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ICHTHYOFAUNA OF LAKE TAŞKISIĞI (SAKARYA, TURKEY)

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Abstract
This research was conducted to find out the fish species inhabiting in Lake Taşkısığı between August 2016-2017. Totally 152 fish samples were caught using by fishing nets with different scales, dip nets and fishing lines. In this study, 15 species belonging to 7 families (Cyprinidae, Siluridae, Esocidae, Gobiidae, Poecilidae, Centrarchidae, Percidae) have been identified.

Keywords: Fauna, fish, health, nutrition, population

INTRODUCTION

Adequate and balanced nutrition throughout life has vital importance for growth and development, protection and sustainability of health [1]. Nutritional problems are concerned with urbanization, envionmental pollution, climate change, population growth, natural disasters, habitat losses and invasive species. Malnutrition and unbalanced nutrition has been caused to decrease in the quality of life and to increase in various diseases as physically, mentally, socially.

Unhealthy diets have high social and economic costs for individuals, families, communities and governments [2]. Fish is an excellent food due to structural composition of high quality and quantity of proteins, vitamins, minerals and fatty acids [3]. Potential nutrient content and energy value have shown variable related to species, habitat and size of fish. Fish consumption has been displayed great numbers of beneficial effects on development of retina and brain in unborn babies, and prevention of cardiovascular disease, rheumatoid arthritis, cancer, asthma, obesity and Alzheimer in adults [1, 3, 4]. The ultimate goal of the our national health policy is to achieve a healthy society composed of healthy individuals. It is recommended that fish should be in healthy food plate at least twice a week for supporting body.

Fish and fisheries provides vital source both can not be replaced with a single alternative food and economic security for local communities. Also fish has significant role for livelihood because of preserving as a stock in the food industry. Lake Taşkısığı has biological and economical importance and statu of naturel conservation area. This study has been realized to determine Lake Taşkısığı fish community, and to assist similar future investigations as regards protection, sustainabile development and consumption for health of the lake biodiversity.

MATERIALS AND METHODS

The study area is located in 15 km. to center of Adapazarı in the province of Sakarya (Figure 1). Lake Taşkısığı was formed in the ancient Sakarya River as an alluvial embankment lake. It has a surface area of 65 ha, altitude of 14 m, length of 1.18 km, width of 0.94 km and maximum depth of 3.8 m [5]. Lake Taşkısığı is abouth 2 km. to the west of Lake Little Akgöl. The lake is fed by the sources coming from the bottom.

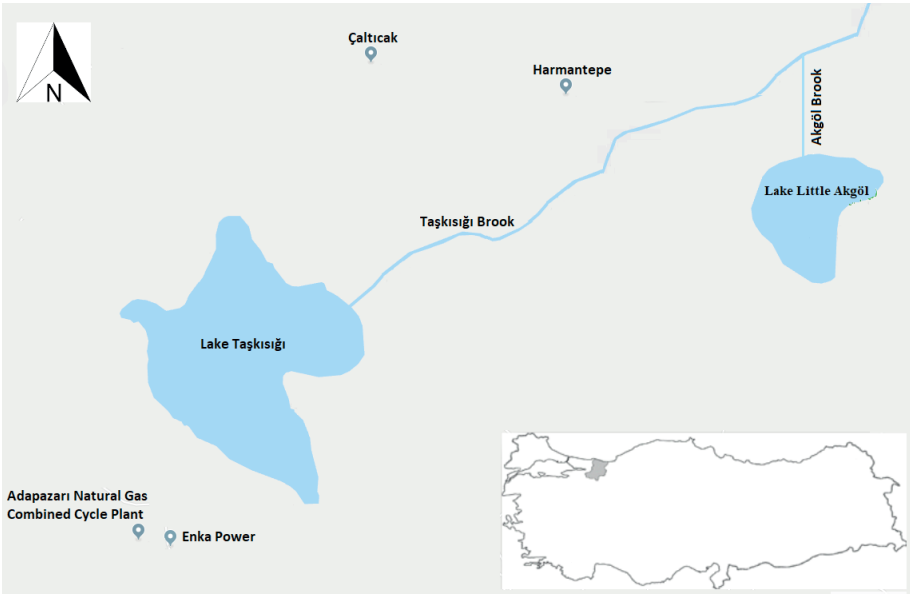

Figure 1. Research area

This ichthyological survey was carried out in Lake Taşkısığı between August 2016-2017. Totally 152 fish samples were collected using by gill nets, dip nets and fishing lines. The samples were fixed and preserved in a %4 formalin solution. Respectively, the colours and morphological features of taxa were recorded and photographed before fixation. Metric measurements were taken with digital calipers on the left side of the specimens. Meristic characters such as number of gill rakers, pharyngeal teeth, dorsal and anal fin rays, lateral line scales were counted under a stereoscopic binocular microscope. Rauchenberger [6] , Geldiay and Balık [7] and Kottelat and Freyhof [8] have been used to identify at the level of family, genus and species. Current status of scientific name are based on Eschmeyer's Catalog of Fishes [9].

The abbreviations using for diagnostic characters in the text are given below.

A: Anal fin, **D:** Dorsal fin, **GR:** The number of gill rakers on the first gill arch, **Llat:** Lateral line scales, **P:** Pectoral fin, **V:** Ventral fin, **N:** Number of examined fish, **PT:** Pharyngeal teeth, **SL:** Standart length, **Sq:** The number of scales on a line between the back of the head and the begining of the caudal fin in the fish without lateral line.

RESULTS

As a result of evaluation of totally 152 fish specimens caught from the research area, 15 species belonging to 7 families (Cyprinidae, Siluridae, Esocidae, Gobiidae, Poecilidae, Centrarchidae, Percidae) have been identified. Taxonomic characters of identified taxa were given below according to findings.

Family: Cyprinidae

***Abramis brama* (Linnaeus, 1758)**

SL: 201-260 mm D: III 9-10 V: II 8 A: III 25-27 P: I 16-18 Llat: 52-55 PT: 5-5 N: 4

Body is deep, and laterally compressed. Mouth is small, and terminal. No barbels around mouth. Abdominal keel is exist in between ventral fins and anal fin.

***Alburnus alburnus* (Linnaeus, 1758)**

SL: 92-112 mm D: III 8 V: II 7-8 A: III 14-16 P: I 14-16 Llat: 45-52 PT: 2.5-5.2 N: 17

This species is a small, slim-bodied fish. Mouth is small, and superior, and withouth barbels. The distance from ventral fins to anal fin is carinated. Lips are thin. A well developed papillae is present on the middle of lower lip.

***Blicca bjoerkna* (Linnaeus, 1758)**

SL: 105-211 mm D: III 8 V: II 8 A: III 21-24 P: I 13-16 Llat: 44-50 PT: 2.5-5.2 N: 7

Body is kompressiform. Mouth is small, and terminal. Barbels are absent. Abdominal keel is exist in between ventral fins and anal fin.

***Carassius carassius* (Linnaeus, 1758)**

SL: 138-217 mm D: III-IV 16-17 V: II 7-8 A: III 6 P: I 14 Llat: 33-35 GR: 38-40 PT: 4-4 N: 9

Body is short, and deep, and laterally compressed. Mouth is small, and terminal. No barbels around mouth. The last unbranched ray of dorsal and anal fin is ossified, and serrated.

***Carassius gibelio* (Bloch, 1782)**

SL: 189-254 mm D: IV 17-18 V: II 8 A: III-IV 5-6 P: I 15-17 Llat: 31-34 PT: 4-4 GR: 55-60 N: 10

Morphological characters of this species is similar to *C. carassius*. The number of gill rakers on the first gill arch is strong, and reliable diagnostic character to distinguish from each other. It is known that other measurable and countable morphological characters showed variations according to ecological features of the habitats.

***Cyprinus carpio* Linnaeus, 1758**

SL: 390-440 mm D: III-IV 18-21 V: II 8 A: III-IV 5-6 P: I 14-16 Llat: 36-37 PT: 1.1.3-3.1.1 N: 6

Body is somewhat elongated and oval shaped. Mouth is large, and terminal, and protractile. Two pairs barbels are present, one pairs are on the corner of mouth and the others are on the snout. The last unbranched ray of dorsal and anal fin is ossified, and denticulated.

***Rutilus rutilus* (Linnaeus, 1758)**

SL: 129-289 mm D: III-IV 9-11 V: II 8-9 A: III 10-12 P: I 16-17 Llat: 40-45 PT: 5-5 N: 24

Body is fusiform. Eyes have conspicuous orange pigmentation on upper side of iris layer. Mouth is small, and terminal. No barbels around mouth.

***Tinca tinca* (Linnaeus, 1758)**

SL: 107-281 mm D: IV 8-9 V: II 8-9 A: III-IV 7 P: I 16-18 Llat: 96-105 PT: 5-4 N: 9

Body is short, and oval shaped, and covered by small scales embedded in the dermis. Mouth is small, and terminal. One pair of barbels are on the corners of mouth. It was observed that the unbranched ray of pectoral and ventral fins in males reaching sexual maturity are well developed.

Family: Siluridae

***Silurus glanis* Linnaeus, 1758**

SL: 285-493 mm D: I 3-4 V: I-II 10-11 A: I 85-93 P: I 15-17 N: 6

Body is elongated that dorso-ventrally flattened in head, and laterally compressed in caudal. Mouth is big, and superior. Body is naked and covered by intensively mucous layer. Dorsal fin is short, and placed in just behind of head. Anal fin is very long and nearly reaches to caudal fin.

Family: Esocidae

***Esox lucius* Linnaeus, 1758**

SL: 228-500 mm D: VIII-IX 14-15 V: I-II 8-10 A: VIII-IX 11-13 P: I 12-15 Llat: 114-122 N: 6

Body is sagittiform, and covered by small scales embedded in skin. Snout is long, and dorso-ventrally flattened. Jaws are look like a duck's jaws. Dorsal and anal fin are present near the caudal fin.

Family: Gobiidae

***Babka gymotrachelus* (Kessler, 1857)**

SL: 46-76 mm D_1: VI D_2: I 16-17 V: I 5 A: I 14-15 P: 17 Sq: 53-55 N: 3

Anterior half of body is cylindirical and posterior half of body is laterally compressed. Mouth is terminal. Lateral line is absent. Pelvic fins are fused, and look like a disc-shaped sucker. Head and major part of predorsal are naked.

***Proterorhinus marmoratus* (Pallas, 1814)**

SL: 41-61 mm D_1: VI D_2: I 15-16 V: I 5 A: I 13-14 P: 15-17 Sq: 40-45 N: 2

Body is conical shaped. Mouth is terminal. Lateral line is absent. Pelvic fins are fused, and look like a disc-shaped sucker. Anterior nostrils are barbel shaped and curving to upper lip.

Family: Poecilidae

***Gambusia* Poey, 1854**

SL: 31-49 mm D: I-II 6-7 V: I 4-5 A: III 8 P: III-IV 8-10 Llat: 32-34 N: 27

This species is a small, robust-bellied fish. Head is large, and flattened on the upper surface. Mouth is small, and superior. Eyes are large relative to the body. Snot is clearly cornered. Lateral line is absent. We did not identified at the level of species since all of examined specimens are female and we could not benefit from the gonopodial features.

Family: Centrarchidae

Lepomis gibbosus (Linnaeus, 1758)

SL: 105-121 mm D: IX-XI 11-12 V: I 5 A: III 10-11 P: II 10-11 Llat: 40-45 N: 6

Body is short, rather deep, and laterally compressed. Mouth is small, and superior, and without barbels. It was observed that orange and blue stripes are exist in cheeks and a bright red spot is exist in upper margin of each opercle.

Family: Percidae

***Perca fluviatilis* Linnaeus, 1758**

SL: 117-240 mm D_1: XIII-XV D_2: II 12-15 V: I 5 A: II 8-9 P: II 12-13 Llat: 65-70 N: 16

Body is stout, and oval shaped. Mouth is big, and terminal. No barbels around mouth. It has a black blotch on posterior part of first dorsal fin. The rear edge of operculum is serrated. The margin of post operculum is finished with a hard spine.

DISCUSSION AND CONCLUSION

The taxonomic characteristics of species inhabiting in Lake Taşkısığı are in agrement with the findings recorded on similar studies in the literatures [7-8, 10-13]. None of fish species in the study area has been status of endangered, vulnerable, critical, endemic or migrator in national or international list [14-16].

Fish contains vitamins such as thiamin (B_1), riboflavin (B_2), niacin (B_3), pyridoxine (B_6), folic acid (B_9), cyanocabalamin (B_{12}), A, D ve E; minerals such as calcium, phosphorus, iodine, zinc, iron, selenium, fatty acids such as omega-3 (n-3), omega-6 (n-6), eicosapentaenoic acid (EPA), several essential amino acids, such as lysine and methionine [17-19]. More than as an energy source, the dietary contribution of fish is significant in terms of high-quality, easily digestable animal proteins. Since bioavailability of protein from fish is approximately 5 to 15 percent higher than that from plant sources, fish has a special importance in Healthy Food Plate [3]. In 2015, fish has been accounted for about 17 percent of animal protein consumed by the world population [3]. Fish provided about 3.2 billion people with almost 20 percent of their average per capita intake of animal protein, particularly between 50 to 90 percent of animal protein in the diets of coastal populations [3]. Moreover, fish and fisheries provide a source of employment and income for rural populations.

Annual per capita fish consumption vary from 2 kg to 50 kg depending on cultural, economical and geographical factors of each coutry. Rate of fish consumption is higher in countries that developing and having inland waters and marine coastal areas. In 2015, It is reported that average per capita fish consumption is 2 kg in Afghanistan, Ethiopia and Lesoto, 7.7 kg in low income countries, 9.9 kg in Africa, 12.2 kg in least developed countries 21.6 kg in North America, 22.5 kg in Europe, 24 kg in Asia, over 50 kg in developing small island countries especially in Oceania, 20.2 kg in the world [3], 6.1 kg in Turkey which has an inland sea and 26 river basins and status of a peninsula [20].

The population of the world and Turkey are recorded respectively 2 billion and 13.5 million in 1927 [21-22] and 7.6 billion and 82 million in 2018 [23]. As it seen, totally population in last century has been increased four times in global scale and six times in our country. Nowadays, the population growth has been continuing even though slowly. According to an estimated medium demographic profile scenario that current conditions, total fertility, rate of birth and death will have not been changed and remained constant, the population of the world will be 8.5 billion in 2030, 10.1 billion in 2050 and the population of Turkey will be 89.3 million in 2030, 97.3 million in 2050 [23].

Biodiversity researches concerning about natural sources for adequate and balanced nutrition of the growing population should be conducted and periodically updated considering that globally developments and variables. *Carassius carassius, Carassius gibelio, Gambusia sp.* and *Lepomis gibbosus* are exotic fish that rapidly reproducing and spreading in our wetlands. It is no doubth that removal these invasive fish species from the lake without damaging biodiversity and ecosystem will have supported sustainable development of lake environment as well as to conserve biodiversity.

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