

Viability of Rare Fish Species in the Water Biotopes of the Khorezm Oasis and the Ecological Factors Determining Them

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Annotation: In this article, based on scientific sources, the viability of rare and valuable fish species in the main aquatic biotopes of the Khorezm oasis (stepped environment, its rate, success of reproduction) and the quality of their determining ecological analysis, water, chemical indicators, water temperature, mineralization, water content, the state of the chemical base, and the influence of anthropogenic fluid (reclamation, water, pollution) on fish survival were highlighted. With the help of supporting tools, it helps to maintain safety measures.

Keywords: Khorezm oasis, aquatic biotope, rare fish, viability, hydro-ecology, anthropogenic factor, population, biodiversity.

Introduction

The water bodies of the Khorezm oasis (lower reaches of the Amu Darya, canals, collector-drainage networks, lakes and reservoirs) become an important area for the collection of internal water bioresources. In this area, the predominance of natural and artificial aquatic biotopes, the sharp continentality of the climate, as well as intensive production of water resources, the composition of fish fauna and the state of populations are changing[1]. Control over the number and species diversity of fish planted in inland water is explained by the deterioration of water quality, the purification of the hydrological regime, and the intensification of anthropogenic quality. Ecological monitoring of the viability of rare fish species is an important element, which serves as a scientific basis for ensuring the preservation of aquatic ecosystems, developing a sustainable and sustainable strategy for bioresources[2].

Research objective. Creation of scientific sources based on useful analysis determining the viability of rare fish species in the aquatic biotopes of Khorezm and providing recommendations for resource population safety[3].



Materials and methods

The scientific article is based on literature review, hydroecological literature, and generally accepted theoretical methods for inland aquatic ecosystems. The ecological indicator for increasing viability was highlighted:

- Physicochemical indicators of water: temperature, pH, mineralization (salinity), dissolved oxygen, ammonia, and nitrites/nitrates.
- Biologically direct, under the conditions of the food chain, plankton and Bence resources, the degree of movement and predation.
- Anthropogenic and wastewater: melioration runoff, collector wastewater inflow, pesticide, prevention of the water regime.

Classical scientific structures on the ecology of inland waters and fish biology (population ecology, adaptation to the biotope, analysis of stress factors) are adopted as the main methodological direction.

Results and discussion

The viability of fish in the Khorezm oasis depends mainly on the specific hydrological and hydrochemical conditions of aquatic biotopes. The width of the collector-drainage network in the region increases water mineralization and increases physiological stress for some species[4]. Increased salinity can complicate the osmoregulation process in fish, slowing down growth rates and reducing reproduction[5].

The temperature of the water and the amount of dissolved oxygen are decisive factors in its viability[6]. In winter, oxygen deficiency (especially in stagnant water bodies), and in summer, a decrease in oxygen against the background of high temperatures increases metabolism in fish. This leads to a weakening of the immune system and an increase in parasitic and protective immunity[7].



In the ecosystems of the anthropogenic Yukarysm oasis, especially water intake: water intake for irrigation, river regulation, the construction of hydraulic structures limit the natural migration routes[8]. In fish, the restoration of the population slows down, which is more dependent on migration. At the same time, the introduction of fertilizers and pesticides into the water intensifies eutrophication, disrupting the natural balance of aquatic flora[9].

A decrease in the number of plankton and benthic organisms reduces their indicators, especially in juvenile stages[10]. For this, viability is possible not with one factor, but only with the totality of several ecological factors

Conclusion.

The viability of rare fish species found in the Khorezm oasis is closely related to the main hydro-ecological indicators of the aquatic environment. In particular, changes in the level of water mineralization, oxygen regime, and temperature under the influence of seasonal and anthropogenic factors directly affect the processes of fish survival, nutrition, and reproduction. As a result of excessive salinity or oxygen deficiency, the physiological activity of fish weakens, the immune system weakens, and the natural population decreases. Sharp temperature fluctuations disrupt egg-laying and larval development.

The intensification of anthropogenic production activity in the region in recent years has put significant pressure on aquatic ecosystems. The chemical composition of water is deteriorating due to insufficient protection of the water regime, deterioration of collector-drainage systems, and their direct entry into water bodies. In addition, industrial and agricultural waste, household pollution, as well as cases of illegal and harmful fishing, sharply narrow the natural habitat of rare fish species. These factors lead to a decrease in biodiversity and an increase in the risk of extinction of certain species.

A comprehensive and systematic approach is necessary to preserve rare fish species and restore their natural populations. First of all, it is important to establish constant monitoring of water quality, strengthen environmental safety measures, and widely introduce methods of artificial reproduction. One of the effective measures is the breeding of valuable and endangered fish species using incubation technologies, with their subsequent adaptation to natural water bodies. At the same time, the preservation of fish resources can be ensured by strengthening control over illegal fishing and strictly complying with legislative requirements.

Practical recommendations

It is necessary to regularly conduct hydroecological monitoring of water bodies, constantly monitoring the pH of the water, the amount of dissolved oxygen (DO), the degree of salinity, and the concentration of ammonia. Timely analysis of these indicators allows for the early detection of negative changes and the adoption of prompt measures.

It is important to strictly restrict or completely prohibit fishing for rare fish during their breeding season, as well as to introduce biological "peace" zones. Such areas create favorable conditions for the natural reproduction of fish and population recovery.

It is necessary to limit the inflow of collector-drainage waters into open water bodies or introduce systems for their preliminary filtration. By improving land reclamation management, it is possible to reduce the level of water pollution and maintain the stability of the hydroecosystem.

It is also necessary to restore and develop environmental programs aimed at supporting natural resources. The application of biomanipulation methods, maintaining the ecological balance between aquatic plants and fauna, ensures the long-term sustainability of fish resources.

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