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RESEARCH PAPER

Are the Fishers of Lake Marmara Willing to Pay for a Sustainable Fishery Management?

Huriye Göncüoğlu Bodur[1,*], Melike Ayan[1], Mehmet Özcan[2], Zafer Tosunoğlu[1]

[1] Ege University, Fisheries Faculty, 35100, Bornova, İzmir, Türkiye.
[2] Gazi University, Faculty of Economics and Administrative Science, Econometrics Department, Ankara, Turkey.

* Corresponding Author: Tel.: +90.232 31112 99; Fax: +90.232 3111299;
E-mail: huriyegoncuoglu@gmail.com

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Abstract

This study, analyzing the sustainable use of fisheries in Lake Marmara, was conducted in Gölmarmara, a town of Manisa. The study makes use of contingent valuation method to calculate the monetary values which fishers who are actively using the lake are willing to pay in order for a sustainable use of the lake. For this purpose, data were collected through face-to-face interviews made with 55 of the 130 commercial fishers active in the lake. Variables affecting fishers' acceptance of extra payment were found to be: knowing the lake is a natural protection zone, education, experience in fishing, income, vessel ownership and retirement status. Of the 55 fishers interviewed, 96% (53 fishers) believe that the lake is under a threat in terms of fisheries while 50 fishers (90%) are willing to pay for the sustainability and improvement of the fisheries in the lake (18,681 TRY ($ 6,912) in total per year). The calculated willingness to pay (WTP) per fisher averages 143.7 TRY per year. With this study, fishers have proven that they will take on responsibility in creating the required data and budget to establish a sustainable fisheries management and prepare management plans.

Keywords: Lake Marmara, fisheries, willingness to pay, environmental valuation, sustainable use.

Introduction

Balance between nature-human relations has been disturbed to nature's disadvantage because of the problems related to human development. Increased pressure on natural resources has brought the fact to global agenda that imminent depletion of these resources has high costs. In this concept, use of environmental valuation methods are recognized as a guide in conveying the economical value of natural resources and establishing sustainable managements (Anderson & Bishop, 1985; Kula, 1994; Gürlük & Rehber, 2012).

Such threats, generally on wetlands, have drawn the attention of academic circles in Turkey in the last decade as seen in a considerable number of studies (Yazıcı & Şahin, 1999; Özesmi, 1999; Girgin, 2000; Karadeniz, 2000; Arı, 2003; Yiğitbaşıoğlu, 2003; Gündoğdu, Torusdağ & Sarıkaya, 2005; Çalışkan, 2008; Gürbüz, Karabulut & Korkmaz, 2008; Güney, 1992; Güney, 1995; Karadeniz, Tiril & Baylan, 2009). These studies have proven to be noteworthy contributions in the protection of wetlands, and some emphasized on the shortcomings of the Ramsar Convention in protection of such areas (Arı, 2006; Adams & Hutton, 2007; Adaman, Hakyemez & Hutton, 2009).

As a natural and sustainable resource, wetlands continue (Adger & Luttrell, 2000; Arı & Derinöz, 2011; Yeniyurt, Hemmami, Çağırankaya & Koopmanschap, 2011; Cağırankaya et al., 2013; Muluk et al., 2013) to be beneficial (Bond et al., 1992; Brouwer et al., 1999) since the early existence of the human race. One third of the human population use coastal wetlands in one way or another throughout their lives (Özen & Beklioğlu, 2007). There are almost 63 million hectars of wetlands on earth with a total value of more than $3.4 billion USD (WWF, 2004). Total wetlands in Turkey exceed 1 million hectars, half of which have been dried (Korkanç, 2004). It's estimated that, by 2030, almost all wetlands in the country will have been dried (İlhan, 2011).

In global studies made towards valuation of the benefits (both environmental and economic) of wetlands (Kramer & Eisen-Hecht, 2002; Earnheart & Smith, 2003; Narvud, 2008; Kaffashi et al., 2012), strategies on rational use of the resource are developed in accordance with the price regulations based on users' preference values. In Turkey, the studies on economic valuation of wetlands are limited (Gürlük & Rehber, 2009; Aydın, Tunca, Karadurmuş

& Durgun, 2013). Almost all natural resources without a management plan are at the verge of depletion. For a protected area to be able to serve all the benefits expected, it must be managed effectively. For such outcome, a management plan is required. (Gbadegesin & Ayiloka, 2000; Ostrovsky, 2003; Emerton, Bishop &Thomas, 2006; Alkan & Korkmaz, 2009; Yeniyurt et al., 2011; Ministry of Environment and Forestry, 2016).

In Turkey, wetlands are handled in a centralized approach, with conventional sense of mere protection. Although protected by law, these areas often lack effective management and control mechanisms (Güneş, 2011). Most of the areas are impossible to succeed in protecting without understanding that these areas are a whole with their users and/or people living around them, thus need their participation throughout planning, application and management stages. (Demirayak, 2006; Erdem, Erdoğan & Şengür, 2009; Güneş, 2011; IWMI, 2014). In terms of planning and management, these areas are generally treated in a strict and conservative manner which excludes the local population (Alkan & Korkmaz, 2009; Chatterjee, Philips & Stroud, 2008). This approach causes a conflict between the users of the resource and the decisionmakers in terms of set goals. Management plans almost always remain on paper (Alkan & Korkmaz, 2009). The participation of members during the preparation of the plans, which is asserted as a requirement in the EU Habitats Directives and Biodiversity Agreement, is now the basic principle in the protection of resources (Ministry of Environment and Forestry, 2016).

Experiences in wetland management plans in Turkey generally have revealed that top level support and cooperation have positive impact on application; that case studies contribute to improved capacities; and, in case of a successful participation, that different organizations have shown efforts in fulfilling their own responsibilities both on personal and financial basis (Yeniyurt et al., 2001).

Wetland management has proven successful thanks to shared responsibilites and financing resources. Financing is a foremost shortcoming in Turkey in terms of realizing wetland management plans. For most of the activities management plans to be enacted, sufficient financial resources should also be determined. In debates on financial resolution, it is adviced that various members should allocate suitable budgets for wetland management in line with their own professions (Yeniyurt et al., 2001; Emerton et al., 2006). The issue of finance owes to the fact that the budgets of the organizations to provide these services are rather tight and investments are expensive. One of the alternative approaches towards the resolution of financial issues is additional payments made by the users of these resources (Emerton et al., 2006).

The Lake Marmara has been declared a wetland protection area in 2008 by the General Directorate of Natural Conservation and National Parks. The lake is an important source for the local population (Arı & Derinöz, 2011). According to İlhan and Sarı (2013), among the factors adversely affecting the fisheries in the lake, the most important is excessive and illegal fishing. Government regulations on Lake Marmara are insufficient and a permanent management plan should be established instead of temporary solutions (Girgin, 2000).

In this study, contingent valuation method has been used to determine how much fishers are willing to pay from their incomes and the factors affecting this willingness in order to establish a sustainable use of the lake for fisheres. Determining the payments in this manner will both provide additional financial source for the proposed management plans and constitute a guide for budget estimations.

Methodology

Data Source: This study used primary data, which was gathered from face to face interviews with the fishers. The study was conducted between April-July, 2015. The primary data consists of the descriptive characteristics and perceptions of the fishers and the variables affecting their willingness to pay (WTP) for the sustainability and improvement of the fisheries in the lake.

Sampling area: Lake Marmara, which is located in Gölmarmara, a town in the city of Manisa where all of the 130 active commercial fishers are members of the S.S. Gölmarmara Su Ürünleri Kooperatifi, which is the only fisheries cooperative with a valid commercial fishing licence. The study was conducted in the villages Tekelioğlu, Hacıveliler, Gölmarmara and Yeniköy as shown in Figure 1.

Sample size: Face-to-face interviews were made with 55 fishers (n=55) selected from the 130 cooperative members (N=130) with simple random sampling. Fishers in the sampling were calculated by using the proportional sample size formula:

Consider estimation of the proportion C of individuals in a population size of N who possess a certain attribute. If necessary, variance, σ^2_C, of the sample proportion is specified, the required sample size to estimate was calculated based on the formula (Newbold, 1995; Miran, 2003):

$$n = \frac{NC(1-p)}{(N-1)\sigma_c^2 + C(1-C)}$$

where n is the sample size, N is the total population of target group, C is the contribution ratio (0.10 is fitted to reach sample size), and σ^2_C is the variance.

The possible value of this expression, whatever the value of C, is

$$n = \frac{0.25N}{(N-1)\sigma_c^2 + 0.25}$$

A 95% confidence interval for the population proportion will extend approximately $1.96\sigma_c = 0.10$ ($\sigma_c = 0.05102$) on each side of the sample proportion. So, the number of fishers to be sampled in the survey was found to be 55, with 10% error margin and 95% confidence interval. The total number of fishers interviewed was 55.

Data Analysis: In the study, WTP of fishers of Lake Marmara was analysed in terms of sustainable use of the lake for fisheries. The fishers were presented with the scenario: "A management plan is intended for the betterment of fisheries and sustainable use of the lake" and asked the question "Would you be willing to make a financial contribution to a fund raised for this purpose?" Such hypothetic scenarios provide us with an opportunity to measure the WTP of individuals for certain incidents. For this purpose, conditional valuation method was used to analyse the WTP of fishers. This method is helpful in finding out how much people are willing to contribute for environmental improvements such as creating clean water resources, establishing and improving protection zones, increasing fish stocks, etc. (Karabat & Atıs, 2012). WTP biases according to the individual's socio-economic status, demographical properties, ideas, experiences etc. (Reid-Grant & Bhat, 2009). These changes are calculated with various econometric models (Arin & Kramer, 2002; Togridou, Hovardas & Pantis, 2006; Reid-Grant & Bhat, 2009). Survey results were evaluated on Microsoft Excel, SPSS 13.0 and STATA 13.0.

Data collected and generated by the conditional valuation method were analyzed using Logit and Probit models. A dependent variable with 50 TRY ($19) limit has proven statistically meaningful. Many models were considered, containing the potential factors (independent variables) that could affect the WTP of fishers. Among those, the model containing the variables such as number of active fishers, knowing the area is a natural protection zone, education, retirement, income, experience and vessel ownership was found to be statistically meaningful. Variables used in Logit and Probit models to determine the factors affecting the WTP are shown in Table 1.

A binary variable takes two values which are 0 and 1, which may represent two different opinions like willing -not willing. Binary variables can be used as dependent or independent variables in a regression model. When used as dependent variable in linear regression, that model is called a linear probability model. Since Y is binary, it follows that:

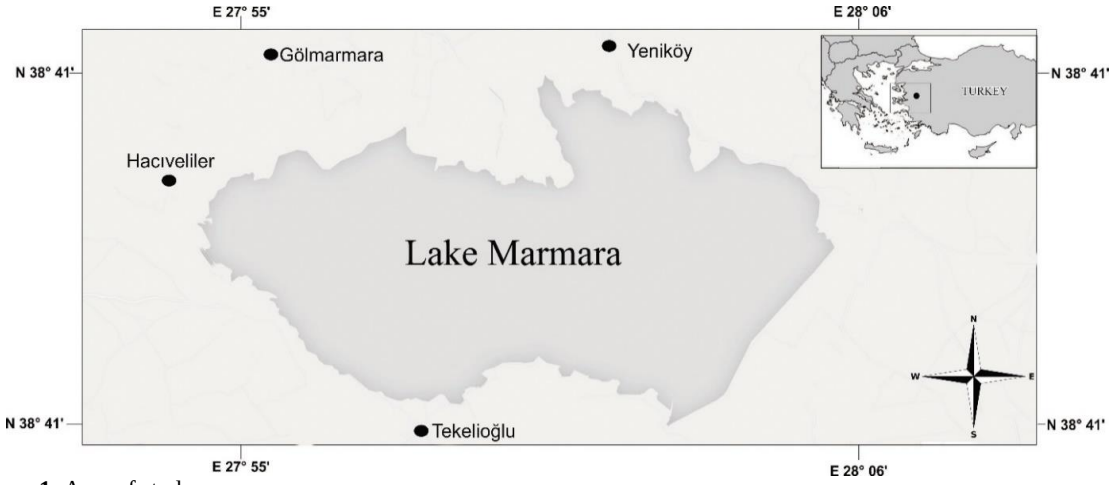

Figure 1. Area of study.

Table 1. Independent variables and descriptions used in Probit and Logit models
(Dependent variable: Willing to pay for sustainable use of the lake; Yes= 1, No=0)

Variable	Description
Number of employees	Number of crew on the vessel
Knowing the area is a natural protection zone	1=Yes, I know, 2=No, I don't know
Education	Level of education of fishers (years)
Retirement	Does the fisher have a pension from any form of social security program 1=Yes, 0=No
Income	Monthly income of the fisher from fishing only (TRY)
Experience	Experience in fishing (years)
Vessel ownership	Fisher owns a vessel 1=Yes, 0=No

$$P\left(Y=1\middle| X_{1i},...,X_{2i}\right)=\alpha_0+\alpha_1X_{1i}+\cdots+\alpha_kX_{ki}$$

The coefficient α_i is the change in the probability that $Y=1$ associated with a unit change in X_i holding constant the other regressors. Values of the estimated dependent variable are expected to get numbers which are placed between 0 and 1 for Model (1). However, linear probability model can not provide estimated dependent variable values that lie in (0,1) interval. Also, disturbance term of Model (1) no longer fits normal distribution. To handle these problems, linear probability model rearranges with standard normal cumulative distribution function or logistic cumulative distribution function (Kennedy, 2008). According to distribution function, model gets different names. The probit regression model uses the standard normal cumulative distribution function. Before setting Probit model, an unobservable utility index must be defined which is determined by explanatory variables:

$$I_i=\beta_0+\beta_1X_{1i}+\cdots+\beta_kX_{ki}$$

I_i relation with Y depends on threshold level of the index, call it I_i^*, such that if I_i exceeds I_i^* Y equals to 1, otherwise Y equals to 0. Under the assumption of normality, Probit model can be written as follows:

$$p_i=P\left(Y=1\middle| X_{1i},...,X_{ki}\right)=\Pr\left(I_i\geq I_i^*\right)=\frac{1}{\sqrt{2\pi}}\int_{-\infty}^{\beta_0+\beta_1X_{1i}+\cdots+\beta_kX_{ki}}e^{-t^2/2}dt$$

t is a standardized normal variable, $t\sim N(0.1)$. P_i shows probability of $Y=1$. (Gujarati & Porter, 2008). On the other hand, the Logit model takes advantages of logistic cumulative distribution function. Logit model can be expressed as:

$$p_i=P\left(Y=1\middle| X_{1i},...,X_{ki}\right)=\frac{\exp\left(\beta_0+\beta_1X_{1i}+\cdots+\beta_kX_{ki}\right)}{1+\exp\left(\beta_0+\beta_1X_{1i}+\cdots+\beta_kX_{ki}\right)}$$

or,

$$\text{logit}\left(p_i\right)=\log\left(\frac{p_i}{1-p_i}\right)=\beta_0+\beta_1X_{1i}+\cdots+\beta_kX_{ki}$$

According to Logit model Y has binomial $Bin\left(n_i,p_i\right)$ distribution. Also, logit term $\log\left(\frac{p_i}{1-p_i}\right)$ represents log of odds ratio, which means a ratio of the probability that $Y=1$ to the probability that $Y=0$. Because of nonlinear structure, these two models should be estimated with Maximum Likelihood method (Gujarati & Porter, 2008).

There is an important complexity about interpreting estimated coefficients of Probit and Logit models. An estimated $\hat{\beta}$ never tells the effect of related independent variable on probability of $Y=1$ directly. However, the Logit and Probit coefficients will still explain the direction and statistical significance associated with the effect of increasing an independent variable. Thus, a positive coefficient tells that an independent variable increases the probability that $Y=1$. If coefficient is significant, then it could be said that this positive effect will be statistically significant. If we need to see the magnitude of the effect of a change in X_i on $p\left(Y=1\right)$, calculating conditional marginal effects of each independent variable is useful. In the case of Probit, it can be written as:

$$\frac{\partial Y_i}{\partial X_k}=\frac{\partial\Phi\left(X_i\beta\right)}{\partial X_k}=\phi\left(X_i\beta\right)\beta_k$$

where ϕ is the probability distribution function of the standard normal cumulative distribution function (Φ). Therefore, the marginal effect of increasing X_k results in a change in Y of magnitude $\phi\left(X_i\beta\right)\beta_k$. In the case of Logit, marginal effects can be shown as:

$$\frac{\partial Y_i}{\partial X_k}=\frac{\partial\Lambda\left(X_i\beta\right)}{\partial X_k}=\lambda\left(X_i\beta\right)\beta_k$$

where λ is the probability distribution function of the standard logistic cumulative distribution function (Λ). The marginal effect of increasing X_k results in a change in Y of magnitude $\lambda\left(X_i\beta\right)\beta_k$. It can be seen that marginal effects depend on value of X. For this reason, there are two types of marginal effect calculation; one based on the marginal effects evaluated at the mean values of the explanatory variables ($\phi\left(\bar{X}_i\beta\right)\beta_k$ for Probit, $\lambda\left(\bar{X}_i\beta\right)\beta_k$ for Logit); and the other calculation uses the sample average of the marginal effects ($N^{-1}\sum_i\phi\left(X_i\beta\right)\beta_k$ for Probit, $N^{-1}\sum_i\lambda\left(X_i\beta\right)\beta_k$ for Logit) (Cameron & Trivedi, 2005; Winkelmann, 2008).

Choosing one of these binary dependent variable models for empirical study is another critical decision for researcher. There are some differences could be observed which are based on cumulative distribution function of the model. However, none of these models is clearly better than another. According to Kennedy (2008):

These two functions are very similar, and in today's software environment the choice between

them is a matter of taste because both are so easy to estimate. Logit is more common, perhaps for historical reasons and its lower computational cost made it more common before modern software eliminated this advantage.

As mentioned by Kennedy, computational costs may effect decision. Therefore, we chose to estimate two models and report both results. Also, because of the similarity of cumulative distribution functions, we expect to find very identical marginal effects from Probit and Logit model estimation.

Results and Discussions

Descriptive Statistics

Of the 55 fishers interviewed, average age is 53±10 (min. 33- max. 75) years, with an average fishing generations of 2±1 (min.0-max.3) in the lake. Number of dependent family members per fisher is 3±2 (min. 0-max. 6). 80% of the fishers are married. 27% earn their livings solely from fishing. 94% of the fishers do not want their children to do fishing as a job.

According to our study, S.S. Gölmarmara Su Ürünleri Kooperatifi has 130 commercial fisher members. However, İlhan, and Sarı (2013) had reported the number of vessel-owner fisher members to be 154 in 2013. 18% decrease in the number of fishers active in the lake in a 2-year period shows the adverse effects of the problems on the fisheries. This effect caused a reluctancy (94%) in young population against the job. According to the researches of Yiğit et al. (2009), average age of lake fishers of the city Sakarya is 40-49 at a ratio of 36.2%. Similarly, according to Dartay et al. (2009), ages of fishers in the Keban dam lake vary between 30 and 50 by 64.5%. However 40% of the fishers in Lake Marmara are over 50 years old. High average age and reluctancy of younger generations are the signs that fishing as a job in the lake is destined to diminish.

76% of the fishers are vessel owners. The average age of vessels used by fishers is 14±6 (min.2 – max. 25) years. Fishers spend an average of 186±45 (min. 49– max. 252) days fishing. Their vessels have 6m±1m (min. 4m – max.10m) average length with average power of 10±1 (min. 9 - max. 13) HP. Average number of crew on the vessel is 2±1 (min.1-max.3) persons. 81% of the fishers prefer gillnet as fishing gear, while 16% use gillnet and fyke net, whereas 2% use gillnet and longline.

The three most important problems fishers face in the lake are illegal fishing (30.5%), insufficient control (23.3%) and low catch amounts (14%) (see Figure 2).

85% of the fishers in Lake Marmara consider illegal fishing as the most important problem to be addressed. Mostly electro-shock devices are used in illegal fishing. Ünal et al. (2011) state that illegal fishing is the foremost (23%) problem in the inland sea cooperatives in the Aegean region of Turkey. Results of this and other studies show that protection-control services in Lake Marmara are rather ineffective. Excessive and illegal fishing in the lake disadvantage the fisheries, causing decrease in catch amounts (32.5%) and fishers' incomes (50%). To address the problem, control services should be more frequent. Fishers (48%) have stated that the biological and economic status in the lake has worsened in the last 5 years, mostly caused by illegal fishing using electro-shock devices.

Reasons for the deterioration of the lake in terms of fisheries in the last 5 years are shown in Figure 3. The foremost reasons are misconduct of members (54%), illegal fishing (31%), adverse climate conditions (4%), mismanagement of the cooperative

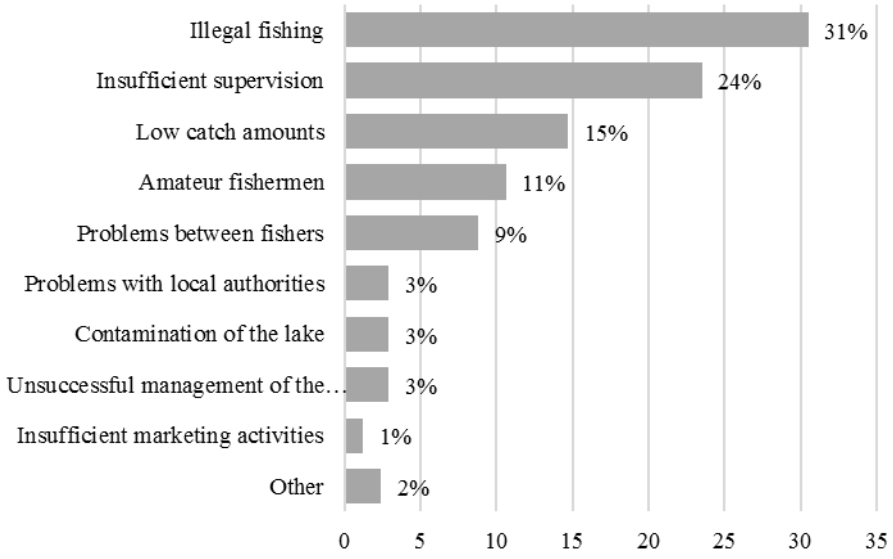

Figure 2. Proportional distribution of fishers' problems (%).

(4%), no idea (4%) and legislative regulations concerning the fisheries in the lake (3%) (see Figure 3). While there are still pressing problems in Ramsar sites, Lake Marmara, which is an internationally significant wetland, though not yet been included in the Ramsar list, has own problems (Arı & Derinöz, 2011). Fisheries are one of the leading economic functions the lake provides. In the last 5 years, fish population in the lake has continued to diminish (İlhan & Sarı, 2013). Studies pertaining to the lake have been constantly delayed, therefore ongoing studies have not been effective in terms of sustainability, showing that the regulations are costly and temporary (Girgin, 2000). For this purpose, interviews with the active fishers in the Lake Marmara, which is an international wetland protection zone, attempt to explore the factors affecting their WTP for a management plan that can improve the fisheries and sustainable use.

Willingness to Pay Analysis

Logit and Probit Model Results

Descriptive statistics of variables in the model are shown in Table 3.

Table 4 shows the results of a Logit model estimation where the likelihood of paying 50 TRY ($19) and more for the sustainable use of the lake is examined. According to the results of estimated Z statistics, there are 6 variables that are statistically meaningful (by 10% meaningfulness) in affecting the willingness of fishers to pay 50 TRY ($19) and more. Although the number of crew on the vessel is not statistically significant, it was included nevertheless since the estimation success of the model was found to decrease when excluded. Estimated coefficients for Logit models do not convey a directly meaningful comment; however the signs of these coefficients reveal the direction of the relation between the likelihood of the variable and the dependent variable. Among the variables, only retirement and vessel ownership have been estimated to have a negative effect on the WTP. In order to receive meaningful interpretations, odds ratios and conditional marginal effects of variables at their means are calculated (Gujarati & Porter, 2008). As expected from estimation of the Logit model, R-Square value is found at low level. However, according to likelihood ratio statistics, estimated model is statistically significant at 5% significance level. Therefore, significant marginal effects could be interpreted.

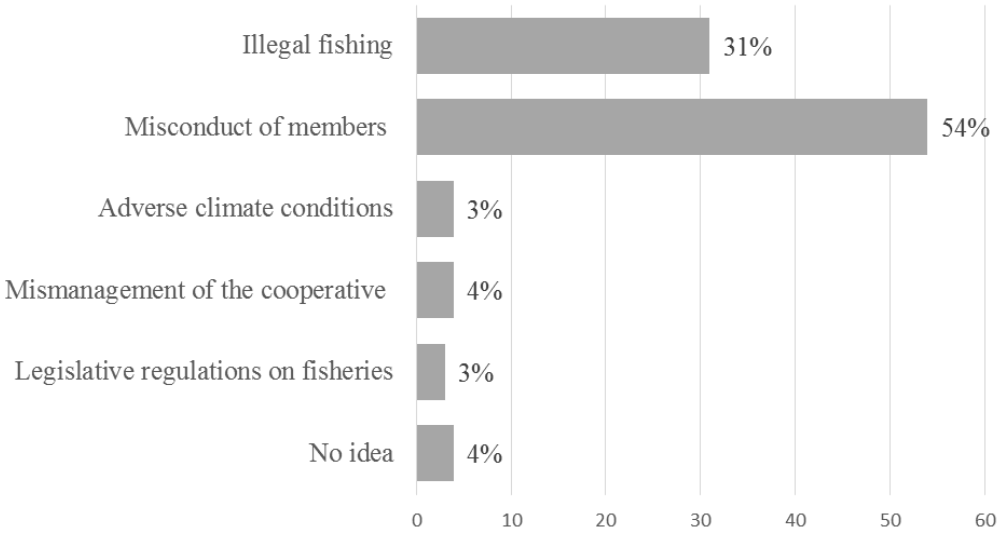

Figure 3. Deterioration of Lake Marmara in terms of fisheries in the last 5 years and reasons.

Table 3. Descriptive statistics of variables

Variable	Minimum	Maximum	Average	Std. Deviation
Number of employees	0.00	3.00	2.16	0.37
Knowing the lake is a natural protection zone	0.00	4.00	1.64	0.80
Education	0.00	11.00	5.24	1.32
Level of income	500.00 ($188)	2250.00 ($846)	782.41($294)	346.98 ($130)
Experience	10.00	60.00	31.30	12.31
Vessel ownership	0.00	1.00	1.22	0.46
Retirement	0.00	1.00	1.67	0.47

*: 1TRY~$2.66-€2.94 in 2015 (CBRT. 2017)

Accordingly, it can be said that the fishers who know that the lake is a natural protection zone are 53% more willing to pay than those who don't. Also, 1 year of increase in education is found to have increased the WTP by 25%. Retirement status, on the other hand, has a negative effect on the WTP: Retired fishermen are 47% less willing to pay compared to those without a pension. 1 TRY increase in the income has been observed to increase the WTP by 0.05%. Number of years of fishing as a job is considered as fishing experience. Correspondingly, 1 year increase in fishing experience has a 2% positive effect on WTP. As a negative effect on likelihood of WTP, the marginal effect of vessel ownership variable suggests that the fishers owning a vessel are 36% less willing to pay compared to those fishers not owning a vessel.

Aside from the Logit model estimation, a Probit model estimation was also run for a 50 TRY and above WTP of fishers for the conservation of lake (see Table 5). Since their cumulative distribution functions are based differently, a direct comparison of results of the two models is not possible. However, both the estimated marginal effects of the independent variables and coefficient estimates are very close in both models. These similarities are also observed in goodness-to-fit indicators such as McFadden R-Squared, Log Likelihood and LR Statistics. According to Probit model estimations, coefficients of all independent variables except number of employees have been found statistically meaningful at a significance level between 5% and 10%. Coefficients belonging to variables of retirement and vessel ownership have been found to be negative. This suggests that the WTP 50 TRY ($19) of fishermen who are retired with a social security program is 45% less than those without a pension. Similarly, vessel owners are 37% less willing to pay compared to those fishers not owning a vessel. Among variables with positive coefficient estimates, 1 year of increase in education increases the WTP by 25%. Also, fishers who know that the lake is a natural protection zone are 51% more willing to pay than those who don't. Calculations also reveal that 1 more year of

Table 4. Logit model estimation, Dependent Variable: 50 TRY and above WTP, Method: ML - Binary Logit (Newton-Raphson / Marquardt Steps), Sample (adjusted): 53

Variable	Odds Ratio	Conditional Marginal Effects	Coefficient	Std. Error	Z-Statistic	Prob.
Number of employees	0.420119	-0.21657	-0.86722	0.649743	-1.33	0.182
Knowing the lake is a natural protection zone	8.474854	0.533696	2.137103	1.070601	2.00	0.046**
Education	2.681238	0.246302	0.986278	0.48298	2.04	0.041**
Retirement	0.154434	-0.46649	-1.86799	1.028923	-1.82	0.069*
Income	1.002068	0.000516	0.002066	0.001082	1.91	0.056*
Experience	1.086979	0.020828	0.083402	0.04087	2.04	0.041**
Vessel ownership	0.234984	-0.36167	-1.44824	0.878504	-1.65	0.099*
Constant	0.002156	-0.21657	-6.13959	2.999672	-2.05	0.041**
LR Statistic (7 df)		: 15.73	Prob. (LR statistic)		: 0.0276**	
McFadden R-Squared		: 0.214152	Log Likelihood		: -28.862125	
Obs. with Dep=0		: 27	Total Obs.		: 53	
Obs. with Dep=1		: 26				

Table 5. Probit model estimation, Dependent Variable: 50 TRY and above WTP, Method: ML - Binary Logit (Newton-Raphson / Marquardt Steps), Sample (adjusted): 53

Variable	Conditional Marginal Effects	Coefficient	Std. Error	Z-Statistic	Prob.
Number of employees	-0.21754	-0.54544	0.389894	-1.4	0.162
Knowing the lake is a natural protection zone	0.51315	1.286622	0.61266	2.1	0.036**
Education	0.246884	0.619012	0.292143	2.12	0.034**
Retirement	-0.4504	-1.12929	0.599509	-1.88	0.06*
Income	0.00049	0.001229	0.00058	2.12	0.034**
Experience	0.02046	0.051301	0.023821	2.15	0.031**
Vessel ownership	-0.36825	-0.92333	0.533645	-1.73	0.084*
Constant	-0.21754	-3.77779	1.797252	-2.1	0.036**
LR Statistic (7 df)	: 15.96	Prob. (LR statistic)		: 0.0255**	
McFadden R-Squared	: 0.2172	Log Likelihood		: -28.749691	
Obs. with Dep=0	: 27	Total Obs.		: 53	
Obs. with Dep=1	: 26				

(**) and (*) represent 5% and 10% level significance respectively.

experience increases the likelihood of WTP by 2%, and 1 TRY increase in the income increases the WTP by about 0.05%.

The per-fisher annual payment needed for sustainable fisheries and betterment in the lake has been calculated as 143.7 TRY ($53) whereas the total WTP is 18,681 TRY ($6,912) per year. WTP of fishers in Lake Marmara is significantly higher than those in other zones. In a study made in Lake Manyas, the WTP was calculated as 60 TRY ($28) per year. (Gürlük & Rehber, 2009). Similarly, a study made in the city of Ordu resulted in a WTP of 31.5 TRY[2] ($16) /year (Aydın et al., 2013). A similar study was made in Lake Clinton in Kansas, AR, USA where the local population was willing to pay $22 US[2] (33TRY) /year (Earnheart & Smith, 2003). Other studies also prove that fishers in Lake Marmara embrace the lake more compared to fishers in other regions.

It was also seen that there is an inverse proportion between the WTP and the explanatory variables retirement and vessel ownership, where WTP drops as vessel ownership and retirement status increase. Maintanence costs of vessel owners are increasing every year. Consequently, the WTP tends to decrease. Retired fishers also cannot contribute as much, due to their small pensions and less workdays at sea (33% less WTP than others).

On the other hand, there is a direct relation between the level of education and WTP. As the level of education increases, fishers tend to be more sensitive and prudent about the subject.

As fishers' incomes (income from only fishing) increase, their professional motivation and wellfare tend to increase, resulting in a better vision about the advantages of sustainability of the lake, and more willingness to pay.

Professional experiences of the fishers also play a positive role in the WTP. Experience is also a positive indicator in terms of continuing fisheries activities, product quality and consequently, food safety.

Knowing that the lake is a natural protection zone is another positive variable for increasing WTP. As fishers' knowledge about the lake widen, they are more inclined to show positive attitude towards a sustainable protection.

Conclusions

Turkey became a party in the Ramsar Convention in 1994 and has since designated 13 Ramsar sites, commiting to protect 179,989 hectares of land within the national borders, not only Ramsar sites but also wetlands. Wetlands are significant for hosting diverse wild life, especially waterfowl, as well as providing substantial functions for nature and economical values for human beings (de Groot, Stuip, Finlayson & Davidson, 2005; Arı, 2006; Arı & Derinöz, 2011). For these values to continue providing, efforts on establishing a participative, rational and sustainable management have escalated, since the aproach of mere protection which neglects local population proved to be unsuccessful (Phillips, 2002).

Protected zones are facing a financial threat both in terms of the amount of accessible funds and the way these funds are put to use. The purpose of funding is both protecting the biodiversity and in general, encouraging for a more sustainable use. There is an urgent need to diversify the financial portfolio of protected zones and help these funds to reach groups and activities which are essential for biodiversity (Emerton et al., 2006).

So far, the problems faced have revealed that planning is the most important element in wetland management. (Yeniyurt et al., 2011). Failing to encourage local participation in planning activities especially cause the local population, who have an organic bond with the protected zone, to have a negative attitude towards the zone (Ramsar-Resolution VII.8, 1999). Inclusion of local population and other interest groups in the planning activities, on the other hand, would present a good opprotunity in digressing from a law-driven, passive protection approach (Alkan & Korkmaz, 2009).

The current status of fisheries in Lake Marmara has negative indicators in terms of social, economic and biological sustainability. Present supervision and regulations are insufficient. Girgin (2000) has asserted that the regulations on the lake are insufficient, temporary solutions need to be replaced by a permanent management plan. Results show that managerial measures have to be taken for the sustainability of the lake. Although 8 years have passed since the lake was designated as a wetland protection zone, as of yet there is no management plan concerning the lake. For fishers as a prominent member group of the lake, sustainability of the lake is a priority. High WTP of the actual users of the resource confirms the high economic value of the lake. With this study, fishers have proven that they are willing to take responsibility on creating the required data and budget to establish a sustainable fisheries management and prepare management plans.

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