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Review Article

General Aspects of Recreational Angling and Some Estimations on Catch Amounts in Turkey

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ABSTRACT

Some simple approaches make easy to see problems that lie at the centre of the phenomenon. Contrary to expectations of outputs at the decision given may originate from lack of this simple approaches. From this point of view, recreational angling performed by hundreds of thousands or millions of people, has serious effects on both ecosystem and economy. Recreational angling known as a daily activity. Even though its outputs indicated in a few local, estimation of its effects in every parts of Turkey can be light on legislative regulations. Allowed daily recreational catch limit is 5 kg per person in Turkey. But coupled with this amount and conjectural angler numbers, an unseen situation is transpired. It was aimed in this study, besides state of recreational angling in Turkey, comparing of annual catch of recreational angling with Turkey total fishery, inland and marine capture fishery statistics. Also economic gains from this activity and lack of knowledge about legislative regulations draw the attention.

Keywords: *Recreational fishery, Angling, Amateur fishery, Angling*

Türkiye'de Rekreasyonel Olta Balıkçılığının Genel Özellikleri ve Av Miktarına İlişkin Bazı Tahminler

ÖZET

Bazı basit yaklaşımlar belirli bir olgunun temelinde bulunan problemlerin görülmesini kolaylaştırmaktadır. Verilen bir kararda beklenen çıktıların olmaması ise bu basit düşüncelerin eksikliğinden kaynaklanıyor olabilir. Bu bağlamda değerlendirildiğinde yüzbinlerce belki de milyonlarca kişinin Türkiye'de yaptığı rekreasyonel amaçlı olta balıkçılığı gerek ekosistem gerekse de ekonomi üzerinde çok önemli etkilere sahip olmaktadır. Günlük bir aktivite olarak bilinen olta balıkçılığının çıktıları mevcut bölgesel birkaç çalışma ile belirtilse de Türkiye genelindeki etkisinin tahmin edilmesi bu konudaki yasal düzenlemelere ışık tutabilir. Türkiye'de kişi başı günlük izin verilen av miktarı 5 kg'dır. Ancak bu miktar ile ülke nüfusunda tahmini olarak bulunan oltacı sayısı birlikte düşünüldüğünde daha önce göremediğimiz bir durum ortaya çıkmaktadır. Bu çalışmada rekrasyonel olta balıkçılığının Türkiye'deki durumunun yanı sıra bu yöntemle tahmini olarak elde edilebilecek

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miktarların Türkiye toplam su ürünleri üretiminin yanı sıra içsular ve denizlerdeki avcılık yolu ile elde edilen miktarlarının kıyaslanması amaçlanmıştır. Ayrıca bu aktivitenin yarattığı ekonomik girdi ve konuyu ilgilendiren yasal düzenlemeler konusunda da ciddi bir bilgi eksikliği göze çarpmaktadır.

Anahtar Kelimeler: *Rekreasyonel balıkçılık, Oltacılık, Amatör balıkçılık, Oltacılık*

I. INTRODUCTION

Recreational fishing which is one of the most important issue of the world fisheries has been described by FAO [1] as "fishing of aquatic animals (mainly fish) that do not constitute the individual's primary resource to meet basic nutritional needs and are not generally sold or otherwise traded on export, domestic or black markets". Therefore, it is clear to say that recreational fishery (RF) is an amateur fishery and can be used as the synonym of amateur fishery. Although there is a difference between recreational and commercial fisheries, the matter becomes inextricable in the case of livelihood fisheries [1]. It is admitted that the exact boundary between subsistence and recreational fisheries is impossible because many recreational fishers (even in wealthy countries), have strong subsistence like incentives to harvest fish [2].

Amateur fishing is a leisure activity that enables to have fun, do sports, and integrate with the nature by recognizing living creatures and to learn the fundamentals of maritime and marine hood [3]. It has been also reported that considerable amount of money has been spending by the activists of RF [3]. All around the world, angling is the most common recreational fishing technique. So, this is the reason that recreational fishing is frequently used similarly with angling [4]. After all, some recreational fishers use different fishing gears like spears, bows and arrows, gillnets, traps, rifles in some countries [5] and this activity has been intensively performed in marine coastal areas but also in rivers and lakes with or without a boat.

The number of amateur fishermen has been increased up to huge amounts in Turkey and over the world. Arlinghaus and Cooke [5] estimated the number of recreational fishermen (with reliable statistics from countries), according to the total population in a country, is 10.6 ± 6.1 percent. From this finding, only in North America, Europe and Oceania, 140 million recreational fishermen are available [1]. Globally, number of recreational fishermen was estimated between 220 million [6] and 700 million [7]. Thus, negative effects of RF on marine ecosystems have reached up to serious levels [3]. In addition, it was reported that more than 10% of the total fishery in the Mediterranean was composed by amateur fishery [8,3].

As mentioned above, angling- the most important component of recreational fisheries - involve a significant amount of people all around the world and it generates really high economic income in developed countries. According to Turkish amateur fishery commmunique, permitted daily catch quota was regulated as 5 kg per person. However, this quota is shows interesting statistics. This study aims to cover the relationship between daily limits and potential angler numbers in Turkey and express administrative recommendations for a sustainable management.

II. EVOLUATION AND PRESENT SITUATION OF ANGLING

Fishing has been performed since prehistoric times and have been rising for centuries by developing technology. Pasiner [9] reported that "sportive fishery" in other words "angling" was based on ancient times among fishing methods. There are plenty of historical reports of ancient cultures and peoples fishing as a way of gaining food to feed their populations. Cave paintings that are at least 15,000 years old show that humans used barbed poles and spears to hunt for fish, and paintings on tomb walls and pictures on papyrus show that the ancient Egyptians used woven nets, baskets and harpoons to catch fish such as Nile perch, catfish and eels. Mosaics show that nets and hook and line were used by the Romans to catch fish, and it is also thought that fishing was an important part of ancient Greek culture, although the low status of fishermen meant that it was not well recorded by the Greeks. There are also accounts of fishing thousands of years ago in ancient China, Japan, Jordan and what is now modern day Iraq [10]. However, the most highlighted development period of angling coincided with industrial revolution and has become a separate sector recently. Furthermore, the number of equipment shops and volume of electronic trade have grown considerably all over the world after 1990's with the rapid development of RF materials. Angling itself brings out huge economy by including many shareholders such as transportation, accommodation and equipment. Recently, it has been recognized as fisheries tourism especially in coastal zones as an individual sector. Arlinghaus et al. [11] reported that economic effects of recreational fishing create a multibillion-dollar industry that supports huge economic activity and livelihoods. Regarding to this case, £1 billion has been spent by recreational fishermen of United Kingdom (UK) in 2004 [12]. In addition, sea anglers in the UK spend at least £1 billion annually. European Anglers Alliance [13] (EAA) reported that 2.900 companies, manufacturers and wholesalers have been trading in fishing equipment which corresponds to 60.000 jobs and generating 5 billion Euros turnover annually. Furthermore, in 15 EU countries, 25 million fishermen spend 25 billion Euros for equipment, transportation and lodgings per year [13,14]. Another statement regarding the economy of angling was given by Williams [15] from Ireland. The author mentioned the results of a survey carried out by the Irish government and concluded that, angling tourism was the second after golf and worth £89 million and 3.500 jobs and commercial salmon fishing was worth £3.3 million and 800 jobs individually. However, the numbers are huge for United States (US). In 2010 amateur fishing was worth 50 billion US dolars and 350.000 employments [16]. Inadequate studies from Turkey regarding the RF cause some serious issues about reliable findings. Even so, an economic value of 27.493.365 TL was reported on 7669 licenced recreational fishermen from İzmir Bay, Turkey by Tunca et al. [17].

This economic magnitude which related to human intensity, generates some issues on fishery management. Typically, "prevention" and "sustainability" underlie the amateur fishery management [3]. Area, time, length and species prohibitions and catch amount limitations are the fundamentals of this management strategy. Besides, amateur fishing licence or certificate is another important tool for managing angling based RF in developed countries. This licence is very necessary and useful for monitoring the number of fishermen and estimating the recreational catch amount. The most efficient applications of this certification can be given from Germany and United States of America. Amateur fishery licence is obligatory in Germany and special licence is needed for inland waters according to the source [3]. On the other side, fishing licences have been grouped in some states of US as lifelong licences or temporary licences. In addition, pioneer fishermen licence and ordinary licence have been defined separately [18,3]. However, the most updated approach to amateur or recreational fishery management is ecosystem based management strategy as it is in commercial fishery. The main

principal of the ecosystem based fishery management (EBFM) is to guarantee or effort to guarantee the sustainable use of sources despite probable changes, ambiguousness in the ecosystem. EBFM targets to organize human activities in order to maintain long term sustainability of the ecosystem by considering biodiversity, habitats, pressure and threats on vulnerable species [3].

III. Current Situation And Administrative Issues Of Angling IN Turkey

Angling in Turkey has been intensively performed in marine coastal areas rivers and lakes. Although it is a very common fishing technique and displays technical variety in Turkish coastal regions, there are rare studies related to this method. These studies are related to straight and kirbed hooks catch efficiency [19], analysing of socio-economic patterns of part time small scale fishery [20], bluefish angling and the tackles [20], effects of different baits on length and condition of fish in the recreational angling [22] have been studied so far. Also, Akyol et al. [23] worked on the inshore fishery as well as the fisheries resources in Marmara Island. Moreover, Tunca et al. [17] stated the economic value of recreational fishing in Izmir Bay, Aegean Sea.

Multispecies structure of the Mediterranean Sea enables to have variety in catch composition of RF's. Therefore among many species, carps (*Cyprinus carpio*), trouts (*Salmo trutta*), European perch (*Perca fluviatilis*), Pike (*Esox lucius*), Wels catfish (*Silurus glanis*) for inland waters and mackerels (Scomber spp.), bluefish (*Pomatomus saltator*), brown meagre (*Sciaena umbra*), sea bass (*Dicentrarchus labrax*), bonitos (*Sarda sarda*), sparids and sea breams (Diplodus spp., *Sparus aurata*), common Pandora (*Pagellus erythrinus*), bogue (*Boops boops*), blotched picarel (*Spicara maena*) and squids (*Loligo vulgaris*) are the main angling species for Turkish seas. Recreational fishing in Turkey has been managed by Republic of Turkey Ministry of Food, Agriculture and Livestock with the publication named "4/2 amateur fishery regulations (2016/36)". These regulations include 7 chapters as follows:

1. Aim, concept, legal basis and definitions

    a. Amateur fisherman: natural person involves in amateur fishing activity

    b. Amateur fishery: fishing activity which is not aimed to gain commercial and tangible profits but only to perform for sportive or recreational purposes

2. Performing amateur fishery (amateur fishery regulations for Turkish and non-Turkish citizens and recreational tourism license)

3. Obligations and limitations regarding the species (general information, length limits, daily catch quotas and time prohibitions are mentioned in this part)

4. Methods and limitations (prohibitions according to gear types, obligations for inland and marine waters take place in this part)

5. Area obligations and limitations (this part includes the prohibited areas in marine and inland waters)

6. Litigations and banned decisions

7. Various and final judgements

According to the regulations, Turkish citizens can perform amateur fishery if they provide to obey the prohibitions, limitations and responsibilities of the regulation. Five-year-valid "amateur fisherman licence" is given to applicants by the directorates of the ministry. However, this licence is not mandatory to have or tote during fishing. Moreover, non-Turkish citizens, who are continuously residents or official guests, can perform amateur fishing in Turkey with the "guest amateur fisherman" licence. They are given 2-year-valid guest amateur fishermen licence by the directorates of the ministry if they prove their situation by documentary. Recreational or amateur fishing tourism is another aspect mentioned in the regulations. Amateur fishing tourism permission (certificate) is given to legal and real taxpayers for 2 years by the authority. Certificate owners are responsible for fishermen who are under the control of the licence owner in terms of respecting the regulations. Certificate of those who do not follow the regulations properly are cancelled and they are suspended to renew the licence for 2 years by the competent authority of the Ministry [24].

Besides that, non-governmental organisations (NGO) of sportive and amateur fishery also exist in Turkey and the main technique mentioned in their activities is by far the angling. Federation of amateur and sportive angling (ASOF) is the biggest NGO including ten local associations. The total number of members belonging to all these NGO's were reported to be 13366 [25].

Although RF is a leisure time activity, it includes a seriously huge economy. Especially in developed countries, angling has been managed in accordance with scientific and administrative norms. However, required scientific and administrative approaches have not been conducted at the optimum level in Turkey. In addition, state or private sector based enterprises and scientific studies on RF are inadequate in Turkey. Ünal and Kıraç [3] stated that control, inspection and monitoring of Turkish RF are less in comparison to commercial fisheries. They also reported the deficiency on periodic data gathering and analyse, so they concluded that, amateur fishing drops behind and is unattended in terms of administration because of these reasons. Another case is the lack of information on economy and legal regulations of Turkish RF. In the light of these detections; as the first step for an efficient management of angling in Turkey, anglers must be registered. Although amateur fisherman licence is placed in the amateur fishery regulations published by Ministry of Food, Agriculture and Livestock, non-compulsory situation of having or toting the licence during fishing, create a serious executive conflict. Moreover, deficiency on fisherman registration brings another problem.

IV. ESTIMATION OF ANNUAL LANDING OF TURKISH RECREATIONAL FISHERY

It is considered that 5 kg daily catch allowance which is one of the fundamental limitations of Turkish amateur fishery regulation, does not correspond to scientific criteria or attitude. As an example, according to our observations, daily angling based catch amount in Bodrum peninsula (south-west coasts of Turkey) have reach up to 60-70 kg for one angler and *Sparus aurata* and *Pagellus erythrinus* are the most targeted and common species. Angling on Galata Bridge (İstanbul, Turkey) is another outstanding example to understand the angling pressure. In this area number of angler per day and

yield per year were determined as 203 people and 64 tonnes, respectively [26]. In this sense, primarily, amateur fishermen in Turkey must be registered to define this limit.

Following this, there is a big gap on executive and scientific data in Turkish RF. There is no information about angling based recreational fishery data in Turkish Statistical Institute database. Even so, an estimation can still be made on the annual catch amounts of angling in Turkey. Arlinghaus and Cooke [5] (2009)'s study can be taken as the main reference to assess the number of recreational fishermen in Turkey. Their finding to participation to RF in comparison with the population of a given country (10,6 % ±6,1 (SD) leads us to guess the number of Turkish anglers (population of Turkey is 79.814.871 according to Turkstat, [27]. Therefore, some results regarding the amount of angling based recreational catch can be derived by considering the amateur fishery regulations, general fishery production and population of Turkey. Our assumption includes people who are between the age of 15 and 69, whom are considered to be active and aware anglers due to their physical and mental conditions. Location of the citizens was also given in two categories to be "marine" and "inland" in our assumption. This assessment may be a light to understand the annual landing of recreational fishery per year (Table 1, Table 2, and Table 3).

Table 1. *Estimated total amateur fishery production according to daily variable catch.*

Total Population	Number of amateur fishermen in Turkey **			Fishing days per year ***	Daily catch (kg)	ETRC (tonnes)			Ratio of ETRC to TFP (%)*			Ratio of ETRC to TCP (%)*		
	Min	Max	Mean			Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
56.986.378	2.564.387	9.516.725	6.040.556	52	1	133.348	494.870	314.109	22.7	84.1	53.4	39.8	147.6	93.7
					2	266.696	989.739	628.218	45.3	168.1	106.7	79.5	295.2	187.3
					3	400.044	1.484.609	942.327	68.0	252.2	160.1	119.3	442.7	281.0
					4	533.392	1.979.479	1.256.436	90.6	336.2	213.4	159.1	590.3	374.7
					5	666.741	2.474.349	1.570.545	113.3	420.3	266.8	198.8	737.9	468.4

** Turkish fishery production according to Turkstat [28].*

***Number of fishermen in Turkey calculated from approach of Arlinghaus and Cooke [5]..*

****Fishing period is assumed as 1 day per week.*

ETRC: Estimated total recreational catch, TFP: Total fishery production of Turkey (588.715t), TCP: Total capture production of Turkey (335.320t), MCP: Marine capture production (301.464t), ICP: Inland capture production (33.856t)

Table 2. *Estimated amateur fishery production of marine coastal zones according to daily variable catch.*

Coastal Population	Number of amateur fishermen in Turkey**			Fishing days per year***	Daily catch (kg)	ETRC (tonnes)			Ratio of ETRC to MCP (%)*		
	Min	Max	Mean			Min	Max	Mean	Min	Max	Mean
32.164.817	1.447.417	5.371.524	3.409.471	52	1	752.66	279.319	177.292	25.0	92.7	58.8
					2	153.426	569.382	361.404	50.9	188.9	119.9
					3	234.482	870.187	552.334	77.8	288.7	183.2
					4	318.432	1.181.735	750.084	105.6	392.0	248.8
					5	405.277	1.504.027	954.652	134.4	498.9	316.7

** Turkish fishery production according to Turkstat [28].*

***Number of fishermen in Turkey calculated from approach of Arlinghaus and Cooke [5].*

****Fishing period is assumed as 1 day per week.*

ETRC: Estimated total recreational catch, TFP: Total fishery production of Turkey (588.715t), TCP: Total capture production of Turkey (335.320t), MCP: Marine capture production (301.464t),

Table 3. *Estimated amateur fishery production of inland according to daily variable catch.*

Hinterland Population	Number of amateur fishermen in Turkey**			Fishing days per year***	Daily catch (kg)	ETRC (tonnes)			Ratio of ETRC to ICP (%)*		
	Min	Max	Mean			Min	Max	Mean	Min	Max	Mean
24.821.561	1.116.970	4.145.201	2.631.085	52	1	58.082	215.550	136.816	171.6	636.7	404.1
					2	116.165	431.101	273.633	343.1	1273.3	808.2
					3	174.247	646.651	410.449	514.7	1910.0	1212.3
					4	232.330	862.202	547.266	686.2	2546.7	1616.5
					5	290.412	1.077.752	684.082	857.8	3183.3	2020.6

** Turkish fishery production according to Turkstat [28].*

***Number of fishermen in Turkey calculated from approach of Arlinghaus and Cooke [5].*

****Fishing period is assumed as 1 day per week.*

ETRC: Estimated total recreational catch, TFP: Total fishery production of Turkey (588.715t), TCP: Total capture production of Turkey (335.320t), ICP: Inland capture production (33.856t)

As can be seen from the tables, RF may have a huge effect on the annual catch. According to daily catch limits, annual catches decreases or increases. Recreational daily catch of coastal fishermen (almost 3.5 million) may constitute more than the marine commercial capture production (Table 2).

IV. CONCLUSION

Although recreational fishery seems like innocent, our assumptions showed that angling based recreational fishery has a high catch value. This value exceeds the total, marine and inland fishery production in some cases. Even if, we use half of populations, annual catch still remains high.

Percentages of inland recreational fishery assumptions are so high. It could be thought that inland capture production statistics are inadequate. Recreational catch statistics should be determined to understand the certain fishery data. But İlhan et al. [29] mentioned that illegal fishing (electricity, chemicals, illegal gears etc.) still continues in inland waters. So, it may be hard to gather real inland fishery statistics.

Tunca et al. [17] reported the total number of average RF trips in İzmir Bay and the consumer surplus per individual as 143.4±113.33 trips and 25 TL (≈6.59 USD), respectively. Approximately 21 billion TL (143 trips x 25 TL x 6.000.000 (the sum of number mean number of amateur fishermen in Table 2 and 3) participants) (≈5.644.736.842 USD) has been assessed in Turkish RF

Furthermore, even though amateur fishing does not aim to gain commercial profits, economic response of angling based annual catch is thought to be very high. Tunca et al. [17] stated the presence of 7.996 registered amateur fishermen in İzmir and they calculated the market value of annual catch as 35.935.424 TL (≈9.476.171 USD) created only by registered ones. Moreover, it is known that some amateur fishermen have been marketing their catches but no administrative data relevant to this situation exist in Turkish RF.

For an efficient amateur fishery management, it is required to perform actions such as data gathering with appropriate methods, analyses, planning and conducting. It is also of crucial importance to conduct studies including the control of amateur fishermen's present and future behaviors [3]. General Fisheries Commission for the Mediterranean (GFCM) presented the actions to be taken for the management of amateur fishery in 2010 as follows: Effective licensing system to get information about recreational fishery (number of fishermen, distribution); gear, area, catch, species limitations with scientific conclusions (prohibition of gears, MPAs, size and amounts etc.); technical guidelines, codes of Practice for recreational fishermen, adequate regulations (proportional enforcements), education (awareness and promotion of recreational fishery); developing the best fishing methods, gathering biological and environmental data and making risk analysis; precautionary approach and assessment of the cross-sectoral interactions (commercial fisheries, tourism), indirect impacts of recreational fishing, possible effects of new technologies on sub-sector and environment; strengthen the political and institutional support (in order to resolve conflicting ecological/environmental and socioeconomic objectives).

In this context, priority must be given to the compulsory use and control of amateur fisherman license in Turkey. Then, amateur fishery regulations, especially the daily catch allowance, must be revised according to the studies or suggestions produced by universities or appropriate authorities. Moreover,

conducting periodic educative seminars and monitoring of angling is momentous for sustainability of RF management. In addition, it is considered that, creating or constructing special angling areas prevents arguments between recreational activities.

Online D*aily Recreational Fishermen Registry System* according to region may be implemented to all recreational fishermen. If a recreational fishermen want to go anywhere on coastal or inland fishing areas, who has to register him/herself to the system. But this suggestion accompanies a real time preservation and controlling system like land hunting.

Finally, to maintain the sustainability of RF which is very popular throughout the world including Turkey and also comprises a huge economy must be managed in the light of scientific criteria. Academic studies related to the topic should be improved for adaptation of ecosystem based fishery management to amateur fishery. Moreover, crucial executive responsibilities must be shouldered by ministries, universities, local authorities and amateur fishery associations. However, it is obvious that amateur fishermen respectful to nature and sea should take the major part of the responsibility to save the future of angling.

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