| ISSN: 0001-5113<br>AADRAY | ACTA ADRIAT.,<br>59(2): 191 - 206, 2018 | ORIGINAL SCIENTIFIC PAPER |
|---|---|---|

DOI:10.32582/aa.59.2.4.

# Recreational fishing along the Middle and Eastern Black Sea Turkish coasts: Biological, Social and Economic Aspects

Sezgin TUNCA[1*], Mehmet AYDIN[2], Muhammet KARAPİÇAK[2] and Marko LINDROOS[1]

*[1]Department of Economics and Management, University of Helsinki, Helsinki, Finland*

*[2]Ordu University, Fatsa Faculty of Marine Sciences, Ordu, Turkey*

**Corresponding author, e-mail: sezgin.tunca@gmail.com*

*This study investigated biological, social and mainly economic dimensions of recreational fishing (RF) in 8 coastal Middle and Eastern Black Sea provinces of Turkey. In all provinces, a total number of 874 shore-based recreational fishers were interviewed via on-site face-to-face interviews during the fishing activity or at access points being monthly from January to December in 2015. Market value with RF index of added value approaches were used to calculate economic gains and losses from RF. The consistency was observed with the high education levels, high expense and high market value for fishers in the Middle Black Sea provinces; Kastamonu, Samsun, Sinop and Ordu. In all provinces, the harvesting costs stayed far below the average market prices of target species. Also, positive values of RF index were observed in all provinces. The species catch composition in Western and Eastern provinces did not show great differences. Furthermore, even if the habitat type along the Black Sea coast of Turkey did not show great variations, in the Western provinces some certain species including* T. trachurus, S. sarda, B. belone, P. saltatrix, M. cephalus *were caught in higher amounts. To summarize, RF along the Black Sea coasts of Turkey is an industry creating high economic returns by expenditures, jobs, catch value and further increased indirect economic impact in services sector.*

**Key words***:* Recreational fishing, social, economics, biological, Black Sea, Turkey

## INTRODUCTION

Recreational fishing (RF) is one of the most demanding marine and coastal recreational activities throughout the world. In developed parts of the world, averagely, 10.6% of the population participates in RF (ARLINGHAUS & COOKE, 2009). Besides, global numbers of RF participation differ from 220 million fishers (World Bank, 2012) to 700 million (COOKE & COWX, 2004). These huge numbers of RF participants are also representative for the proved socioeconomic and biological impact of RF as part of the fisheries sector (WORLD BANK 2012; ARLINGHAUS *et al*, 2013). Further, economic magnitude of RF has previously been calculated much higher than the professional fishers (e.g. ISAKSSON & OSKARSSON, 2002; NAUTILUS, 2000).

Although comparison between RF and commercial fisheries by using expenditures and gross

value is not suitable (EDWARDS, 1990; MCPHEE & HUNDLOE, 2004) and not quite right (McPHEE *et al.*, 2008), it would be realistic to calculate economic value by using indicators such as added value and by also considering direct and indirect economic activity under market based approaches (FRANQUESA *et al.*, 2004). Besides, up to now, few scientifically accepted methods exist to make this comparison (TUNCA *et al.*, 2016).

Huge numbers of RF participation especially in developed countries have also raised concerns about the ecological impact of RF on marine habitats and resources by targeting certain species in certain periods of the year, high numbers of anchoring in certain sensitive habitats, losing or leaving fishing equipment in the sea. Moreover, differently from the commercial fishers, recreational fishers commonly target species on the upper levels of the food web that means they seek to catch certain species with certain size (COLEMAN *et al.*, 2004). As a result, RF may result in changes in the trophic chain of the marine ecosystem by affecting its structure and function (e.g. PAULY, 1995; MYERS & WORM, 2003), and also by changing the structure of the population by loses of genetic variability (LLORET *et al.*, 2008). Even so, the ecological impact of RF has been found to be close to the commercial fishing (MCPHEE *et al.*, 2002; COLEMAN *et al.*, 2004; COOKE & COWX, 2004; LEWIN *et al.* 2006; LLORET *et al.*, 2008) and the changes occurring by RF are almost the same with the ones occurring by commercial fisheries (COOKE & COWX, 2006; LEWIN *et al.*, 2006).

In contrast to owing negative ecological consequences, RF has been found to have positive socioeconomic impacts to the societies (PAWSON *et al.*, 2008; MORA *et al.*, 2009; IHDE *et al.*, 2011). Especially, many previous studies in developed countries proved the huge economic impact of RF reaching billions of dollars or euros in economic activity with thousands of created jobs (e.g. GORDOA *et al.*, 2004; PAWSON *et al.*, 2007; NOAA, 2013) even its economic impact was almost the same as commercial fisheries (McPHEE *et al.*, 2002; COOKE & COWX, 2006). In the Mediterranean basin, there are few other studies that proved the considerable economic and ecological consequences of RF activities, particularly in marine protected areas (LLORET *et al.*, 2008; FONT & LLORET, 2011a; FONT & LLORET, 2011b). In addition to studies from Turkey being one from the Black Sea (AYDIN *et al.*, 2013), one from Çanakkale Strait (ÜNAL *et al.*, 2010) and two from Aegean Sea (TUNCA *et al.*, 2012; TUNCA *et al.*, 2016).

In spite of the fact that RF has such reasonable economic and ecological results, the management of RF (not only in developing countries but also in many developed countries) is lacking monitoring, control and surveillance. That may be the result of the previous low attention beside commercial fisheries (GORDOA *et al.,* 2004; LLORET *et al.,* 2008; ÜNAL *et al.,* 2010) and not including within the recreational and leisure researches. However, this ignorance trend for RF would likely to decrease in recent years with the increasing attention of scientists and decision makers (NRC, 2006; LUCY & STUDHOLME, 2002; COLEMAN *et al.*, 2004). In the case of RF management, countries implement different management measures that vary considerably. For example: in Turkey, the compulsory license system is in progress to be introduced soon instead of the current non-compulsory licensing as a result of changing politics and its implementation would be a priority to begin managing RF.

In this study, we collected for the very first time socioeconomic and fisheries indicators data from shore-based RF in eight provinces along the Middle and the Eastern Black Sea coasts of Turkey. The goal was to assess RF activity by provinces to serve as a reference for optimization of RF management. The study focused on the regionally most frequently practiced RF type, shore-based RF. The results would be valuable in evaluating RF pressure in province level and in classifying the economic impact of RF on the regional and national economy.

## MATERIAL AND METHODS

The questionnaire survey was conducted in eight Middle and Eastern Black Sea Provinces of Turkey, Kastamonu, Sinop, Samsun, Ordu, Giresun, Trabzon, Rize, Artvin (Fig.1) from

January to December in 2015. The field surveys were regularly conducted once a month within or around the fishing ports and were completed in daytime being randomly selected six weekend days and six times in week days during the whole year to increase the representativeness of the samples.

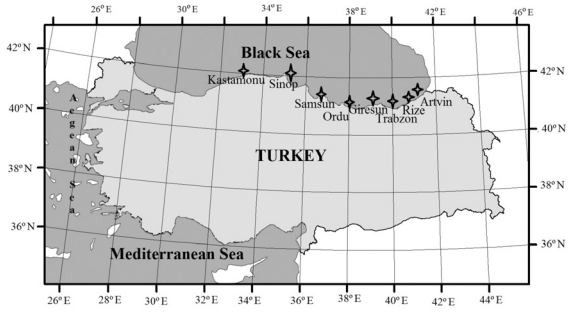


*Fig. 1. Survey sites on the map*

The data was collected from shore-based recreational fishermen via on-site face-to-face interviews during the fishing activity or at access points to obtain a representative sample of fishing and socioeconomic indicators by provinces.

The survey questionnaires gathered three types of information: (1) descriptors of the fishers (gender, age, marital status, education, occupation, monthly income, means of transport, RF experience, ownership of RF license, fishing type, release of illegal catch, (2) fishing activity (gear, preferred hours, daily fishing hours, annual fishing days, daily catch, annual catch by species with market values, (3) costs (transportation, fishing gear, bait, others), and subsequently they were estimated at the level of province.

The data of the previous study in Ordu Province by AYDIN *et al.* (2013) was used in the comparison with our results. Additional information on the number of RF licenses registered in the provinces was gathered. The price per kilogram of the commercial species was taken from fish markets, averaging the annual fish prices of 2015. Descriptors and fisheries indicators of the surveyed fishers were analyzed separately by locality. Catch per Unit Effort calculation was estimated following the methodology (ÜNAL *et al.*, 2010; TUNCA *et al.* 2016). Euro/TL exchange rate for the year 2015 was used as €1 = 3.022 TL (OECD, 2015).

For each province, the average annual effort per fisher, in fishing hours, was estimated in two steps. Firstly, for each interviewed fisher, the annual fishing hours (TAFHF) were estimated by multiplying the declared daily hours of fishing (DHF) by the annual days of fishing (ADF): $TAFHF_i = DHFi \times ADF_i$. Secondly, the annual effort per fisher (MAEF) was calculated as the average of the annual fishing hours of the interviewees:

$$MAEF = \frac{\sum_{i=1}^{n} TAFHF_i}{n}$$

The mean catch per unit effort of fishers (MCPUE), expressed as catch (kg) per hour, was estimated following the same procedure. First, the annual CPUE per interview ($ACPUE_i$) was estimated by dividing the annual catch declared per interviewee ($ACF_i$) by the total annual fishing hours ($TAFHF_i$):

$$ACPUE = \frac{ACF_i}{TAFHF_i}$$

Then, MCPUE was estimated as the mean over the total number of interviewees:

$$MCPUE = \frac{\sum_{i}^{n} ACPUE}{n}$$

This procedure prevents any bias due to a potential relationship between fishing intensity and fishing efficiency. The estimated catch rates per location were considered representative for RF in those provinces. Assuming this premise, the total catch (TC) per province was estimated by multiplying the MCPUE (kg/h fisher) by the MAEF (mean annual fishing hours per fisher) and the number of fishers. The number of fishers per province was estimated assuming that the percentage of fishers per province in the studied sample was representative of the fisher population in each province. Accordingly, the total number of fishers was estimated by multiplying those percentages by the total number of RF licenses in each province; however, the RF license is not mandatory in Turkey. Therefore,

the estimated figures clearly underestimated the population of recreational fishers of similar magnitude to the population of fishers without license. As a result, the estimations of numbers of fishers per province were corrected by adding the corresponding proportion of fishers without license. The contribution of each commercial species to the catch was calculated by summing the catch declared by fishers and estimating their percentage with respect to the total catch:

$$\%S_j = \frac{\sum_{i=1}^{n} C_{ji}}{\sum_{i=1}^{n} ACT_i}$$

Where n = number of interviewees for each province, $C_{j,i}$ the annual catch declared by each fisher for each particular species and $ACT_i$ the total annual catch declared by each fisher.

The total catch per species (TCS) in each province was calculated by multiplying the corresponding proportion of each species by the total catch (TC) previously estimated for each province.

The economic evaluation was performed by calculating the value of the catch, the expenses of the activity and the balance between the two. The value of the catch of the reported species was estimated by multiplying the TCS by their corresponding market value. The value of the remaining catch (TCR), the difference between the total catch and reported species, was estimated by averaging the market price of several species present in those areas. The sum of the two gives the value of the total catch (VCRF).

The annual expenses were estimated per interviewee ($EI_i$) by adding the declared expenses of each item, and the annual costs per fisher were calculated averaging $EI_i$ per province. The total expenses of fishers (TERF) were calculated by multiplying the annual expenses per fisher (EF) by the number of the corresponding fishers which was previously estimated by province. The contributions of expenditures by items were calculated by summing the costs declared by fishers on each item and their corresponding percentage to the total costs:

$$\%I_j = \frac{\sum_{i=1}^{n} I_{ji}}{\sum_{i=1}^{n} EI_i}$$

Where n = number of interviewees for each province, $I_{j,i}$ the annual costs declared by each fisher for each particular item and $EI_i$ the total annual cost declared by each fisher. The added value of RF was estimated in order to estimate the balance between its expenses and the economic profit gained by fishing. A balance equal to zero would indicate a null value of RF, whereas above or below zero would be indicative of positive or negative values of RF. This was estimated by each province applying the following equation:

$$AVRF = 1 - \frac{VCRF}{TERF}$$

## RESULTS

Descriptive characteristics of shore recreational fishers were calculated by provinces. RF was in all provinces determined as a man dominant activity. The age of shore fishers presented slight differences for each province, mainly

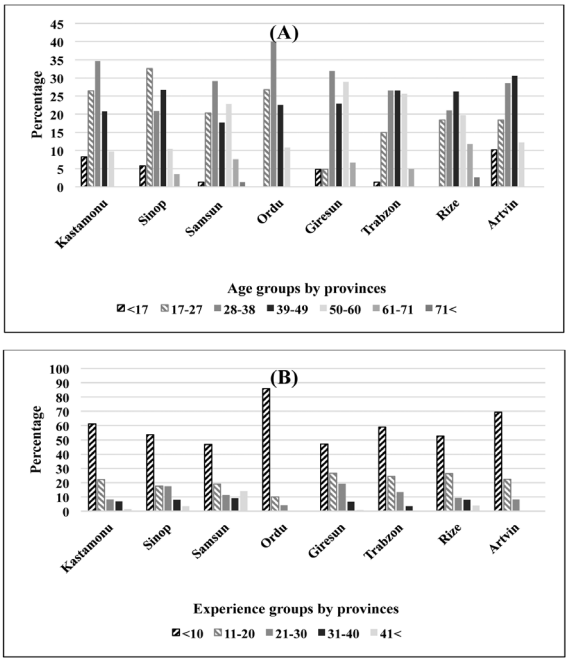


*Fig. 2. Distribution percentage of fishers by: A) age groups and B) experience by provinces*

varying from 15 to 74 years (Fig. 2a). In general, fishers distributed in the year interval from 17 to 60. More specifically, fishers in Kastamonu, Sinop, Ordu and Artvin were younger than other provinces and distributed from 17 to 49 years whereas, Samsun, Trabzon and Rize fishers were mostly varied from 17 to 60 years of age and 28 to 60 years of age interval were mainly observed in Giresun.

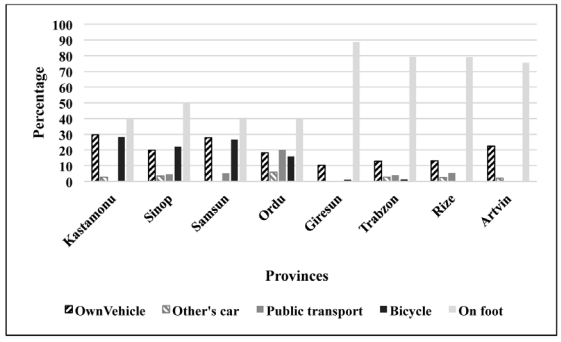


*Fig. 3. Distribution percentage of fishers by transportation types by province*

*Table 1. Socio-demographic and inspectional characteristics of shore-based RF by provinces*

| Characteristics | | Kastamonu | Sinop | Samsun | Ordu | Giresun | Trabzon | Rize | Artvin |
|---|---|---|---|---|---|---|---|---|---|
| % Surveyed fishers | | 8.2 | 9.8 | 9 | 13.7 | 19 | 25.9 | 8.7 | 5.6 |
| The number of surveyed fishers | | 72 | 86 | 79 | 120 | 166 | 226 | 76 | 49 |
| RF organization membership % | | 0 | 0 | 0 | 2.5 | 0 | 0 | 0 | 0 |
| Acceptance of compulsory rf license % | | 51.4 | 36 | 26.6 | 22.5 | 18.6 | 21.2 | 15.2 | 18.6 |
| RF License payment (€) | | 30.8 | 38.4 | 27.6 | 24.3 | 18.5 | 20.4 | 15.2 | 17.6 |
| Compulsory catch reporting % | | 27.8 | 26.7 | 10.1 | 13.2 | 10.5 | 13.2 | 9.6 | 16.4 |
| Inspected by authority % | | 23.6 | 22.1 | 34.2 | 9.2 | 2.4 | 10.2 | 6.6 | 6.1 |
| Ever been fined % | | 4.2 | 0 | 6.3 | 0 | 0 | 0 | 0 | 0 |
| Education % | Uneducated | 2.8 | 3.5 | 2.5 | 0.8 | 0 | 0.9 | 0 | 0 |
| | Elementary school | 1.4 | 9.3 | 12.7 | 5.8 | 29.5 | 32.7 | 30.3 | 46.9 |
| | Secondary school | 2.8 | 7 | 2.5 | 20.8 | 6.6 | 8.4 | 3.9 | 2 |
| | High school | 70.8 | 45.3 | 51.9 | 43.3 | 46.4 | 43.1 | 34.2 | 26.5 |
| | Bachelor's degree | 22.2 | 33.7 | 30.4 | 28.3 | 17.5 | 23.5 | 31.6 | 24.5 |
| | Master's degree and above | 0 | 2.3 | 0 | 0.8 | 0 | 0.4 | 0 | 0 |
| Monthly income % | <400 € | 48.6 | 54.7 | 31.6 | 51.7 | 44 | 52.7 | 50 | 55.1 |
| | 400-800 € | 36.1 | 31.4 | 45.6 | 32.5 | 32.5 | 32.3 | 25 | 22.4 |
| | 801-1,200 € | 9.7 | 9.3 | 15.2 | 11.7 | 23.5 | 14.6 | 25 | 22.4 |
| | 1200 € < | 5.6 | 4.7 | 7.6 | 4.2 | 0 | 0.4 | 0 | 0 |
| Occupation % | Public servant | 19.4 | 18.6 | 11.4 | 22.5 | 28.3 | 23.9 | 32.9 | 40.8 |
| | National company | 11.1 | 7 | 12.7 | 18.3 | 7.8 | 11.1 | 2.6 | 2 |
| | Retired | 12.5 | 17.4 | 29.1 | 13.3 | 30.1 | 28.8 | 27.6 | 38.8 |
| | Unemployed | 15.3 | 17.4 | 24.1 | 1.7 | 0.6 | 1.3 | 1.3 | 0 |
| | Student | 18.1 | 20.9 | 7.6 | 15 | 6.6 | 9.7 | 15.8 | 4.1 |
| | Commercial fisher | 4.2 | 2.3 | 5.1 | 4.2 | 0 | 1.3 | 0 | 0 |
| | Self-employed | 11.1 | 10.5 | 7.6 | 15 | 23.5 | 21.7 | 17.1 | 14.3 |
| | Other (foreign company, housewife and farmer etc.) | 8.4 | 5.8 | 2.5 | 10 | 3 | 2.1 | 2.6 | 0 |

*Table 2. Catch and economic indicators by provinces*

| **Fisheries Statistics** | Kastamonu | Sinop | Samsun | Ordu | Giresun | Trabzon | Rize | Artvin |
|---|---|---|---|---|---|---|---|---|
| Annual fishing hours per fisher | 476.8 | 540.4 | 920.4 | 130.8 | 130.1 | 123.8 | 119.7 | 123 |
| CPUE (kg/h fisher) | 0.72 | 0.52 | 0.34 | 0.64 | 0.54 | 0.43 | 0.31 | 0.38 |
| Annual catch per fisher (kg) | 238 | 252.6 | 236.4 | 72.1 | 30.1 | 26.1 | 19.9 | 33.4 |
| % Catch of commercial species | 96.2 | 96 | 97.4 | 92.2 | 96.5 | 97.6 | 97.9 | 96.5 |
| **Province Estimated Statistics** | | | | | | | | |
| Number of RF license | 1,013 | 446 | 2,670 | 2,374 | 1,071 | 3,198 | 898 | 325 |
| % of Surveyed fisher with license | 40.3 | 32.6 | 43 | 21.7 | 22.3 | 17.7 | 19.7 | 10.2 |
| Estimated number of fishers | 2,514 | 1,368 | 6,209 | 10,940 | 4,803 | 18,068 | 4,558 | 3,186 |
| Annual catch (t) | 17,138 | 21,724 | 18,670.5 | 8,647.7 | 3,994 | 5,879 | 1,509 | 1,634 |
| Catch of commercial species (t) | 16,494 | 20,859 | 18,177.5 | 7,970.7 | 3,855 | 5,738 | 1,477 | 1,576 |
| **Economic Indicators** | | | | | | | | |
| Total estimated market value of catch (x1000 €) ~ | 1,716.7 | 1,148.7 | 3,948.4 | 3,366.3 | 362.2 | 1,510.2 | 262.3 | 375.4 |
| Market value of respondents' annual catch (x1000 €) ~ | 49.2 | 72.2 | 50.2 | 36.9 | 12.5 | 18.9 | 4.4 | 5.8 |
| Annual expenses per fisher (€) | 183.5 | 210 | 315.9 | 55.5 | 18.8 | 25.1 | 55.1 | 34.2 |
| Total annual expenses (x1000 €) | 461.2 | 287.2 | 1,961.3 | 606.6 | 90.4 | 452.6 | 251.2 | 109 |
| Harvesting cost (€/kg) | 1.33 | 3.90 | 2.77 | 1.29 | 1.31 | 1.96 | 4.15 | 2.49 |
| RF index of added value | 0.73 | 0.75 | 0.50 | 0.82 | 0.75 | 0.70 | 0.04 | 0.71 |

By considering the RF experiences in years (Fig. 2b), Samsun and Ordu shore fishers were the most and least experienced fishers, respectively. Kastamonu, Trabzon and Artvin fishers had the other lowest RF experience (≤15 years of practice) following Ordu shore fishers. Regarding the actual monthly income levels of fishers, we found similarity among provinces. Kastamonu, Sinop and Ordu fishers had mostly income level below €800 whereas shore fishers in Samsun, Giresun, Trabzon, Rize, Artvin had monthly income level below €1,200. Profiles of the poorest and the richest fishers were observed in Sinop and Samsun, respectively (Table 1).

The results show that most fishers had a certain level of education, this being higher among the fishers in the middle Black Sea provinces (Kastamonu, Sinop, Samsun, Ordu) compared to the eastern provinces (Giresun, Trabzon, Rize, Artvin) where the fishers had higher percentage in elementary school education. Master's degree and above education had no or the lowest shares like in Sinop, Ordu and Trabzon Provinces (Table 1). The earning power of respondents show differences between middle and eastern Black Sea provinces, being higher with considerable percentages over 1,200 € monthly salary group in Kastamonu, Sinop, Samsun, Ordu Provinces.

Considering occupations of the fishers, the highest percentage of occupation was public servant in all provinces except Sinop provinces where public servant was the second mostly shared occupation. Retired individuals constituted the majority in Samsun Giresun, Trabzon and Artvin provinces whereas; public servants had the highest share in Kastamonu, Ordu and Rize. In Sinop, students interestingly got the highest share in RF participation. Unemployed individuals were significantly high in Kastamonu, Sinop and Samsun Provinces.

Although RF license is not compulsory in Turkey, significant percentages of fishers in all provinces had RF license being relatively higher in the middle Black Sea provinces, Kastamonu, Sinop and Samsun (Table 2).

Similarly, percentages for acceptance of a compulsory RF license were also relatively higher in the middle Black Sea provinces. The willingness to pay for a compulsory license differed between locations. The highest payment amount was observed for Sinop fishers followed by Kastamonu and Samsun fishers whereas, fishers eastern Black Sea provinces stated the lower amounts of willingness to pay. The percentage of being inspected by an authority was comparatively higher in the middle Black Sea provinces, Kastamonu, Samsun, Sinop (Over 20%) whereas, the fishers in the rest provinces have rarely been inspected with percentage below 10%. Only small proportion of fishers in Kastamonu and Samsun Provinces have been fined (Table 1).

The predominant means of transport were by on foot that was followed by own vehicle in all provinces. Apparently, transportation to the fishing site by on foot was much highly preferred by fishers in the eastern provinces, however; bicycle use was only common in the middle Black Sea Provinces (Kastamonu, Sinop, Samsun, Ordu) (Fig. 3).

Afternoon and sunset were the most preferred certain times of the day for fishing except Sinop where fishers preferred any time of the day for fishing without being depended on certain times of the day whereas, sunrise was considerably preferred by Giresun (20%) and Trabzon (17%) fishers. Even if the significant numbers (percentages between 25-60%) of the respondents in all provinces preferred weekend days for fishing weekly preferences were not exact that the fishers were preferring any time of the week days.

The annual fishing hours varies between locations being significantly higher in western provinces (Table 2). Samsun fishers very significantly spending the highest time, 920.4 hours, for fishing whereas Trabzon and Artvin fishers got the lowest RF effort being around 123 annual fishing hours. Also, Ordu Giresun and Rize fishers have not showed reasonable difference with Trabzon and Artvin fishers in terms of annual fishing hours. Kastamonu and Sinop fishers had the close numbers for annual RF effort being 476.8 and 540.4 hours, respectively.

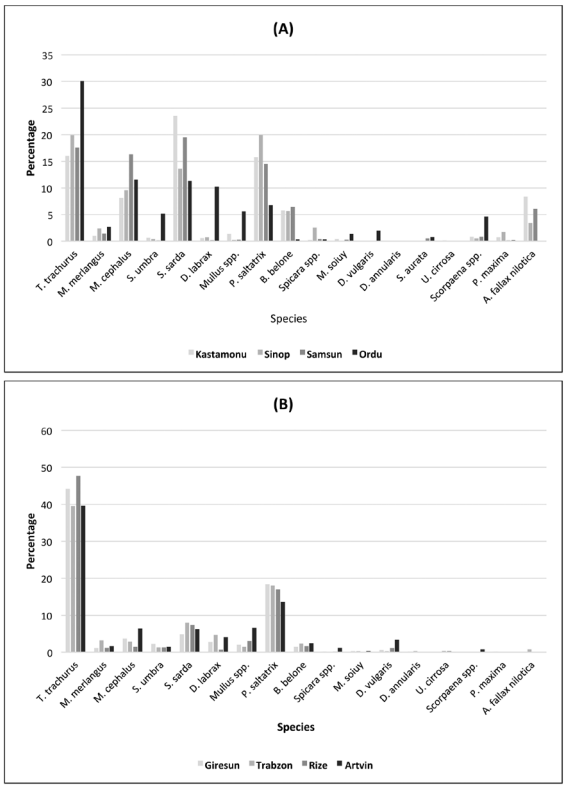


*Fig. 4. Catch composition of fishers by province: A) Kastamonu, Sinop, Samsun, Ordu; B) Giresun, Trabzon, Rize, Artvin*

CPUE was calculated as highest for Kastamonu fishers (0.72 kg/h) followed by Ordu (0.64 kg/h) Giresun (0.54 kg/h) and Sinop fishers (0.52 kg/h). Samsun (0.34 kg/h), Rize (0.31 kg/h) and Artvin (0.38 kg/h) fishers had relatively lower CPUE amounts compared to the other provinces. Annual average catch per fisher also varied between western and eastern provinces being highest for Sinop fishers (252.6 kg) and lowest for Rize fishers (19.9 kg). Extrapolation of the economic value of RF in each province, Samsun and Ordu shows the first two highest values followed by Kastamonu Trabzon and Sinop provinces whereas, Giresun, Rize and Artvin provinces had the lowest economic values from RF.

Commercial species within the overall catch represents over 95% of the total catch. The market value has direct relevance with the catch composition of fishers as well as the estimated numbers of fishers in each province. Further, species caught showed significant variations

among provinces. In all provinces, catch composition of fishers were dominated by certain species including *Trachurus trachurus, Mugil cephalus, Pomatomus saltatrix, Sarda sarda, Merlangius merlangus* and *Belone belone.* Distinct differences were observed in catch composition between middle and eastern coastal provinces. *M. Cephalus*, *S. sarda*, *B. belone* and *A. fallax nilotica* had higher shares in the catch composition of fishers in the Middle Black Sea provinces. Annual catch and the number of species of surveyed fishers were higher in Middle Black Sea provinces. In terms of total estimated annual catch, Trabzon province showed an exception among the Eastern Black Sea provinces and had high annual catch estimate in province level (Fig. 4a; 4b).

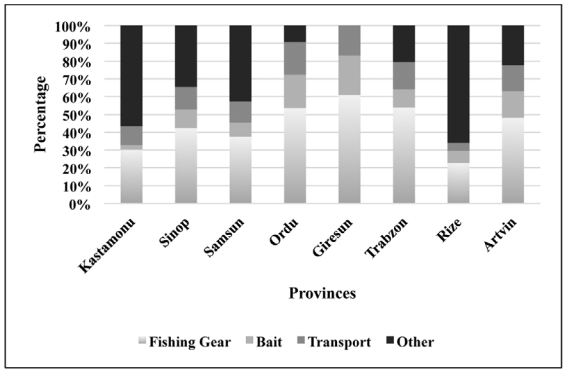


*Fig. 5. Distribution percentage of cost items by provinces*

The estimated annual market value of RF catch varies by provinces as a main result of the differences in catch rates and fishing effort. The minimum value was observed for Rize (€0.26 Million) whereas, maximum value was observed for Samsun (€3.95 Million). In terms of annual RF expenses per fisher, higher amounts were determined for the Middle Black Sea provinces (Kastamonu, Sinop, Samsun) compared to the rest provinces. The highest total annual RF expense was observed for Samsun whereas, Giresun had the lowest total annual RF expense (Table 2). Considering the harvesting costs (€/kg) in province level, the highest cost was observed in Rize (€4.15) followed by Sinop (€3.90), Samsun (€2.77) and Artvin (€2.49) and the lowest cost was for Ordu (€1.29). Accordingly, the added values showed that all provinces had the positive value with a noteworthily result of Rize, 0.04 that is slightly over 0. The rest of the provinces seems that they get remarkable benefits from RF activity but the existing uncertainties including high amount of attributed data might have resulted estimation biases (Table 2).

## DISCUSSION

This study presents information on RF in eight coastal Black Sea provinces in Turkey. The principal results were investigated by comparing with the similar studies in the region. The fishing profile and socioeconomic dimensions showed considerable variation among provinces. This study uses the RF index of added value approach to more reliably estimate and compare the RF benefits by provinces. This study mainly demonstrated how fishers' social, economic and catch profile varied through provinces.

Male dominant gender issue remained the same in this study as previously observed in similar studies in the region (MORALES-NIN *et al.*, 2005; ÜNAL *et al.*, 2010; VEIGA *et al.*, 2010; TUNCA *et al.*, 2012; AYDIN *et al.*, 2013; DIOGO & PEREIRA, 2013; TUNCA *et al.*, 2016). The age profiles of fishers were very broad and accumulated in between 17 to 60 years in which middle age participants had the major share in almost all provinces as similar studies in the Mediterranean countries (MORALES-NIN *et al.*, 2005; LLORET *et al.*, 2008; VEIGA *et al.*, 2010; ÜNAL *et al.*, 2010; TUNCA *et al.*, 2012; AYDIN *et al.*, 2013; TUNCA *et al.*, 2016). Remarkably, youngest fishers below 17 years old had the reasonable shares among the surveyed fishers in Kastamonu, Sinop, Giresun and Artvin (Fig. 2a). In contrast, there were no observation for the oldest age groups over 61 years in Kastamonu and Ordu. Furthermore, fishers had low RF experience in years being mostly less 10 years in all provinces similarly to the previous studies in Turkey (TUNCA *et al.*, 2012; AYDIN *et al.*, 2013; TUNCA *et al.*, 2016) (Fig. 2b).

The educational level was higher for fishers in Kastamonu, Sinop and Samsun compared to other surveyed provinces. In general, education levels were similar to the reported for other Turk-

ish regions (ÜNAL *et al.*, 2010; TUNCA *et al.*, 2012; TUNCA *et al.*, 2016). The highest shares of elementary school education level were observed for the Eastern provinces; Giresun, Trabzon, Rize and Artvin (Table 1). The consistency was observed with the high education levels, high expense and high value of fishers in Middle Black Sea provinces; Kastamonu, Samsun, Sinop and Ordu. Similarly, lower education levels, RF expenses and values were observed for the Eastern Provinces with an exception for Trabzon where had high economic value from RF.

To summarize, shore fishers in the middle Black Sea provinces had the highest educational level; however, monthly income did not show significant differences among all provinces that is probably the result of having similar occupations as public servant and retired in each province. There is a high percentage of public servants, retired and self-employed fishers in all provinces followed by the national company workers and students. Remarkably, commercial or professional fishers were not observed as shore fishers but these results may not be representative for all recreational fishers if all shore fishers and boat fishers are taken into account. In the Mediterranean, it is well known that especially small-scale fishers continue fishing and selling the recreational catch illegally after their retirement so, this can be valid for the Black Sea shore-based recreational fishers and maybe for the boat fishers that should also be studied in the future. Moreover, a very few number of housewives, farmers and foreign company employees were observed during the survey. Interestingly, there is also considerable percentage of unemployed fishers in Kastamonu, Sinop and Samsun that may be a response bias of the surveyed fishers or they may have other income sources. The proportion of the retirees showed variation from 12.5-38.8% being higher in the Eastern provinces. Also, the previous RF studies in Turkey showed similar variation for the retiree's proportion (13-36%) (ÜNAL *et al.*, 2010; TUNCA *et al.*, 2012; AYDIN *et al.*, 2013; ARDAHAN & TURGUT, 2013).

Low participation rates to RF organizations were observed in the surveyed provinces because of the inexistence or insufficient numbers of these organizations for marine recreational fishing. Anyhow, the results on the membership rates to RF organizations did not differ from the previous studies in Turkey (ÜNAL *et al.*, 2010; TUNCA *et al.*, 2012; AYDIN *et al.*, 2013; TUNCA *et al.*, 2016). Considering the acceptance of compulsory RF license, significant proportions of fishers in each province accepted the hypothetical proposal of compulsory RF license. Also, the same proportions were valid for the acceptance of compulsory catch reporting that finally gave us partial information about the environmental sensitivity of the fishers. Also, reasonable amounts of willingness to pay for the RF license were consistent with the income levels that were higher in Western provinces that the Eastern ones. Further, investigation on the determinants of willingness to pay amount will be done as future work.

The annual fishing effort per fisher presented significant differences between provinces. Kastamonu, Sinop and Samsun fishers had the highest annual fishing hours that were close to the results of similar previous studies (VEIGA *et al.*, 2010; ÜNAL *et al.*, 2010; TUNCA *et al.*, 2012) whereas, the fishers in the Eastern provinces had the lowest annual fishing hours compared to the reviewed similar studies (Table 3). The high annual RF effort could indicate high amount of free time that fishers have in Western provinces as their occupation were reasonably retired, public servant or self-employed and maybe resulting with an activity that is far beyond recreational (TUNCA *et al.*, 2016).

The catch rates also showed slight differences between provinces although, annual fishing hours and annual catch amounts varied greatly between provinces. The highest mean CPUE was observed for Kastamonu fishers, doubling the estimation of Rize fishers. The CPUE results were found to be in line with the previous study results in Turkey and did not show great differences with the previous studies in the Mediterranean (Table 3) (MORALES-NIN *et al.*, 2005; RANGEL & ERZINI, 2007; LLORET *et al.*, 2008; GORDOA *et al.*, 2009; ÜNAL *et al.*, 2010; FONT & LLORET, 2011b; TUNCA *et al.*, 2016). It is noteworthy to mention

*Table 3. Findings on fishing attitudes and economic indicators from previous studies and current study (adopted from Tunca et al., 2016)*

| Publication Year | Author /s | Country | Fishing type | Survey Year | Surveyed Fishers | Annual Fishing Days | Total Catch (x1,000 t) | Number of Species | Effort (h d$^{-1}$) | CPUE (kg) | Annual hours per Fisher | Annual Costs per Fisher (€) | Annual Catch Value (Million €) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2007 | Rangel & Erzini | Portugal | S | 2001 | 2,081 | - | 0.67 | 35 | - | 0.08 | - | - | - |
| 2008 | Lloret *et al.* | Spain | B/Bottom Rod | 2006 | 409 | - | 0.23 | 27 | 4.1 | 0.09 | - | 500 | 0.16 |
| | | | B/Fluixa | | | - | | 13 | | 0.09 | | | |
| | | | B/Surface | | | - | | 4 | | 1.1 | | | |
| | | | B/Trolling | | | - | | 8 | | 0.91 | | | |
| 2010 | Veiga *et al* | Portugal | S | 2006-2007 | 1,321 | 126 | 0.16 | 48 | 4.7 | 0.21 | 705 | - | - |
| 2010 | Ünal *et al.* | Turkey | S | - | 190 | 75.5 | | 31 | 4.75 | 0.81 | 359 | 213 | 6.20 |
| | | | B | - | | 102.3 | | 42 | 6.07 | 2.77 | 621 | 1,376 | 9.20 |
| 2011a | Font & Lloret | Spain | | 2009 | 84 | - | - | - | - | - | - | 600 | - |
| 2011b | Font & Lloret | Spain | S | 2007 | 260 | - | - | 25 | - | 0.09 | 177 | - | - |
| 2012 | Tunca *et al.* | Turkey | S | 2011 | 50 | 143.4 | 0.012 | 12 | 4.74 | 0.42 | 679.7 | - | 0.08 |
| 2013 | Aydın *et al.* | Turkey | S & B | 2011 | 120 | 40 | 0.009 | 15 | 3.31 | - | 132 | - | 0.06 |
| 2013 | Diogo & Pereira | Portugal | B | 2004-2005 | - | 19.6 | 0.16 | 32 | 4.4 | 2.3 | 86.6 | 897 | - |
| 2016 | Tunca *et al.* | Foça, Turkey | S | 2013 | 48 | 68.9 | 0.45* | 21 | 4.68 | 0.25 | 345 | 517.12 | 2.92 |
| | | | B | | 82 | 111.9 | 3.18* | | 5.10 | 0.64 | 601.6 | 2,133.4 | 19.17 |
| | | Gökova, Turkey | S | | 105 | 85.6 | 0.55* | 17 | 3.18 | 0.45 | 296 | 676.04 | 4.32 |
| | | | B | | 25 | 93.2 | 0.14* | | 3.98 | 0.41 | 312.8 | 6,176 | 1.49 |
| Current Study | Tunca *et al.* | Kastamonu | S | 2015 | 72 | 100.9 | 0.58 | 19 | 4 | 0.72 | 476.8 | 183.5 | 1.72 |
| | | Sinop | | | 86 | 110.3 | 0.36 | 19 | 5 | 0.52 | 540.4 | 210 | 1.15 |
| | | Samsun | | | 79 | 162.2 | 1.31 | 19 | 5 | 0.34 | 920.4 | 315.9 | 3.95 |
| | | Ordu | | | 120 | 40 | 0.07 | 19 | 3 | 0.64 | 130.8 | 55.5 | 3.37 |
| | | Giresun | | | 166 | 41.4 | 0.11 | 12 | 3 | 0.54 | 130.1 | 18.8 | 0.36 |
| | | Trabzon | | | 226 | 40.5 | 0.46 | 15 | 3 | 0.43 | 123.8 | 25.1 | 1.51 |
| | | Rize | | | 76 | 38.6 | 0.09 | 12 | 3 | 0.31 | 119.7 | 55.1 | 0.26 |
| | | Artvin | | | 49 | 44.9 | 0.10 | 16 | 3 | 0.38 | 123 | 34.2 | 0.38 |

*S: Shore fishers, B: Boat fishers, "-" means that the data is not available, * indicates the values were estimated for whole region using the estimated number of fishers*

that generally accepted CPUE calculation methodology is necessary to avoid comparison biases (TUNCA *et al.*, 2016).

The species catch composition in Western and Eastern provinces did not showed great differences. Even if the habitat type along the Black Sea shore does not show great variations, in the Western provinces some certain species including *T. trachurus, S. sarda, B. belone, P. saltatrix, M. cephalus* were caught in higher

amounts. This can be explained by the different river entrances and regimes along the site, closeness to the Marmara Sea that highly explains the difference in catch amount of some migratory species. In contrast to our results, some of the previous findings in the Mediterranean show that habitat change resulting with the change of species composition (MORALES-NIN, 2005; RANGEL & ERZINI, 2007; ÜNAL *et al.*, 2010; TUNCA *et al.*, 2012; AYDIN *et al.*, 2013; DIOGO & PEREIRA, 2013). Even if the catch amounts of some species showed reasonable differences between Western and Eastern Provinces, some certain species including *T. trachurus, M. cephalus, S. sarda, P. saltatrix, S. sarda, B. belone* dominated the catch composition in all provinces. *Spicara spp., S. aurata, M. soiuy, A. fallax nilotica* were found as considerable differences between Eastern and Western provinces being caught almost only in Western provinces. The differences in species catch amounts and composition are the result of geographic locations and environmental factors. There were low number of species in catch composition because of the nature of Black Sea owing low number of species compared to the Mediterranean Sea. Finally, analyzing RF catch composition has been a useful and suggested tool to define the littoral system (GORDOA *et al.*, 2009).

Annual expenses per fisher were higher in Kastamonu, Samsun and Sinop provinces compared to the rest of the provinces but still stayed lower than the values found for two Turkish MPAs (TUNCA *et al.*, 2016) (Table 3). In previous studies, annual expenses per fisher were also lower than the expenses of the boat fishers (Table 3). The time differences between studies don't have a considerable effect on the economic values (FONT & LLORET, 2011a; TUNCA *et al.*, 2016). But, such comparisons maybe avoided because of the existence of methodological as well as many social, economic, geographical differences that the values might be affected (TUNCA *et al.*, 2016). Specialization in RF along the Black Sea countries were not apparent as determined for the other studies in Turkey in contrast to the historically began trend in specialization of fishers (BRYAN, 1977) and also, unbalanced trend between income and expenses of the fishers explains that fishers have other motivations and benefits from RF activity (ÜNAL *et al.*, 2010, TUNCA *et al.*, 2012; AYDIN *et al.*, 2013; TUNCA *et al.*, 2016).

The general economic impact of RF in this region seems to have a positive value that can be understood by even only comparing estimated annual market value of catch with the estimated annual expenditures for each province. Although commercial fishing in Black Sea has great economic impact and importance in total Turkish fisheries, only shore RF in the region seems to have huge economic impact in the region compared to the commercial fishing. In some places, economic impact of RF was calculated higher than commercial fishing (McPHEE *et al.*, 2002; GORDOA *et al.*, 2004; COOKE & COWX, 2006). The harvesting costs also stayed far below the average market prices of the target species. This would partially be the result of relatively cheaper hand-lines and rods used to fish on the shore. The highest harvesting cost was observed for Rize fishers (€4.15) whereas, Ordu fishers had the lowest harvesting cost (€1.29) but, low catch amount that generated high economic value was only observed in Ordu province. Even if the annual RF expenses per fisher in Trabzon and Rize provinces were not as high as fishers in the Middle Black Sea provinces, total annual estimated RF expenses in Trabzon and Rize were found considerably high because of the high number of fishers determined. Furthermore, high RF expenditure in the Middle Black Sea provinces did not result in high economic losses because of high economic benefits with high catch amounts generated similar harvesting as in the Eastern provinces.

To summarize, RF along the Black Sea coasts of Turkey is a million euros industry generating huge economic activity with RF related expenditures, jobs and further increased indirect economic impact in services sector. In particular, RF is generating greater economic activity with high participation, high catch amounts and economics value in the Middle Black Sea provinces and in particular, Trabzon in the Eastern region.

## CONCLUSIONS

In all provinces, RF is an important social and economic activity, especially considering the economic value, RF is generating huge economic activity with positive added value in all provinces. According to the results, shore-based RF owns such big economic value so, the economic impact generated by the boat-based RF in the region would also be high and should specifically be investigated in the future studies. Also, even if it was ignored for the shore-based fishers as in other sites of Turkey, monitoring, control and surveillance under determined RF management schemes should be established well. Furthermore, direct and indirect economic impacts of RF in different sectors on local and national level should also be investigated. The use of more explicative economic indicators such as added value, harvest cost will be useful in comparing and evaluating the exact economic value and impact of RF. Lastly, not only for shore-based RF but also for boat, RF charters and competitions, detailed management plans should be developed in collaboration with all stakeholders to preserve and increase future RF benefits.

## ACKNOWLEDGEMENTS

This paper is the output of the research study by the researchers with special interest to recreational fishing activities in the Black Sea region. The research was not financially supported by any fund. Data were collected with reasonable efforts of researchers in Ordu University, Fatsa Faculty of Marine Sciences. The authors are very thankful to all recreational fishers who honestly and patiently answered all questions in the forms.

## REFERENCES

ARDAHAN, F. & T. TURGUT. 2013. Motivational factors for recreational fishing, the profile and life satisfaction level of recreational fishers and nonparticipants of fishing in Turkey. Turkish Journal of Sport and Exercise, 15:1, 58-72.

ARLINGHAUS R. & S.J. COOKE. 2009. Recreational fisheries: socioeconomic importance, conservation issues and management challenges. In: B. Dickson, J. Hutton & W.M. Adams (Editors). Recreational Hunting, Conservation and Rural Livelihoods: Science and Practice. Oxford: Blackwell Publishing, pp. 39–58.

ARLINGHAUS, R., S.J. COOKE & W. POTTS. 2013. Towards resilient recreational fisheries on a global scale through improved understanding of fish and fisher behavior. Fisheries Management and Ecology, 20: 91–98.

AYDIN, M., S. TUNCA, U.KARADURMUŞ & D. DURGUN. 2013. Valuation of recreational fishing benefits: A snapshot from Ordu, Turkey. Ege J Fish Aqua Sci 30(4): 147-154. DOI: 10.12714/egejfas.2013.30.4.01

BRYAN, H. 1977. Leisure value systems and recreational specialization: The case of trout fishermen. Journal of Leisure Research, 9 (3):174.

COLEMAN, F.C., W.F. FIGUEIRA, J.S. UELAND & L.B. CROWDER. 2004. The impact of United States recreational fisheries on marine fish populations. Science, 305, 1958–1960.

COOKE, S.J. & I.G. COWX. 2004. The Role of Recreational Fishing in Global Fish Crises. BioScience, 54 (9): 857-859.

COOKE, S.J. & I.G. COWX. 2006. Contrasting recreational and commercial fishing: Searching for common issues to promote unified conservation of fisheries resources and aquatic environments. Biological Conservation, 128: 93-108.

DIOGO, H. & J.G. PEREIRA. 2013. Recreational Boat Fishing Pressure on Fish Communities of the Shelf and Shelf Break of Faial and Pico Islands (Azores Archipelago): Implications for Coastal Resource Management. Acta Ichthyologica et Piscatoria, 43 (4): 267–276. DOI:10.3750/AIP2013.43.4.02

EDWARDS, S.F. 1990. An economics guide to allocation of fish stocks between commercial and recreational fisheries. US Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. Technical Report, 94 p.

FONT, T. & J. LLORET. 2011a. Socioeconomic implications of recreational shore angling for the management of coastal resources in a Mediterranean marine protected area. Fisheries Research, 108: 214–217.

FONT, T. & J. LLORET. 2011b. Biological implications of recreational shore angling and harvest in a marine reserve: the case of Cape Creus. Aquatic Conserv: Mar. Freshw. Ecosyst., 21: 210–217.

FRANQUESA, R., A. GORDOA, T. MINA, S. NUSS, J. BORREGO. 2004. The recreational fishing in the Central and Western European Mediterranean frame. FAO Fisheries Report, No. 739:1-15.

GORDOA, A., R. FRANQUESA, B. CALLIART, J.M. SERNA, A. DI NATALE, M. ORDAN. 2004. Sport Fishing: an informative and economic alternative for tuna fishing in the Mediterranean (SFITUM). EC Project 02/C132/11/41. Volume II, p. 47.

GORDOA, A., M.P. OLIVAR, R. AREVALO, J. VIÑAS, B. MOLÍ, X. ILLAS. 2009. Determination of Atlantic bluefin tuna (*Thunnus thynnus*) spawning time within a transport cage in the western Mediterranean. ICES Journal of Marine Science, 66: 2205-2210.

IHDE J.F., M.J. WILBERG, D.A. LOEWENSTEINER, D.H. SECOR, T.J. MILLER. 2011. The increasing importance of marine recreational fishing in the US: challenges for management. Fisheries Research, 108, 268–276.

ISAKSSON, A., & S. OSKARSSON. 2002. "Economic Value of Icelandic Salmon (*Salmo salar L.*) in Angling and Net Fisheries." Prepared Paper for the Technical Workshop on Social and Economic Values of Atlantic Salmon, NASCO - Directorate of Freshwater Fisheries, p. 6.

LEWIN, W. C., R. ARLINGHAUS, T. MEHNER. 2006. Documented and potential biological impacts of recreational fishing: insights for management and conservation. Reviews in Fisheries Science, 14: 305– 367.

LLORET, J., N. ZARAGOZA, D. CABALLERO, V. RIERA. 2008. Biological and socioeconomic implications of recreational boat fishing for the management of fishery resources in the marine reserve of Cap de Creus (NW Mediterranean). Fisheries Research, 91: 252–259.

LUCY, J.A. & A.L. STUDHOLME (EDS). 2002. Catch and Release in Marine Recreational Fisheries. Bethesda, MD: American Fisheries Society Symposium, 30: p. 250.

MCPHEE, D.P., D. LEADBITTER, G.A. SKILLETER. 2002. Swallowing the bait: Is recreational fishing ecologically sustainable? Pacific Conservation Biology, 8: 40–51.

MCPHEE, D., & T. HUNDLOE. 2004. The role of expenditure studies in the (mis) allocation of access to fisheries resources in Australia. Australasian Journal of Environmental Management, 11(1): 34-41.

MCPHEE, D. P., A. GORDOA & X. ILLAS. 2008. Marine Recreational Fisheries Management Challenges and Marine Protected Areas: Comparison Between the Mediterranean and Australia In: Øystein Aas (Editors). Global Challenges in Recreational Fisheries, pp. 93-110. DOI: 10.1002/9780470697597.ch5

MORA, C., R.A. MYERS, M. COLL, S. LIBRALATO, T.J. PITCHER, R.U. SUMAILA, D. ZELLER, R. WATSON, K.J. GASTON, B. WORM. 2009. Management effectiveness of the world's marine fisheries. Public Library of Science Biology, 7, e1000131, DOI:10.1371/journal.pbio.1000131.

MORALES-NIN, B., J. MORANTA, C. GARC´IA, M.P. TUGORES, A.M. GRAU, F. RIERA, M. CERD`A. 2005. The recreational fishery off Majorca Island (western Mediterranean): some implications for coastal resource management. ICES Journal of Marine Sciences, 62: 727–739.

MYERS, R.A. & B. WORM. 2003. Rapid worldwide depletion of predatory fish communities. Nature, 423: 280-283. DOI: 10.1038/nature01610

NAUTILUS CONSULTANTS LTD. & EKOS ECONOMIC CONSULTANTS LTD. 2000. "Study into

Inland and Sea Fisheries in Wales." Final Report August 2000. Prepared for National Assembly for Wales. (http://www.nautilus-consultants.co.uk/pdfs/wales.pdf)

NOAA, 2013. National Oceanic. Atmospheric Administration. Fisheries Economics of the United States. (http://www.st.nmfs.noaa.gov/economics/publications/feus/fisheries_economics_2011). Accessed on 7 March 2013.

NRC. 2006. Review of recreational fisheries survey methods. National Research Council, National Academy Press, Washington, D.C., USA, pp. 1-4.

OECD STATS. 2015. Annual Euro/TL Exchange Rate. (http://stats.oecd.org/index.aspx?queryid=169) Online accessed on 20 March 2016.

PAULY, D. 1995. Anecdotes and the shifting baseline syndrome of fisheries. Trends Ecol. Evol., 10 (10): 430. DOI: 10.1016/S0169-5347(00)89171-5

PAWSON, M.G., D. TINGLEY, G. PADDA, H. GLENN. 2007. EU contract FISH/2004/011 on Sport Fisheries (or Marine Recreational Fisheries) in the EU. Prepared for The European Commission Directorate-General for Fisheries, PP.55-120.

PAWSON, M.G., H. GLENN, G. PADDA. 2008. The definition of marine recreational fishing in Europe. Marine Policy. 32(3):339-350. DOI:10.1016/j.marpol.2007.07.001.

RANGEL, M.O. & K. ERZINI. 2007. An assessment of catches and harvest of recreational shore angling in the north of Portugal. Fisheries Management and Ecology,14: 343–352.

TUNCA, S., V. ÜNAL, B. MIRAN. 2012. A preliminary study on economic value of recreational fishing in Izmir Inner Bay. Aegean Sea (Turkey). Ege Journal of Fisheries and Aquatic Science. 29 (2):56-62. DOI:10.12714/egejfas.2012.29.2.01

TUNCA, S., V. ÜNAL, B. MIRAN, H. GÜÇLÜSOY, A. GORDOA. 2016. Biosocioeconomic Analysis of Marine Recreational Fisheries: A Comparative Case Study from Eastern Mediterranean, Turkey. Fisheries Research, 174, 270–279. DOI: 10.1016/j.fishres.2015.10.025

VEIGA, P., J. RIBEIRO, J.M.S. GONÇALVES, K. ERZINI. 2010. Quantifying recreational shore angling catch and harvest in southern Portugal (northeast Atlantic Ocean): implications for conservation and integrated fisheries management. Journal of Fish Biology, 76: 2216-2237.

ÜNAL, V., D. ACARLI, A. GORDOA. 2010. Characteristics of marine recreational fishing in Çanakkale Strait (Turkey). Mediterranean Marine Science, 11(2):315-330.

WORLD BANK, 2012. Hidden Harvest: The Global Contribution of Capture Fisheries. Report Number: 66469-GLB, p. 69. (https://openknowledge.worldbank.org/bitstream/handle/10986/11873/664690ESW0P1210120HiddenHarvest0web.pdf?sequence=1). Accessed on 5 April 2016.

Received: 18 April 2018
Accepted: 16 November 2018

# Rekreativni ribolov na turskim obalama srednjeg i istočnog Crnog mora: biološki, socijalni i ekonomski aspekti

Sezgin TUNCA*, Mehmet AYDIN, Muhammet KARAPİÇAK i Marko LINDROOS

*Kontakt e-pošta: sezgin.tunca@gmail.com*

## SAŽETAK

U ovoj studiji se iznose istraživanja biološke, društvene i ekonomske dimenzije rekreacijskog ribolova (RF) u 8 srednje obalnih i istočnih pokrajina Crnog mora u Turskoj. U svim pokrajinama ukupno je 874 obalnih rekreativnih ribara anketirano izravnim intervjuima (razgovorom licem u lice), te tijekom ribolova ili pri pristupnim točkama mjesečno od siječnja do prosinca 2015. godine. Tržišna vrijednost prema indeksu rekreativnog ribolova i dodane vrijednosti korištena je za izračun ekonomskih dobitaka i gubitaka kod rekreativnog ribolova. Konzistencija je promatrana s obzirom na visoki stupanj obrazovanja, visoke troškove i visokom tržišnom vrijednošću za ribare u slijedećim pokrajinama srednjeg Crnog mora: Kastamonu, Samsun, Sinop i Ordu. U svim pokrajinama troškovi ribolova bili su daleko ispod prosječnih tržišnih cijena ciljanih vrsta. Također, u svim pokrajinama zabilježene su pozitivne vrijednosti indeksa rekreativnog ribolova. Sastav ulova u zapadnim i istočnim pokrajinama nije pokazao velike razlike. Nadalje, iako stanišne vrste duž crnomorske obale Turske nisu pokazivale velike varijacije, u zapadnim provincijama neke određene vrste, uključujući *Trachurus trachurus, Sarda sarda, Belone belone, Pomatomus saltatrix, Mugil cephalus* bile su uhvaćene u većim količinama. Ukratko, rekreativni ribolov na crnomorskim obalama Turske je industrija koja stvara visoki ekonomski povrat izdataka u vidu radnih mjesta, ulovne vrijednosti i daljnjeg povećanja neizravnog ekonomskog utjecaja u sektoru usluga.

**Ključne riječi:** rekreativni ribolov, socijalni aspekt, ekonomski i biološki aspekti, Crno more, Turska