Fish Fauna of the Watery Areas of Bukhara Region and Adjacent Territories

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Abstract

The article analyzes the species composition, the leading orders, the spectrum of families, the taxonomic composition of fish species that are living in Bukhara region and adjacent watery areas. There 5 orders belonging to 2 large orders, 9 families, 45 species of fish have been identified. According to the degree of occurrence of these 45 species in Bukhara region and adjacent waters, it was found out that 10 species out of them are highly dominant, 9 species are subdominant, 17 species occur in separate reservoirs, 9 species belong to small, rare species. The influence of various biotic, abiotic and anthropogenic factors on the ichthyofauna of the region is analyzed in detail.

Keywords: *Acipenser nudiventris, Pseudoscaphirhynchus fedtschenkoi, Pseudoscaphirhynchus kaufmanni, Luciobarbus brachycephalus, Ballerus sapa.*

INTRODUCTION

Ensuring the stability of water resource, preserving fish biodiversity and increasing fish productivity by using modern methods are considered important issues of today. Currently, the development of innovative technologies for identifying and monitoring the condition of fish species in natural and artificial reservoirs, identifying factors affecting them, and studying promising species, controlling their numbers is essential as well.

Theoretically, a comprehensive study of the biology and ecology of fish species helps to solve the problem of determining ways to increase the economic efficiency of fish farms. The integrated development of fisheries and fish farms is one of the most important factors in the rational solution of the food problem. The analysis of the ichthyofauna of reservoirs of Bukhara region at the present time, the study of the structure of fish populations by age and size, along with the study of biology and the significance of the acclimatized fish accidentally caught in reservoirs are the keys of the stability of fishing in reservoirs. An urgent issue of today is there is not sufficient amount of information about the species composition, abundance, biotopic distribution, reproduction, seasonal and annual dynamics of fish in Bukhara region and adjacent watery areas.

Due to the fact that the arable lands of the Bukhara region were not provided with water from the Zarafshan River, after the 50s of the last century, the Amu Darya waters were connected to the Zarafshan River through the Amu-Korakul and Amu-Bukhara canals to irrigate crops in the regions near Amu Darya, and provincial irrigation networks began to function as a completely new system.

After several step-by-step pumping stations and water distributors were built in the water supply of the lower districts of the Zarafshan

River, radical changes occurred, as a result of which the ichthyofauna in the waters of the lower reaches of the Zarafshan River mixed with the ichthyofauna of the Kashkadarya and Amu Darya through collector systems and channels.

Material and methods

Fish World is one of the most important objects of biodiversity. To study the fish fauna in Bukhara region in 2012-2022, observations were carried out in so-called Karakir, Zamanbobo, Denizkul, Hadicha, Zikri, Devkhona, Kumsultan and Nogitma, Todakol, Kunimozar and Shurkul reservoirs, Amu-Bukhara machine Channel networks, as well as in the Kagan fishing areas [5]. Fish samples from the ponds of Bukhara region were collected in the field using mesh nets of different sizes (35,45,55,65 mm). When catching small fish, a net with a cage of 15-30 mm, a Braden net with a cage of 8-10 mm, a mesh net and fishing rods were used [1;2]. Fish that were caught was fixed with 4% formalin. Collections of fish caught in different years were also used, in particular those stored in the Zoo Museum of Bukhara State University.

Fishing rods were used to catch predatory fish. The weight of the fish was measured on an electronic scale [4]. When determining the species composition of fish, the literature written by Mirabdullaev and other authors was used, and the scientific names and systematic interpretation of fish were taken from the literature published by Dadaev. [3;8;10].

Result and discussion

Based on the analysis of the field materials collected in Bukhara region and adjacent watery areas, 2 large orders of fish (Ganoidomorpha,Teleostei), 5 suborders (Cypriniformes, Acipenseriformes, Siluriformes, Perciformes, Mugiliformes), 9 families (Acipenseridae, Cyprinidae, Cobitidae, Siluridae, Percidae, Mugilidae, Gobiidae, Channidae, Eleotrididae) 45 species have been identified (Table 1).

Table 1 Distribution of fish species in Bukhara region and adjacent waters (2012-2022)

№	Fish Species	Protection Label	Devkhona	Khadija	Ogitma	Dengizkul	Kora-qir	Shurkul	Tudakul reservoir	Kuyimozor reservoir	Amu-Bukhoro Channel	Amudarya
	Phylum. Chordata											
	Subphylum. Craniata											
	Group. Anamnia											
	Superclass. Pisces											
	Class. Osteichtyes											
	Subclass. Actinopterugii											
	Superorder.Ganoidomorpha											
	Order. Acipenseriformes											
	Family. Acipenseridae											
1	Acipenser nudiventris(A)	UzRDB RL CITES I	-	-	-	-	-	-	-	-	-	+
2	Pseudoscaphirychus kaufmanni(A)	UzRDB RL CITES I	-	-	-	+	-	+	+	+	+	+
3	Pseudoscaphirhynchus hermanni(A)	UzRDB RL CITES I	-	-	-	-	-	-	-	-		+

	Superorder. Teleostei											
	Order. Cypriniformes											
	Family. Cyprinidae											
4	Rutilus rutilus (Q)		+	+	+	+	+	+	+	+	+	+
5	Rutilus rutilus aralensis(A)		+	+	+	+	+	+	+	+	+	+
6	Alburnoides taeniatus (Q)		-	+	+	-	-	-	+	+	-	-
7	Pseudorasbora parva (Z)		+	+	+	+	+	+	+	+	+	-
8	Leuciscus lehmanni (Z)		-	+	-	-	-	+	+	+	+	-
9	Aspius aspius taeniatus (A)		-	-	-	-	-	+	-	-	+	+
10	Barbus brachycephalus (A)	UzRDB	-	-	-	-	-	+	-	-	+	+
11	Capoetobrama kuschakewitschi (A)	UzRDB	-	-	-	-	-	+	-	+	+	+
12	Pelecus cultratus(A)		-	-	-	-	-	+	+	+	+	+
13	Aspius aspius (A)		-	-	-	-	+	+	+	-	+	-
14	Aspiolucius esocinus (A)	UzRDB RL	-	-	-	-	-	+	-	-	+	+
15	Gobio gobio lepidolaemus (Q)		+	+	+	+	+	+	+	+	-	-
16	Chalcalburnus chalcoides aralensis (A)		+	+	+	+	+	+	+	+	+	+
17	Varicorhinus heratensis steindachneri (Z)		-	+	+	+	+	+	+	-	+	-
18	Luciobarbus conocephalus (Z)	UzRDB	+	+	+	+	+	+	+	-	+	-
19	Alburnoides bipunctatus eichwaldi (Z)		-	+	+	+	+	+	+	+	-	+
20	Abramis brama (A)		+	+	+	+	+	+	+	+	+	+
21	Abramis brama orientalis (A)		+	+	+	+	+	+	+	+	+	+
22	Carassius gibelio (Q)		+	+	+	+	+	+	+	+	+	+
23	Cyprinus carpio (Z)		+	+	+	+	+	+	+	+	+	+
24	Hypophthalmichthys molitrix(I)		+	-	+	+	+	+	+	+	-	-
25	Aristichthys nobilis (A)		-	-	-	-	-	+	+	-	-	-
26	Ctenopharyngodon idella (I)		-	+	+	+	+	+	+	+	+	+
27	Mylophoryngodon piceus (A)		-	-	-	-	-	+	+	-	+	+
28	Abramis sapa (A)	UzRDB	-	-	-	-	-	-	+	-	+	+
29	Hemiculter leucislus(A)		-	-	-	+	-	+	-	-	-	-
30	Parabramis pekinensis(Z)		-	-	+	-	+	+	+	-	+	+
31	Rhodeus ocellatus(A)		-	-	+	+	-	+	+	+	+	-
32	Abbotina rivularis(A)		-	-	-	+	-	+	-	+	+	-
	Family. Cobitidae											
33	Nemacheilus oxianus (A)		+	+	-	-	-	+	+	-	+	+
34	Nemacheilus stoliczkai		-	-	-	-	-	+	-	+	+	+
35	Nemacheilus malapterurus longicauda (Q)		+	-	-	+	+	+	+	-	-	+
36	Sabanejewia aurata(A)	UzRDB	-	-	-	-	-	-	+	-	+	-
	Order. Siluriformes											
	Family. Siluridae											
37	Silurus glanus (A)		+	+	+	+	+	+	+	+	+	+
38	Clarias griepinus (I)		-	-	-	-	-	-	+	-	+	-
	Order. Perciformes											
	Family. Percidae											
39	Stizostedion lucioperca (I)		+	+	+	+	+	+	+	+	+	+
40	Perca schrenki(Z)		-	-	-	-	-	-	+	-	+	+
	Family. Gobiidae											
41	Knipowitschia caucasica(A)		-	-	-	-	-	+	+	-	-	+
42	Rhinogobius bruneus(A)		-	+	+	+	+	+	+	+	+	+
	Family. Channidae											
43	Channa argus(Z)		-	-	+	+	+	+	+	+	+	+

Family. Eleotrididae												
44	Micropercops cinctus(Z)		-	-	-	+	+	+	-	-	+	-
	Order. Mugiliformes											
	Family. Poeciliidae											
45	Gambusia affinis (Z)		+	+	+	+	+	+	+	+	+	+

Note: (A)-fish that have passed through the Amu Darya; (H)-fish that have passed through the Zarafshan River; (Q)-fish that have swum through the Kashkadarya basin; (I) – acclimatized.

UzRDB-species (subspecies) listed in the Red Book of the Republic of Uzbekistan (2019)

RL-species (subspecies) listed in the red list of the International Union for Conservation of Nature and Natural Resources (IUCN) (2004)

CITES I, CITES II-species (subspecies) included in the annexes of the Convention on International Trade in Endangered Species of Wild Fauna and Flora.[9].

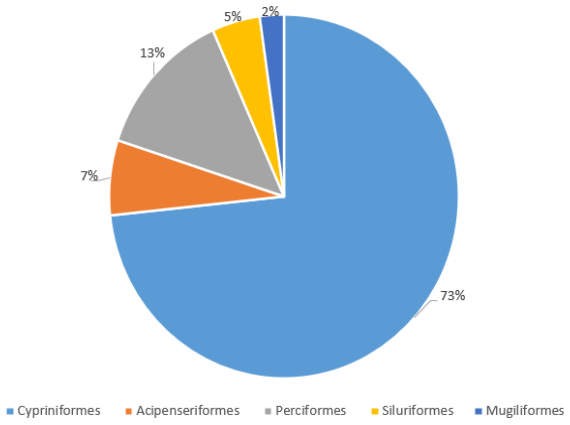
Out of 45 species of fish registered in waters of Bukhara region and adjacent areas, 9 species - Acipenser nudiventris, Pseudoscaphirychus kaufmanni, Pseudoscaphirhynchus Hermanni, Luciobarbus brachycephalus, Luciobarbus conocephalus, Aspiolucius esocinus, Capoetobrama kuschakewitschi, Abramis Sapa, Sabanejewia aurata are listed in the Red Book of the Republic of Uzbekistan, of which 4 species (Acipenser Nudiventris, Pseudoscaphirychus Kaufmanni, Pseudoscaphirhynchus Hermanni, Aspiolucius Esocinus) are registered in the IUCN Red List, 3 species (Acipenser nudiventris, Pseudoscaphirychus kaufmanni, Pseudoscaphirhynchus hermanni) are included in Appendix I and II of CITES [9:5;6:7].

Table 2 The spectrum of the leading orders and families of fish in waters of Bukhara region and surrounding areas

Orders	Number of families	%	Number of species	%
Cypriniformes	**2**	**22,23**	**33**	**73,35**
Acipenseriformes	**1**	**11,11**	**3**	**6,66**
Perciformes	**4**	**44,44**	**6**	**13,33**
Siluriformes	**1**	**11,11**	**2**	**4,44**
Mugiliformes	**1**	**11,11**	**1**	**2,22**
Total	**9**	**100**	**45**	**100**

Cypriniformes is one of the leading orders of fish in the area and consists of 33 species and subspecies. The proportion of other orders is smaller, as can be seen in Table 2.

Figure 1. Distribution of fish by order in Bukhara region and adjacent watery areas.



According to the results obtained, out of the 45 species of fish identified in Bukhara region and adjacent waters, the largest number by species composition, 33 species (73%) belong to the Cyprinidae order, 3 species (6%) belong to the Acipenseriformes order, 6 species (12%) belong to the Perciformes order, 2 species (4%) belong to the Siluriformes order, 1 species (2%) Belongs to the Mugiliformes order (Fig.1).

The category of common types includes Hypophthalmichthys molitrix, Silurus glanus, Cyprinus carpio, Rutilus rutilus aralensis, Ctenopharyngodon idella. The category of endemic species which are on the verge of extinction includes Acipenser nudiventris, Pseudoscaphirychus kaufmanni, Pseudoscaphirhynchus Hermanni, Luciobarbus brachycephalus, Aspiolucius esocinus, Sabanejewia aurata. The category of slightly declining species involves Capoetobrama kuschakewitschi, Abramis Sapa, Luciobarbus conocephalusTable 1.

Table 3 Taxonomic composition of fish found in Bukhara region and adjacent watery areas.

Phylum	Class	Order	Family	Species
Chordata	Pisces	Acipenseriformes	Acipenseridae	Acipenser nudiventris
				Pseudoscaphirychus kaufmanni
				Pseudoscaphirhynchus hermanni.
		Cypriniformes	Cyprinidae	Rutilus rutilus
				Rutilus rutilus aralensis
				Alburnoides taeniatus
				Pseudorasbora parva
				Leuciscus lehmanni
				Aspius aspius taeniatus
				Barbus brachycephalus
				Capoetobrama kuschakewitschi
				Pelecus cultratus
				Aspius aspius
				Aspiolucius esocinus
				Gobio gobio lepidolaemus
				Chalcalburnus chalcoides aralensis
				Varicorhinus heratensis steindachneri
				Luciobarbus conocephalus
				Alburnoides bipunctatus eichwaldi
				Abramis brama
				Abramis brama orientalis
				Carassius gibelio
				Cyprinus carpio
				Hypophthalmichthys molitrix
				Aristichthys nobilis
				Ctenopharyngodon idella
				Mylophoryngodon piceus
				Abramis sapa
				Hemiculter leucislus
				Parabramis pekinensis
				Rhodeus ocellatus
				Abbotina rivularis
			Cobitidae	Nemacheilus oxianus
				Nemacheilus stoliczkai

				Nemacheilus malapterurus longicauda
				Sabanejewia aurata
		Siluriformes	Siluridae	Silurus glanus
				Clarias griepinus
		Perciformes	Percidae	Stizostedion lucioperca
				Perca schrenki
			Gobiidae	Knipowitschia caucasica
				Rhinogobius bruneus
			Channidae	Channa argus
			Eleotrididae	Micropercops cinctus
		Mugiliformes	Poeciliidae	Gambusia affinis

3 species of Acipenseridae family belonging to Acipenseriformes order, 33 species of 2 families - Cyprinidae, Cobitidae which belong to Cypriniformes order, 6 species of 4 families - Percidae, Gobiidae, Channidae, Eleotrididae belonging to Perciformes order, 2 species of Siluridae family belonging to Siluriformes order, 1 species of Poeciliidae family belonging to Mugiliformes order were identified in Bukhara region and surrounding areas. (Table 3).

Conclusion

In the conditions of the unfavorable ecological situation observed since the second half of the last century in the Aral Sea and its surroundings, the analysis, monitoring and creation of a cadaster of fauna and flora of Bukhara region and adjacent territories is of great scientific and practical importance. It is also necessary to create a cadastral information base of fish found in Bukhara region and adjacent water areas, to form new information about the dynamics of the fish population, to organize measures for the protection and sustainable use of the fish world. Today, the data of the state cadaster of fish fauna do not allow us to obtain accurate information about the total number of fish found in Uzbekistan, including Bukhara region. Based on this, we consider it necessary to accelerate our scientific and practical research further in this area.

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