

Original Research Article

<https://doi.org/10.20546/ijcmas.2022.1103.040>

## Ecological Analysis of the Parasite Fauna of Valuable and Low-Valuable Fish in the Pond Farms of the Aral Region

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### Keywords

Pond farms, parasite fauna

### Article Info

**Received:**  
04 February 2022  
**Accepted:**  
05 March 2022  
**Available Online:**  
10 March 2022

### ABSTRACT

The article presents the results of an ecological analysis of the parasite fauna of valuable and low-value fish of the Turtkul pond farm system. At present, there have been significant changes in the ichthyoparasite fauna of the Tuyamuyun reservoir. It has been established that the depletion of the parasite fauna of fish (55 species) is associated with the depletion of the fauna of hydrobions and ecological niches in this region.

### Introduction

At present, much attention is paid to the problems of monitoring the ecological cleanliness and safety of water bodies, regulating the flow of rivers and lakes, and solving problems of hydrochemical changes in aquatic ecosystems. In particular, the study of the influence of the parasitic state of water bodies and their impact on the ichthyofauna, the conservation of their biodiversity, the development and development of methods for combating fish parasites is of great theoretical and practical importance (Allamuratova, 2021; Nurmagomedov, 2008; Lukin, 2005). Scientific research devoted to the issues of increasing the biological productivity of water bodies, the development of measures to limit the reproduction of the number of parasite populations in lakes and pond farms of the republic is of

particular relevance. Studying the taxonomic composition of the ichthyoparasite fauna in pond and lake farms, analyzing the impact of environmental factors on them, limiting the abundance of parasite fauna, massively infected commercial fish species, increasing the efficiency of using natural water bodies and applying scientifically based methods of combating ichthyoparasites becomes a priority (10, 13). It is customary to refer to the lower reaches of the Amu Darya a huge alluvial plain located in the lower reaches of the river from the Tuyamuyun gorge to the former Aral Sea.

### Materials and Methods

Zooplankton in the channel and branches of the river. There is no Amu Darya (Bykhovskaya-

Pavlovskaya, 1969; Tleuov, 1981; Urazbaev *et al.*, 2001). The lakes located in the zone of influence of the Tuyamuyun reservoir (Turtkul, Kelteminar) are in close connection with the channels and quickly dry up with a decrease in its level. The water of internal reservoirs has a mineralization of the order of 1-5 (8) g/l. However, due to the strong wind removal of salts from the dried bottom of the Aral Sea, due to the increased concentration of sulfates and chlorides in the atmosphere and in river flows, as well as the parasitological factor, it does not favorably affect the reproduction of valuable fish species in the Turtkul pond farm. The studies were carried out in 2017-2021. The taxonomy of fish was determined according to Berg (1949); Kamilov (1964); Mirabdullaev *et al.*, (2001). The collected material was processed according to the generally accepted parasitological method of Dogel (1933); Markevich (1950); Lyaiman (1966); Bykhovskaya-Pavlovskaya (1952, 1960) and others.

## Results and Discussion

In the course of our research, in the system of the Turtkul groups of pond farms and lakes, we found a total of 55 species of parasites in the studied fish, incl. fish in the Yanbosh-yop canal - 29 species, in ponds 4.6 compartments - 55 species, in collectors 23 species, in lakes Turtkul - 13 species and Kelteminar - 11 species.

In systematic terms, the found parasites belong to 13 classes and forms: 1) Flagellata (6 species), 2) Sarcodina (1), 3) Sporozoa (1), 4) Cnidosporidial (3), 5) Microsporidia (1), 6) Cilata (30), 7) Dermocystidium (1), 8) Monogenoidea (19), 9) Cestoidea (2), 10) Trematoidea (1), 11) Nematoda (1), 12) Hirudinea (1), 13) Crustacea (3)-species.

Among the parasites found, the class of monogenetic flukes is characterized by the most diverse species composition (19 species were found). It is represented mainly by specific species and only some *Dactylogyrus vastator*, *D. anchoratus* and some others were found in 2 hosts. The most numerous were the pathogenic genera *Dactylogyrus* (19 species). Of the protozoa, parasitic

ciliates turned out to be the most numerous in species terms - 20 species, of which the genus *Trichodina* (10 species).

Total infection with the parasite was also noted for carp (20.0-86.7%), carp (20.0-60.0%), Turkestan barbel (30.8-85.0%), Aral roach (20.0-86.7%), Aral bream (10.0-81.0%), grass carp (26.6-83.3%), silver carp (16.7-60.0%), catfish (13.3- 61.1%), pike perch (18.4-61.1%), silver carp (20.0-60.0), bighead carp (15.4-37.5%). A less diverse fauna of parasites was found in the Amur chebachka (12.3-33.3%), the common hawk (13.3-40.0%), and the Amur mustard (13.3-46.7%).

The study of the parasite fauna of fish in the systems of the Turtkul pond farm has not only practical, but also great theoretical significance, since it makes it possible to understand the process of formation of the parasite fauna of fish depending on changes in environmental conditions (8, 9).

At present, there have been significant changes in the ichthyoparasite fauna of the Tuyamuyun reservoir. We found that the depletion of the parasite fauna of fish (55 species) is associated with the depletion of the fauna of hydrobions and ecological niches in this region. Particularly great changes have taken place in the fauna of the carp and some other fish species.

Carp is one of the most valuable commercial fish in the Amudarya basin and in the systems of the Turtkul pond farm. In different reservoirs of the farm and in different seasons, 75 specimens were studied. carp, including in the Yanbosh-yop-15 spec. 4.6 department of ponds - 15, collectors - 15, in lakes Turtkul - 15, Kelteminar - 15 specimens. Of the 14 species of parasites found in carp (20-86.7%), infecting 4.6 ponds on the farm, the most common pathogens are in *Eimeria carpelli* - (13.3-53.3%), *Jchthyophthirius multifiliis* - (13.3-60.0 %), *Apiosoma piscicolum*- (73.3), *Trichodina nigra* (26.7-66.7%), *Dactylogyrus vastator* (6.7-80.0%), *D.extensus* (6.7-53.3%), *Bothriocephalus opsarichthydis* (20.0-53.3%), etc. The species composition, extensiveness and intensity of

infection of carp with parasites in the Yanbosh-yop canal, collectors, lakes were not the same, which depended on both biotic and abiotic environmental factors (flow rate, water turbidity, gas and salt regime of water bodies, etc.) (Fig. 1).

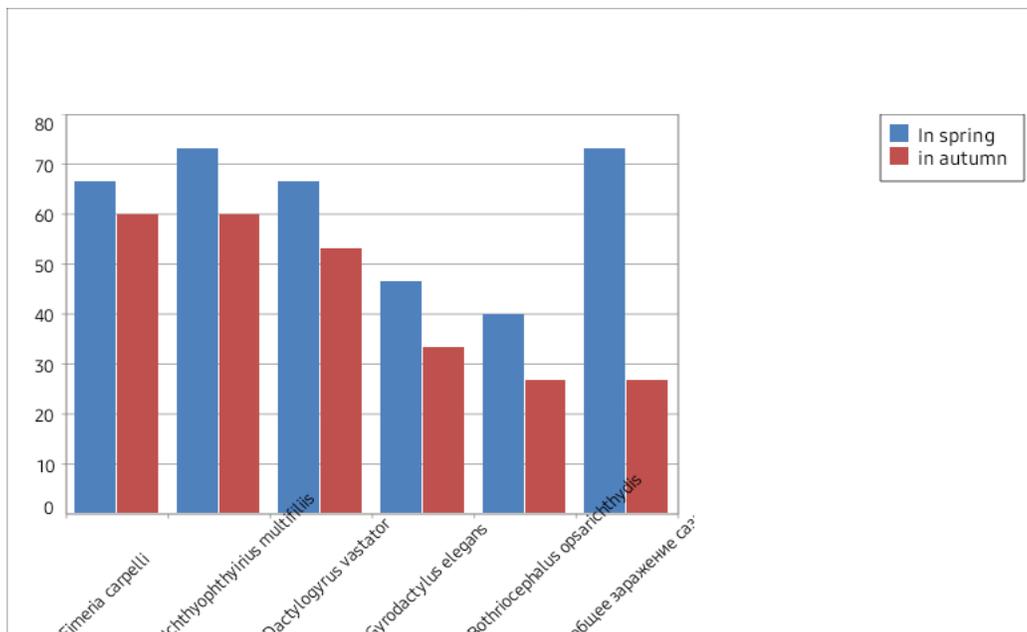
In general, the observation of the formation of the parasite fauna of fish in the system of the Turtkul pond farm shows that in recent years, in the lower reaches of the Amu Darya of the South Aral Sea, the parasite fauna of individual fish has become significantly impoverished. This is due to the action of a number of abiotic factors: current, water level fluctuations, frequent water changes, silting and other environmental factors that create unfavorable conditions for fish parasites. In order to clarify the changes that occurred in the composition of the parasite fauna of fish in the lower reaches of the Amu Darya after the formation of the Tuyamuyun reservoir and in the system of the Turtkul pond farm, we attempted to conduct an ecological assessment of the influence of abiotic factors (water pollution) on the infection of juvenile fish in the reservoirs of the Southern Aral Sea. The species composition, extensiveness and intensity of

infection of fish with parasites in the Turtkul pond farm system were not the same, which depends both on biotic (species composition, number and stationary distribution of intermediate and definitive hosts of parasites, etc.), and from abiotic (flow rate, gas and salt regime of the reservoir, etc.) factors.

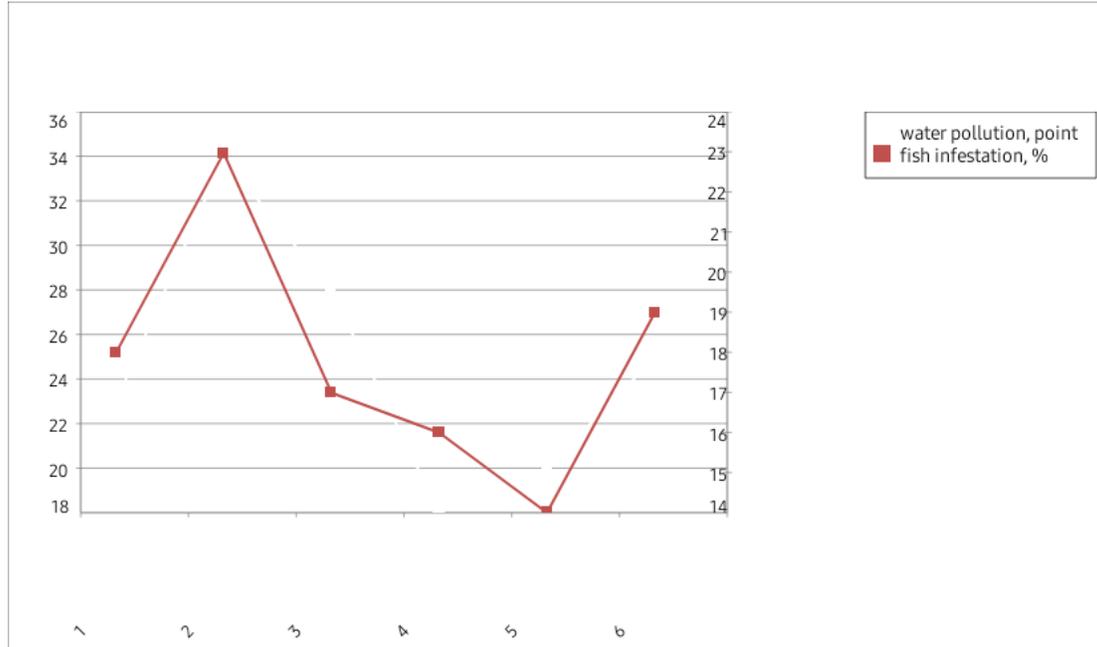
The analysis showed that the dependence of fish infection on water pollution in the reservoirs of the Southern Aral Sea has a polynomial trend (Fig. 2). The highest percentage of infection was found in the 4th department of the pond farm, the minimum degree of infection was in the collector network, which indicates the level of pollution of these reservoirs.

The fight against fish diseases should be aimed primarily at preventing the pathogen from entering the reservoir or suppressing its numbers, strengthening the host's defenses, and creating conditions that prevent the development of diseases. Conventionally, control measures can be divided into general, special and organizational (Nyukkanov, 2004; Strelkov Yu, 2000; Noble, 1964; Pekcan-Hekim *et al.*, 2005).

**Fig.1** Dynamics of seasonal infection of juvenile fish in the conditions of the Turtkul pond farm in the South Prearalie



**Fig.2** Dependence of fish infection on water pollution in the reservoirs of the Southern Aral Sea



Note: 1 - Yanbosh-yop, 2 - 4 ind. ponds, 3 - 6 sec. ponds, 4 - collector, 5 - lake. Turkul, 6 - lake.

In conclusion, General measures to combat fish diseases include the full feeding of fish and the creation of a rich natural food base, high-quality fish farming, keeping ponds in a good sanitary and fish-breeding condition, combating weed “foreign” fish, preventing excessive fish stocking densities near ponds, fighting intermediate and definitive hosts of parasites (mollusks, piscivorous birds, etc.), reduction of traumatization during fishing of ponds and fish transplantation, reduction of the terms of growing juveniles in farms, constant monitoring of the food supply and hydro chemical regime, as well as the condition of fish, etc.

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**How to cite this article:**

Allamuratova Ziyuar Bauaddinovna. 2022. Ecological Analysis of the Parasite Fauna of Valuable and Low-Valuable Fish in the Pond Farms of the Aral Region. *Int.J.Curr.Microbiol.App.Sci.* 11(03): 372-376. doi: <https://doi.org/10.20546/ijemas.2022.1103.040>