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Research article

Current status of fish in Balıklıgöl (Şanlıurfa, Turkey) and comments on "A preliminary investigation on serious mortalities of fish in Balıklıgöl (Halil-ür Rahman Lake, Şanlıurfa)" by Öktener et al. (2008)

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Abstract: In the present study, fish species and their current status in Şanlıurfa Balıklıgöl, which has a sacred importance, are discussed. 4 species belonging to the families Leuciscidae (*Alburnus caeruleus*) and Cyprinidae (*Carasobarbus luteus*, *Capoeta umbla* and *Garra rufa*) were determined in Balıklıgöl. In addition, among the fish species *Cyprinus carpio* and *Capoeta trutta* given incorrectly in a parasitic study by Öktener et al. (2008) were corrected as *Carasobarbus luteus* and *Capoeta umbla* respectively.

Keywords: Cyprinidae, Şanlıurfa Balıklıgöl, *Carasobarbus luteus*, *Capoeta umbla*

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Introduction

Şanlıurfa Balıklıgöl is one of the important historical and religious centers with its natural pools containing fish that are considered as sacred in the southeast of Turkey. Balıklıgöl is also a 1st degree natural protected area and a place on the UNESCO tentative list visited by tourists from all over the country (ŞİÇDR, 2019).

The first study on Balıklıgöl was carried out by Deniz (1967) as a result of fish deaths due to the deterioration of water quality, and in this study, the topography of Balıklıgöl, the causes of fish deaths and recommendations were given. Ünlü and Bilgin (1987) examined the fish species living here taxonomically. In the following years, studies were carried out on the zooplankton of Balıklıgöl (Bekleyen and İpek, 2010), the water quality parameters (Çetin, 1996; Dişli et al., 2003; Dişli et al., 2004; Yetiş et al., 2018; Yetiş et al., 2019) and the parasites that cause fish death (Pişkin and Ütük, 2008; Öktener et al., 2008).

Because the fish in Balıklıgöl are considered sacred, they are not allowed to be caught. Since this situation makes sampling difficult to be correctly identified in the laboratory. Only occasional fish deaths provide the opportunity to examine them. The purpose of this study is to provide accurate information to determine the current status of fish species and to prevent misidentification of fish species in Balıklıgöl in future studies.

Materials and Methods

Balıklıgöl is located in a region in the northwestern part of Şanlıurfa at 37º08'51.37''N-38º47'04.14''E coordinates and it consists of two interconnected large pools named Halil-ür Rahman and Ayn-ı Zeliha (Figure 1). The surroundings of the pools have been used as a public rest, picnic area, historical and religious areas. The Pools receives water from a source at its bottom and flows through the canals to the Karakoyun Stream, which joins the Culap Creek and then joins the Euphrates River in Syria. The altitude of the region is approximately 517 m. Balıklıgöl is generally fed by spring waters. The annual average temperature is about 20°C. The highest temperature was 27.5°C in August and the lowest temperature was 15.5°C in January. Annual pH varies

between 5.7 and 7.5. Dissolved oxygen is between 2.4 and 6.2. Fish swim on the water surface due to low dissolved oxygen in the summer months (Bekleyen and İpek, 2010). When the source part of the water is examined in terms of COD, it can be examined in the category of first class waters (Yetiş, 2015).

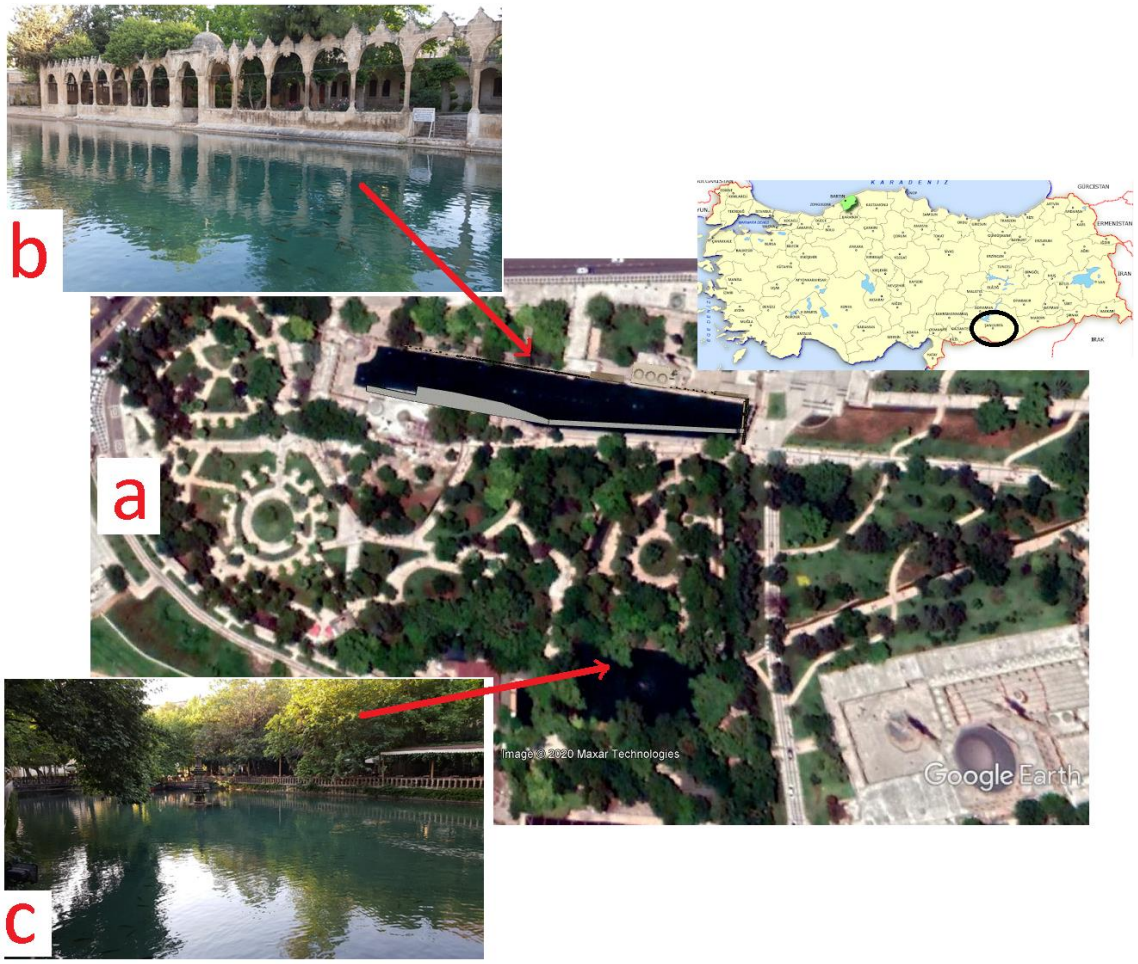

Figure 1. Satellite view (a) of Şanlıurfa Balıklıgöl and its pools, Halil-ür Rahman (b) and Ayn-ı Zeliha (c)

The field studies conducted in Balıklıgöl (Şanlıurfa) between May-July 2015 and April 2016. Because the fish are considered sacred, the fish are not touched, but species have been identified by taking photographs of individuals swimming on the water surface or by taking out dead fish with a scoop. Fishes were identified by using standard keys of Kuru (1980), Ünlü and Bilgin (1987) and Kaya et al. (2016). The conservation status of the identified species was based on IUCN Red List (2020).

Results

It was determined that 4 fish species belong to Leuciscidae (*Alburnus caeruleus* Heckel, 1843) and Cyprinidae (*Carasobarbus luteus* (Heckel, 1843), *Capoeta umbla* (Heckel, 1843) and *Garra rufa* (Heckel, 1843) live in the Balıklıgöl, Şanlıurfa (Figure 2). Among these species, *C. umbla and C. luteus* are the dominant species in ponds and these fish swim in groups (shoal) all over the pools and heading towards the food thrown by the visitors (Figure 3). *A. caeruleus* and *G. rufa* numbers are very few. The low number of juveniles in the ponds where all species breed naturally indicates that these species will disappear completely in the future.

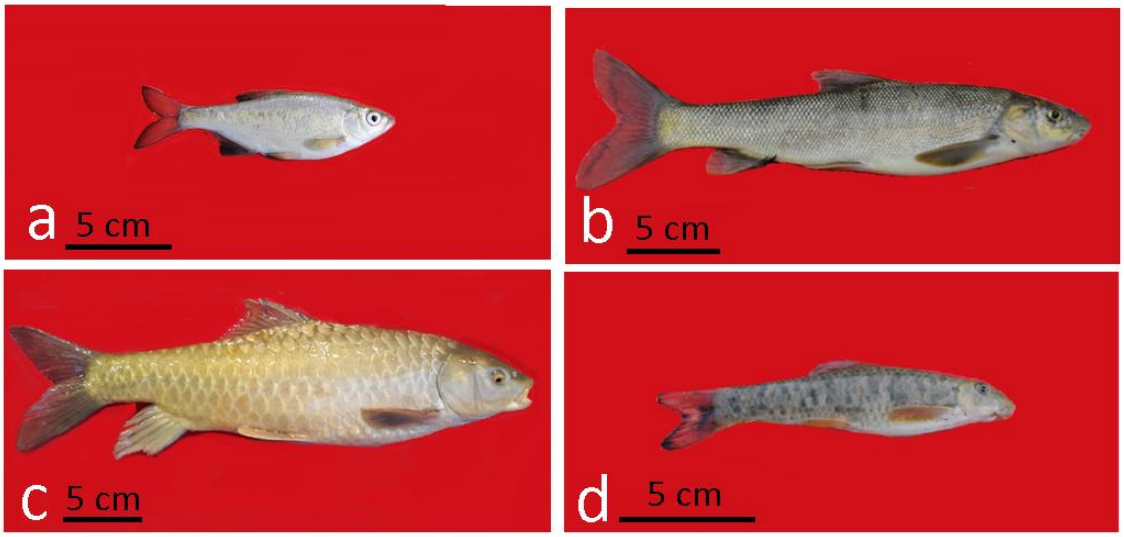

Figure 2. Fish species from the Şanlıurfa Balıklıgöl, Turkey. *Alburnus caeruleus* (a), *Capoeta umbla* (b), *Carasobarbus luteus* (c), *Garra rufa* (d)

Figure 3. Shoal of *Carasobarbus luteus* and *Capoeta umbla* in the Balıklıgöl, Şanlıurfa

Class : **ACTINOPTERYGII**
Order : **Cypriniformes**
Family : **Leuciscidae**
***Alburnus caeruleus* Heckel, 1843** (Figure 2a)
Common names : İnci balığı
Local names : Gümüş balığı
Type locality : Queiq River (Aleppo)
Meristic characteristics :
Heckel (1843): p. 1/3, V. 1/8, A. 3/15-16, L. Lat. 48-50
Beckman (1962): D. 11/9, A. 18-19
Birecikligil and Çiçek (2011): D. II/8-9, A. II-III/13-15, P. I/11, V. I/7-8, L. lat.: 48-54, Pharyngeal teeth: 2.5-5.2
Kaya et al. (2016): D: II-III 8-9, A: III 16-17, P: I 10-13, V: I 6-8, L. lat.: 58-69 (59), Pharyngeal teeth: 2.5-5.2
Present study : D. III/8, A. III/13-15, V. II/6, L. Lat.53-55
Distribution : Tigris, Euphrates and Queiq River basins (Coad, 2010; Kuru et al., 2014; Çiçek et al., 2020).
IUCN criteria : LC
Remarks : In a recent study, it was reported that the species defined as *Alburnoides recepi* (Turan et al., 2014) is not valid and is a synonym of *Alburnus caeruleus* (Birecikligil et al., 2017). *Alburnus caeruleus* is treated as valid species by Freyhof et al. (2018).

Family: Cyprinidae
***Capoeta umbla* (Heckel, 1843)** (Figure 2b)
Common names : Siraz, Yellow barbel
Local names : Karabalık
Type locality : Tigris River (Mosul)
Meristic characteristics :
Karaman (1969): D. III-IV/(8) 9-10, A. III/5, L. Lat. 87-99
Kuru (1975): D. III-IV/(8) 9-10, A. III*/5,* L. Lat. 73-92

Kaya et al. (2016): D. III/8–10, A. III/5, P. I/16–19, V. I/8–10, Gill rakers 18–23, LL: 83–99, L. lat.: 16–22/10–14. Pharyngeal teeth: 2.3.4–4.3.2

Present study : D. IV /8-9, A. ill/5, V. 1/9, L. Lat.76-84.

Distribution : Tigris, Euphrates and Kueik river basins (Coad, 2010; Kuru et al., 2014; Çiçek et al., 2020).

IUCN criteria : LC

Remarks : *Capoeta umbla* having the high haplotype number and haplotype/nucleotide diversity levels was nested together with its sister group *Capoeta damascina*, which indicates that they are evolutionarily a very close group (Bektaş et al., 2017). Despite the intraspecific genetic diversity in *C. umbla* populations; based on these trees, *C. umbla* specimens formed a monophyletic clade and thus was treated as a distinct species. The haplotype network also indicated a close relationship between *C. damascina* and *C. Umbla* (Zareian and Esmaeili, 2017).

Öktener et al. (2008) mentioned the presence of *C. trutta* in the Balıklıgöl. However, *Capoeta truta* is never found in these pools. They are thought to be confused with *C. umbla* due to the similarity of the mouth structure and the larger and more irregular spots on the body.

***Carasobarbus luteus* (Heckel, 1843)** (Figure 2c)

Common names : Himri barbel, Bizir

Local names : Pullu

Type locality : Tigris River

Meristic characteristics :

Karaman (1971): D. IV/10, A. Ill/6, L. Lat. 26-30

Kuru (1975): D. IV/10, A. III/6, L. Lat. 26-31

Bianco and Banarescu (1982): D. IV/10, A. III/6, L. Lat. 28-30

Birecikligil and Çiçek (2011): D. IV/11, A. III/6-7, P. I/14-17, V. I/ 7-9, L. lat.: 26-28 , Pharyngeal teeth: 2.3.5-5.3.2

Kaya et al. (2016): D. IV/10–11, A. III/5, P. I/14–15, V. I/7, Gill rakers 15–16, L. Lat. 28–30

Present study : D. IV/6, A. III/6, V. II/8-9, L. Lat. 29-32.

Distribution : Tigris, Euphrates and Queiq River basins (Coad, 2010; Kuru et al., 2014; Çiçek et al., 2020).

IUCN criteria : LC

Remarks : In spite of some morphometric differences, *C. luteus* populations of Tigris-Euphrates system and Iran belong to the same species (Borkenhagen et al., 2011).

Öktener et al. (2008) mentioned the presence of carp, *C. carpio* in the Balıklıgöl. However, carp is never found in these pools. They are thought to be confused with *C. luteus* due to the similarity of big scales and larger size.

***Garra rufa* (Heckel, 1843)** (Figure 2d)

Common names : Yağlı balık

Local names : Taş balığı

Type locality : Queiq River (Aleppo)

Meristic characteristics :

Karaman (1971): D. III/7-8, A. II/5, L. Lat. 32-37

Kuru (1975): D. III/7-9, A. II-III/7-9, L. Lat. 34-38

Birecikligil and Çiçek (2011): D. III/7-9, A. II-III/5, P. I/11-13, V. I/ 7-8, L. lat.: 34-38, Pharyngeal teeth: 2.4.5-5.4.2

Kaya et al. (2016): D: III 7–9, A: II–III 5, P: I 11–13, V: I 7–8, Gill rakers 23–29, L. Lat. 34–38, L.trans.: 4–5/4–5

Present study : D. 1II/8, A. II/5, V. *II/7-8,* L. Lat. 34-36.

Distribution : Tigris, Euphrates and Queiq River basins (Coad, 2010; Kuru et al., 2014; Çiçek et al., 2020).

IUCN criteria : LC

Remarks : Although *G. rufa* is very common in the Tigris and Fırat water system, Kaya et al. (2016) reported that they could not find any specimens from the type locality in the Quveiq River.

Discussion

Şanlıurfa Balıklıgöl is a unique place with historical and touristic significance with sacred fish inside. Fishes in Balıklıgöl, die massively from time to time due to environmental stress such as oxygen deficiency or various fungal, bacterial and parasitic diseases it has been the subject of several studies (Deniz, 1967; Dişli et al., 2003; Tel et al., 2007; Öktener et al., 2008; Bekleyen and İpek, 2010).

In the present study, four fish species (*A. caeruleus*, *C. umbla*, *C. luteus*and *G. rufa*) were determined from Şanlıurfa Balıklıgöl. All of these species are distributed in the Tigris and Euphrates basin (Coad, 2010; Kuru et al., 2014; Çiçek et al., 2020). In a previous study *A. caeruleus*, *C. umbla*, *G. rufa*, *C. luteus* and *Leuciscus cephalus orientalis* were reported in the Balıklıgöl (Ünlü and Bilgin, 1987). With the observations made in the following years,

it was determined that the reported species belongs genus *Leuciscus* disappeared from Balıklıgöl. It has been also observed that *C. umbla* and *C. luteus* species are common, while *G. rufa* and *A. caeruleus* species are less common.

Şanlıurfa Balıklıgöl consists of three interconnected large pools and this area has been protected by Şanlıurfa Metropolitan Municipality as it is considered sacred and isolated from other aquatic systems. Therefore, it is not possible to introduce any species in this area. Our best knowledge there is no evidence regarding the fish species *C. carpio* and *C. truta*, which are mentioned by Öktener et al. (2008). For this reason, we think that they misidentified the fish species. Therefore, the aim of the present study is to provide a scientific contribution by identify of fish species correctly. Correct identification of the host fish species in parasite studies is very important in terms of host parasite relationship. Most researcher in biological sciences have not completely mastered taxonomic knowledge and there may be some errors in species names which leads to problems in obtaining species information (Kong et al., 2005). Therefore, in order to avoid any confusion or mistake in the species names in scientific research, the species they use in their research should be checked by an expert taxonomist. Considering the fact that Öktener et al. (2008) study has received at least 16 cites until our time (scholar.google.com, 2020), it is inevitable that the scientific mistake made will be transferred to other studies. Correcting the situation should be considered as our scientific duty.

Conclusions

Fish found in Balıklıgöl have been considered sacred for thousands of years. Although the 4 fish species living here are common in the Tigris and Euphrates water systems, the fish here have created a natural aquarium with truly a visually wonder for visitors, and the massively death of these fish will cause this valuable area to lose its importance. As a result of biotic and abiotic negative environmental factors in Balıklıgöl, the number of juveniles is decreasing every year. This situation threatens the future of the species here. Some measures must be taken urgently to prevent given below;

1. Dissolved oxygen values in the water rapidly decrease in extreme hot summer months. During these periods, the water should be mechanically aerated.
2. Visitors overfeed the fish in order to be good deeds. These feeds accumulate at the bottom of the pool, causing organic matter pollution and eutrophication is observed. Feed sales should be prohibited, fish should be fed only at certain times of the day by the staff.
3. It is observed that the fish compete with each other while taking the feed thrown into the water and frequently injure each other by friction, and the injured fish are easily exposed to bacterial, fungal and parasitic diseases. To prevent this, feeding in different parts of the ponds will prevent the fish from becoming large groups.
4. Dead and diseased fish should be removed from the water immediately; injured fish should be treated in separate ponds.
5. Pools should be cleaned daily from leaves and other solid wastes on the water surface. Pool bottoms should be cleaned once a year.

Ethical Approval

The author does not declare ethical approval.

Conflicts of Interest

The author declares that they have no conflict of interest.

Funding Statement

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