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THE CRUCIAN CARPS ROLE IN THE FORMATION OF WATER BODIES BIOLOGICAL RESOURCES: ON THE EXAMPLE OF THE ODESA REGION

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Ukrainian water bodies are an important resource for the fisheries industry, which provides both the domestic market and exports. Use of the water bodies bioproductive potential is of great importance for the country's economy, ecology and food security. Current trends in fisheries development require new approaches to optimize the use of the water bodies bioproductive potential, including the introduction of innovative technologies, resource management and preservation of ecological balance.

Crucian carps play an important role in shaping the biological resources of water bodies, particularly in Odesa region. This region is characterized by a significant diversity of water bodies, including rivers, lakes, estuaries and reservoirs, each of which has its own unique ecological balance. Understanding the role of crucian carps in these ecosystems is key to effective management of biological resources and maintaining ecological balance.

The relevance of the study is determined by the need to conserve and restore the biodiversity of water bodies in Odesa region, improve the ecological status of aquatic ecosystems, and ensure sustainable development of the fishery. Crucian carps, due to their role in ecosystems, can be an effective tool in achieving these goals.

The purpose of the article is to reveal the role of crucian carps in the formation of water bodies biological resources in Odesa region and to determine their impact on environmental sustainability and fisheries in the region.

The object of the study is crucian carps that live in the Odesa region's water bodies. This includes species such as silver crucian carp, common crucian carp, and others.

The subject of the study is the impact of crucian carps on the formation of water bodies biological resources, including their role in maintaining biodiversity, regulating the number of aquatic plants and algae, as well as their impact on the overall productivity and ecological stability of water bodies.

The water bodies of Odesa region are rich in crucian carps, making the region one of the key areas for their commercial fishing. The use of modern technologies and methods allows for efficient fishing without significant impact on the ecosystem.

The ability of crucian carps to control the number of aquatic plants and algae, as well as their economic value, make them an important component of freshwater ecosystems. Further research should be aimed at better understanding their ecological role and developing strategies for the sustainable management of their populations.

Keywords: crucian carp, biological resources, water bodies, Odesa region, ecological role, fisheries, trophic network, ecosystem, bioproductivity, ecological balance.

Problem statement. Crucian carps (*Carassius spp.*) are an integral part of freshwater ecosystems. They play an important role in the biodiversity and functioning of these ecosystems, affecting their productivity and ecological balance. In Odesa region, as in other regions of Ukraine, water bodies play an important economic and environmental role. Therefore, understanding the role of crucian carps in these reservoirs is extremely important for the effective management of their resources [1, 2].

Many water bodies in the Odesa region are experiencing a decline in biodiversity due to anthropogenic impacts, including pollution, river regulation, and overfishing. Crucian carps can contribute to the restoration of biodiversity due to their adaptive abilities and role in trophic networks. In addition, aquatic ecosystems in the region suffer from eutrophication, which is caused by excessive accumulation of nutrients in the water. This leads to excessive growth of algae and other plants that can reduce water quality and cause fish kills. Crucian carps, due to their ability to consume algae and other aquatic plants, can help reduce these negative effects. There is a limited amount of research examining the ecological role of crucian carps in the water bodies of Odesa region [1, 3]. This makes it difficult to develop effective management strategies for their populations and water resources in general.

Analysis of recent research and publications. Crucian carps (*Carassius spp.*) are important inhabitants of freshwater bodies and play a significant role in the formation of biological resources. Studying their role in the water bodies biocenoses in Odesa region is of great importance for the effective management of fish resources and maintaining ecological balance. A significant number of scientific publications are devoted to the study of this topic in the scientific literature. Among the latter are [6, 8].

Crucian carps are of great ecological and economic importance for the Odesa region's water bodies. They not only contribute to the maintenance of biodiversity, but are also a valuable resource for fisheries. Recent studies confirm the high adaptive capacity of crucian carp and their ability to survive in different environmental conditions, which makes them an important target for further scientific research and management decisions.

Objective. The objective of this study is to reveal the role of crucian carps in the formation of water bodies biological resources in the Odesa region

and to determine their impact on the ecological sustainability and fisheries of the region.

Research results. Crucian carp (*Carassius*) belong to the carp family (*Cyprinidae*) and are important freshwater fish that live in various types of water bodies, including lakes, rivers, ponds, and reservoirs. The main species found in the water bodies of the Odesa region are common crucian carp (*Carassius carassius*) and silver crucian carp (*Carassius gibelio*).

The common crucian carp (*Carassius carassius*) has a tall, flattened body with many scales. The color varies from bronze to golden, reaches a length of up to 50 cm and a weight of up to 3 kg. Its peculiarity is high endurance to low oxygen content in water.

Silver crucian carp (*Carassius gibelio*) has a body that is silverier than that of common crucian carp and is slightly elongated. It is up to 40 cm long and weighs up to 2 kg. Its feature is high adaptability to different environmental conditions.

Crucian carps prefer stagnant or slowly flowing waters with rich vegetation. They can live in low-oxygen waters, which makes them very resistant to unfavorable environmental conditions. They are omnivorous, their diet is based on aquatic plants and algae, invertebrates (insect larvae, crustaceans, worms), and organic residues.

Crucian carp spawn in May-June, when the water temperature reaches 16–18 °C. They choose spawning grounds in the coastal zone with rich vegetation [4, 5].

Crucian carps play an important role in the water bodies trophic network, namely in regulating populations of aquatic plants and algae and in feeding predators. Crucian carps consume large quantities of vegetation, which helps control its growth and maintain ecological balance, and they are also important food for predatory fish, birds and other animals, contributing to ecosystem stability.

Due to their endurance, omnivorousness and high adaptability, they are important components of aquatic ecosystems. Crucian carps play a key role in maintaining the water bodies biological productivity and ecological balance. Understanding their ecological role and characteristics is important for effective management of water resources and fisheries, particularly in regions such as Odesa region [6, 7].

Crucian carps, in particular common crucian carp (*Carassius carassius*) and silver crucian carp (*Carassius gibelio*), are important commercially harvested species in Ukraine. They are popular due to their high productivity, adaptability to different environmental conditions, and significant economic potential.

The main species for commercial fishing are common crucian carp (*Carassius carassius*) (mainly found in natural water bodies, including lakes and

rivers) and silver crucian carp (*Carassius gibelio*) (widely distributed in ponds, reservoirs and artificial reservoirs, where it often dominates other species).

Catch methods include: netting – the use of various netting gear, such as seines, pond nets, and vent traps; fishing – the use of fishing rods with bait, especially in reservoirs with low intensity of commercial fishing; trapping – the use of special structures that are located in places of massive fish aggregation.

Active fishing occurs in the spring during the spawning season, when fish gather in coastal areas, and intensive fishing in the fall during the seasonal drop in water temperature, when fish prepare for wintering.

Crucian carps are an important component of the freshwater fish fauna of Ukraine. They have high fishery value and play a significant role in the biocenoses of water bodies. The analysis of crucian carp catches for the period from 2020 to 2023 allows us to assess the state of their populations, the impact of various factors on fishing activities, and the effectiveness of fisheries management measures.

Analysis of fish catches is an important indicator of the fishery resources state and the efficiency of fishing activities. Changes in catch volumes can indicate environmental changes, changes in fish populations, and the impact of fishing practices.

Catch volumes of crucian carps in Ukraine for 2019–2023 range from 8700 tons in 2019 to 3000 tons in 2022 (Fig. 1)

Thus, from 2019 to 2021, the volume of crucian carps catches decreased gradually, but a significant decrease occurred in 2022, when the catch volume decreased by 57.14 % compared to the previous year. In 2023, there was a slight increase of 13.33 %.

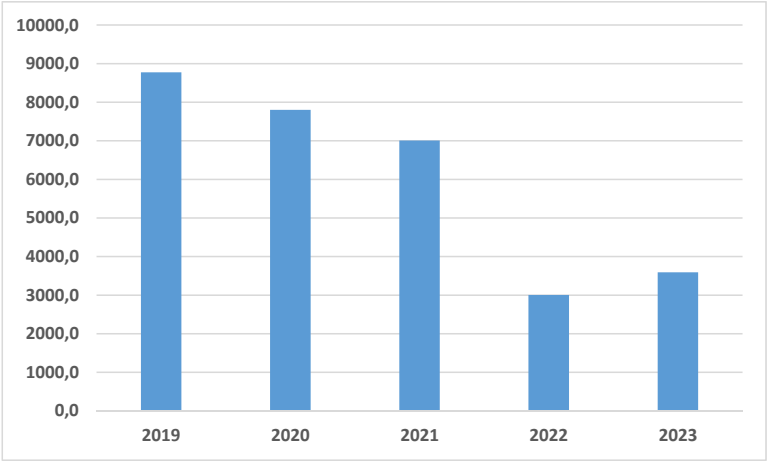

Fig. 1. **Dynamics of crucian carps catches in Ukraine for the period 2019–2023 (according to the State Fisheries Agency of Ukraine)**

Possible reasons for the decline in catches include environmental factors, namely: climate change, water pollution, and the reduction of natural habitats can significantly affect crucian carps populations; fishing pressure, i.e. overfishing, insufficient control over fisheries can lead to populations depletion; and economic and social factors – possible changes in the economy of the fishing industry, social factors, and government policy on fishing can affect catches.

Thus, the catch of crucian carps in Ukraine decreased significantly between 2019 and 2023, with a particularly sharp decline in 2022. In 2023, there was a slight recovery in catch volumes, but the overall downward trend is still relevant.

Considering the volumes of crucian carps catches in the Odesa region in 2019–2023, a significant decrease in catches should also be noted (Fig. 2).

As can be seen from Fig. 2, from 2019 to 2023, the catch of crucian carps in the Odesa region decreased from 3100 tons to 1100 tons, which is a significant reduction (by more than 64 %).

Possible reasons for the decline in catches include the same reasons as for catches throughout Ukraine, i.e. environmental factors, fishing pressure, and economic and social factors.

Consequently, the catch of crucian carps in Ukraine has significantly decreased over the period 2019–2023. To stabilize and restore crucian carps populations, measures need to be taken, in particular by improving the water bodies ecological condition, implementing sustainable fishing practices, and strengthening control over catches.

Odesa region is one of the most important regions for commercial crucian carps production in Ukraine. This period is marked by changes in the fisheries

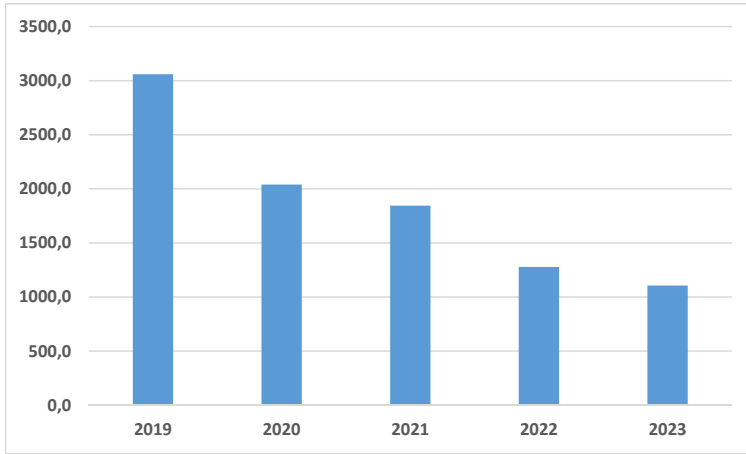

Fig. 2. **Dynamics of crucian carps catches in Odesa region for the period 2019–2023 (according to the State Fisheries Agency of Ukraine)**

sector that have affected the volume of catches and the state of crucian carps populations.

Preliminary data for 2024 show a stabilization. This is due to efforts aimed at balancing the catch and preserving crucian carps populations.

In the period from 2020 to 2024, the catch of crucian carps in Odesa region showed a tendency to stabilize after a fluctuations period. Effective management of fishery resources, introduction of modern fishing methods and measures to preserve ecological balance contributed to maintaining a high level of productivity in the fishing sector. Odesa region continues to play a key role in Ukraine's fisheries, demonstrating a successful combination of economic and environmental approaches.

Conclusions. Crucian carps play an important role in maintaining the biodiversity of water bodies in Odesa region. They ensure the stability of the ecosystem by promoting a balance between different species of aquatic organisms. Due to their ability to adapt, crucian carps can exist in different conditions, making them key species for maintaining ecosystem balance.

Crucian carps are natural regulators of the number of aquatic plants and algae. They consume a significant amount of phytoplankton and macrophytes, which helps to control their excessive growth. This, in turn, helps to prevent eutrophication of water bodies, improve water quality and create favorable conditions for other fish species.

Crucian carps contribute to the ecological stability of water bodies through their influence on the structure of trophic networks. They help to maintain a balance between different trophic levels, which increases the overall productivity of water bodies. As a result, water bodies become more resilient to external impacts such as climate change and anthropogenic pressure.

Crucian carps have a significant economic potential for the fishery of Odesa region. They are a valuable resource for industrial and recreational fishing. Due to their high reproductive capacity and rapid growth, crucian carps can provide stable catches and maintain the economic stability of the region's fisheries.

To effectively manage crucian carps populations and optimize the use of their bioproductive potential, it is necessary to:

– conduct regular monitoring of the crucian carps populations status and the ecological conditions of water bodies;

– ensure scientifically based regulation of crucian carps catch to prevent their excessive depletion;

– develop and implement programs for the restoration and maintenance of crucian carps populations, in particular by stocking water bodies with young fish;

– implement measures to improve the ecological condition of water bodies, including reducing anthropogenic pollution and preventing eutrophication, etc.

Thus, crucian carps play a key role in shaping the biological resources of Odesa region's water bodies. Their ecological and economic importance emphasizes the need for an integrated approach to managing their populations and maintaining the health of the region's aquatic ecosystems.

РОЛЬ КАРАСЕВИХ РИБ У ФОРМУВАННІ БІОЛОГІЧНИХ РЕСУРСІВ ВОДОЙМ: НА ПРИКЛАДІ ОДЕСЬКОЇ ОБЛАСТІ

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Водойми України є важливим ресурсом для рибного господарства, яке забезпечує як внутрішній ринок, так і експорт продукції. Використання біопродукційного потенціалу водойм має велике значення для економіки країни, екології та забезпечення продовольчої безпеки. Сучасні тенденції розвитку рибного господарства потребують нових підходів до оптимізації використання біопродукційного потенціалу водойм, що включає впровадження інноваційних технологій, управління ресурсами та збереження екологічної рівноваги.

Карасеві риби відіграють важливу роль у формуванні біологічних ресурсів водойм, зокрема в Одеській області. Цей регіон характеризується значним різноманіттям водойм, що включають річки, озера, лимани та водосховища, кожна з яких має свій унікальний екологічний баланс. Розуміння ролі карасевих риб у цих екосистемах є ключовим для ефективного управління біологічними ресурсами та підтримання екологічної рівноваги.

Актуальність дослідження визначається необхідністю збереження та відновлення біорізноманіття водойм Одеської області, поліпшенням екологічного стану водних екосистем та забезпеченням стійкого розвитку рибного господарства. Карасеві риби, завдяки своїй ролі в екосистемах, можуть бути ефективним інструментом у досягненні цих цілей.

Метою статті є розкриття ролі карасевих риб у формуванні біологічних ресурсів водойм Одеської області та визначення їхнього впливу на екологічну стійкість та рибне господарство регіону.

Об'єктом дослідження є карасеві риби, що мешкають у водоймах Одеської області.

Предметом дослідження є вплив карасевих риб на формування біологічних ресурсів водойм, включаючи їх роль у підтримці біорізноманіття, регулюванні чисельності водних рослин та водоростей, а також їх вплив на загальну продуктивність та екологічну стабільність водойм.

Водойми Одеської області багаті на карасевих риб, що робить регіон одним з ключових для їх промислового вилову. Використання сучасних технологій та методів дозволяє ефективно здійснювати вилов без значного впливу на екосистему.

Здатність карасевих риб контролювати чисельність водяних рослин та водоростей, а також економічна цінність роблять їх важливим компонентом

прісноводних екосистем. Подальші дослідження повинні бути спрямовані на глибше розуміння їхньої екологічної ролі та розробку стратегій для сталого управління їхніми популяціями.

Ключові слова: карась, біологічні ресурси, водойми, Одеська область, екологічна роль, рибне господарство, трофічна мережа, екосистема, біопродуктивність, екологічна рівновага.

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