
Reduction of number of fishermen to fishable stock level	48.39	22.58	3.23	25.81	-
Optimization of fishing season with stocks	21.88	43.75	3.13	28.13	3.13
Encouragement of fish consumption by promotion and advertisement	31.25	40.63	12.50	15.63	-
Incentives (lower taxes, tax-exemptions, low-interest loans)	67.74	29.03	3.23	-	-
More training in fisheries	36.67	36.67	3.33	23.33	-
Modernization of fishing port, harbor and slipway	37.50	31.25	6.25	25.00	-
Development of fish processing industry	46.88	46.88	3.13	3.13	-
Stabilization of prices	68.75	31.25	-	-	-
More active cooperatives	62.50	28.13	-	9.38	-

DISCUSSION

Small-scale fisheries have difficulties in many parts of the world. One reason could be insufficient interests of scientists and decision-makers to small-scale fisheries (Ünal and Franquesa 2010, Ünal 2011). The present study covered technical and socio-economic characteristics of fisheries and the fishermen opinions and expectations for future fishing activities in Işıklı Lake. Lengths of the boats varied between 5.0 and 7.3 m. Because fishermen generally caught fish from their cooperatives fishing grounds and places that were close to the slipway, they did not need to travel for a long time. Therefore, preference of small boats with low-power engines by the fishermen seemed to be quite reasonable to minimize both depreciation and operating costs. Accordingly, in 59.38% of the boats a 9-10 HP engine with low fuel consumption were preferred. Of the fishermen, 56.26% had 1 600-3 500 m nets, which is convenient for carrying the nets to fishing area and bringing the catch to the shore. Çapkın et al. (2013) determined boat lengths as 5.00-8.50 m in Eğirdir Lake, Korkut et al. (2013) as 6.50-8.50 m in Beyşehir Lake, Soylu and Uzmanoğlu (2003) as 4.00-6.00 m in Durusu Lake and Soylu et al. (2004) as 3.00-9.00 m in İznik Lake. Engine powers were reported to change between 5.0 and 15.0 HP by the same literature. The reported values are consistent with our results. Most of the boats (61.7%) were made of wood and 40.4% of them were 1-7 years of age. The fishermen preferred wooden boat coated with pitch due to low cost of production, and easier maintenance and repair. Since disposal of the low cost boats appeared to be much easier by the fishermen upon completing their economic life, the lake fisheries had a relatively young fishing fleet.

Most of the fishermen were middle and older ages, suggesting that young people do not want to do fishing a profession. But the fact that no more fishing licenses are given by the Ministry of Food, Agriculture and Livestock Provincial Directorates can also play a role at this point. Çapkın et al. (2013) determined ages of fishermen as 21-77, Korkut et al. (2013) as 21-59, Soylu and Uzmanoğlu (2003) as 22-77, Soylu et al. (2004) and Ergüden et al.(2007) as 26-59 and Doğan (2009) as 27-64. These results are more or less similar to those of our study. In agreement with our findings, marriage rate were determined by Çapkın et al. (2013) as 96.42%, by Korkut et al. (2013) as 92.50%, by Ünal (2003) as 86.67%, by Soylu and Uzmanoğlu (2003) as 92.86%, by Doğan (2009) as 93.33% and by Dartay et al. (2009) as 87.09%.

Education level of the fishermen in Işıklı Lake was lower than those found by Çapkın et al. (2013) and Korkut et al. (2013). There was even a fisherman who had never gone to the school in our study area. Majority of the fishermen wives were housewives with a primary

school level education, being in harmony with the literature findings. Number children of the fishermen climbed to 5 in our study, which is similar to findings of Korkut et al. (2013) and Dartay et al. (2009), who reported maximum number as 4. On the other hand, Çapkın et al. (2013) reported the number as between 1 and 9 in Eğirdir Lake fishermen. It is thought these differences arise from variations of fishermen ages and regional differences. Educational status of the fisherman's children in Işıklı Lake appears to be higher than those found by Ergüden et al. (2007) and Uzmanoğlu and Soylu (2006), who reported lower percentages of high school and university graduates. Car and house ownership (46.88% and 65.62%) is within the range of those reported (23.60-66.67% and 54.30-83.33%) in the literature (Ünal 2003, Doğan 2009, Taşdan et al. 2010). Doğan (2009) found that social security percentage of the fishermen as 73.33% and Çeliker et al. (2006) as 72.08%, which are in parallel with our findings (78.12%).

The main impetus of the fishermen to do fishing was pointed out as no other job option in the present investigation. Moreover, they (96.88%) were not in favor of their children doing the same business. The later percentage was reported as 80% by Ünal (2011) and 86.40% by Taşdan et al. (2010). This could suggest that professional satisfaction and future expectation of the fishermen in Işıklı Lake are quite lower than the literature.

In the current study, percentages of boat and fishing gear capitals were 30.37 and 69.63% respectively, being highly different from the reported values. For instance, Doğan (1997) and Çeliker et al. (2006) pointed out those values with the same order between 45.45 and 63.99%, and 63.99 and 36.11%. Calculated gross income from fisheries activities was approximately ₺16 105.00 and cost was ₺6 498.00 per fisherman. Their average annual income was calculated as ₺9 605.00. Doğan (1997) calculated gross income from fisheries activities as approximately ₺36 167.00 and costs as ₺25 650.00 per fisherman. According to a study of Çeliker et al. (2006) in the Black Sea Region, gross income was approximately ₺93 788.00 and variable cost ₺65 337.00. Taşdan et al. (2010) calculated gross income from sea fisheries activities in the Mediterranean Region as approximately ₺61 528.00, variable costs as ₺38 268.00 and gross profits as ₺23 260.00. Çapkın et al. (2013) studied fisheries of Eğirdir Lake and calculated gross income as ₺14 105.00, total operating costs as ₺8 660.00 and net product as ₺5 444.00. Korkut et al. (2013) calculated gross income of Beyşehir Lake fisheries as ₺17 527.00, total operating costs as ₺9 402.00 and net product as ₺8 125.00. A comparison of the net income of the present study with the reported ones display that Işıklı Lake fishermen have a higher income. This is highly likely a result of the carp and pike fisheries which are consumed very much and sold at high prices. The fishermen mostly expect a decrease in amount of the lake production and pointed the water pollution as the main causative factor. The fishermen called attention to intensive activities of hunters around the lake that can cause a significant pollution and interference of water quality with scattered bullets and lead.

The fishermen were also complaining about several issues including insufficient control of fishing bans and recreational fishing, and high lake rent. In Işıklı Lake, 93.75% of fishermen did not think leaving fishing. The reason of this was they do not have another option. In line with this, 84.38% of fishermen were willing to invest in boat and nets in case of an appropriate loan. The fishermen of Işıklı Lake gave high importance to several problems including declining fish stocks due to over-fishing, lack of organization, pollution and coastal development, low fish consumption, insufficient fisheries industry, unstable prices, strong broker initiatives in marketing and insufficient cooperatives activities. In terms of fisheries regulations, the fishermen raised following issues; prohibition of harmful fishing methods, optimization of fishing season in accordance with the stock, increasing fish consumption through promotion and advertising, more subsidiaries (low tax exemptions, low-interest loans) implementation, training in fishing activities, modernization of fishing ports, harbor and slipway place, development of fish processing industries, more efficient cooperatives, establishment of price stability, expansion of social security in fisheries and prevention of lake pollution.

In a nutshell, the present results show that the fishermen of Işıklı Lake were middle-over-aged with a quite low level of education. Net income obtained from fishing was better compared with some other lakes. The observations made during the study revealed that the cooperatives were actively functioning in processes

of renting the lake but they were not interested in product marketing and procurement of the gears. Since during the summer season some of the water sources of the lake were dried plus DSI used the lake water for irrigation, water levels of the lake reduced to levels that fishing cannot be realized. This led to serious economic losses of the fishermen.

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