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## The dynamics of catching aquatic bioresources in the south of Ukraine: Analysis, challenges and prospects for their solution in the context of sustainable development

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**Abstract.** Given the significance of fish farming as a promising sector of Ukraine's agriculture, and the Mykolaiv, Odesa, and Kherson regions are characterised by a significant number of natural and artificial water bodies, the study of aquatic bioresource catching indicators in the south is both important and timely. The research aimed to determine trends in aquatic bioresource catching in southern Ukraine during

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the period 2018-2023 and to analyse the factors influencing the extraction of aquatic bioresources. This article presents overall catch statistics, as well as catch data for inland waters of the south and aquaculture conditions over the past six years. It has been established that the catch of aquatic biological resources in southern Ukraine has been declining each year from 2018 to 2023. The negative trends in aquatic bioresource catching, both in aquaculture and natural water bodies, are linked to several factors. In particular, the decline in catches has been influenced by: COVID-19; the unstable military and political situation in Ukraine, associated with Russian military aggression; outdated material and technical base of fishing enterprises; lack of government subsidies and foreign investment in the sector; imperfections in the systems of control and regulation of the extraction of aquatic bioresources; and irrational use of the bioproductive potential of water bodies in southern Ukraine. Based on a scientific analysis of the dynamics of aquatic bioresource extraction in southern Ukraine and the identification of key factors contributing to the decline in catches, a set of measures has been developed to positively impact the fishing industry. These measures include: attracting foreign investment in fish farming; improving the quality of monitoring, regulation, and control over aquatic bioresource catching at local, regional, and state levels; restoring critical fish farming infrastructure damaged by Russian aggression; ensuring sustainable fisheries management; and introducing EU best practices into Ukrainian fish farming. The scientific results obtained from this research can be used in practice to ensure the sustainable development of fisheries in southern Ukraine

**Keywords:** water bodies; fisheries; sustainable fisheries; aquaculture; inland waters; rational use

## INTRODUCTION

Fisheries is a significant sector of the global economy, especially in countries with significant water resources, and Ukraine is no exception. Given that fisheries products provide valuable food for the population and important raw materials for industry, studying trends in the extraction of aquatic bioresources at various territorial levels is highly important and relevant. Aquatic bioresources are highly sensitive components of aquatic ecosystems. Their life processes are influenced by both biotic and abiotic factors of the aquatic environment, which determine the level of fish stock development in water bodies of various origins. According to D.S. Archybisova and V.S. Suslov (2018), and A. Trofymchuk *et al.* (2021), the level of development of aquatic biological resources in water bodies is highly dependent on their ecological status and fluctuations in temperature. The economic efficiency of the Ukrainian fish product market has a significant dependence on demand. Numerous scientific studies indicate that in recent years, Ukrainian consumers have shown a greater preference for foreign fish products over domestic ones, significantly weakening this economic sector in Ukraine (Melnychenko *et al.*, 2021; Melnychenko & Bogadorova, 2023). It should also be noted that according to the research of I.I. Korman (2020), a large amount of high-quality Ukrainian fish products is exported to various countries around the world, while Ukraine, on the contrary, imports fish products at a price several times higher than domestic ones. This trend suggests that Ukrainian fisheries products are highly valued on the international market but, at the same time, are inaccessible to the Ukrainian consumer market.

The level of efficiency of fisheries operations is significantly dependent on the quantity of aquatic bioresources caught. In turn, the quantity of aquatic

bioresources in water bodies is significantly influenced by the level of development of their natural food base, ecological factors, human anthropogenic activities, the structure of ichthyocenoses, and artificial feeds used for fish feeding (Okeke-Ogbuafor *et al.*, 2022; Zeng *et al.*, 2022). At the same time, the level of extraction of aquatic bioresources is also dependent on socio-economic and political factors that exert a so-called "external" influence, which has been characteristic of Ukraine for a long time. Given ongoing inflationary processes, armed conflict, revolutions, and COVID-19, the extraction of aquatic bioresources in Ukraine has been declining at an intensive rate since 2020 (Glebova & Shkarupa, 2019).

Ukraine offers a favourable environment for fisheries due to its abundance of water bodies, particularly in the southern regions. Numerous scientific studies indicate that the highest levels of aquatic bioresource extraction occur in Odesa, Mykolaiv, and Kherson regions (Bushuyev & Snihirov, 2020; Chepil *et al.*, 2021). Given the importance of the fisheries sector for food security and economic growth, an analysis of recent trends in aquatic bioresource extraction in southern Ukraine will allow for the identification of existing trends, as well as the factors influencing them, and the proposal of scientifically sound solutions to existing problems. The aim of this study was to analyse the trends and dynamics of aquatic bioresource extraction in Odesa, Mykolaiv, and Kherson regions during 2018-2023 and to identify the factors influencing it.

For the study, statistical data on the dynamics of aquatic bioresource catching in southern Ukraine were collected using informational websites of the territorial divisions of the State Service of Ukraine in the Mykolaiv, Kherson, and Odesa regions (Main Department of Statistics in the Mykolaiv region, 2023; Main

Department of Statistics in Kherson region, 2023; Main Department of Statistics in Odesa Region, 2023), as well as the State Strategy for the Development of the Fisheries Sector until 2030. The theoretical nature of the article involved the use of analysis, generalisation, statistical, graphical, and mathematical analysis methods. Analysis and generalisation allowed for an assessment of the theoretical aspects of fisheries sector development and the key factors influencing it. Statistical data on aquatic bioresource extraction over the past five years were used to identify trends and factors inhibiting industry growth. Based on this and the Strategy for the Development of the Fisheries Sector, measures were developed to improve the state of the sector and increase catch volumes. The mathematical method was used to calculate overall catch indicators, while the graphical method allowed for a visual representation of the dynamics of indicators in the form of histograms from 2018 to 2023, highlighting key trends in aquatic bioresource extraction in southern Ukraine.

#### **REGIONAL ANALYSIS OF THE FISHING SECTOR IN SOUTHERN UKRAINE**

Fisheries is a vital sector of the agricultural economy, serving not only as a profitable industry but also playing a significant role in providing the population with high-quality food products. "Fisheries" encompasses the extraction, processing, reproduction, and increase of various species of aquatic bioresources in water bodies of different origins. The fisheries sector provides not only valuable and high-quality food products but also medicinal, feed, and technical products. Currently, in Ukraine, there are two types of fisheries activities: fish farming, which is aimed at the rational reproduction of aquatic bioresources, particularly valuable commercial fish species; and fishing, which primarily aims at the catching of aquatic bioresources.

The southern region of Ukraine, comprising the Mykolaiv, Odesa, and Kherson regions, presents a promising area for analysing the extraction of aquatic bioresources. These regions are very well endowed with natural water resources, but due to the arid and hot climate, a large number of artificial water bodies have been constructed for agricultural purposes. For instance, in the Kherson Region, the total area of water bodies is 467.2 thousand hectares, accounting for approximately 16.4% of the entire region. Regarding natural water resources, the region is traversed by several water arteries, the largest being the Dnipro River and the Inhulets River. Additionally, a significant number of artificial water bodies for various purposes have been constructed within the oblast. As of 2023, there are 1,154 ponds within the region, primarily intended for fish breeding, multi-purpose use, and irrigation of

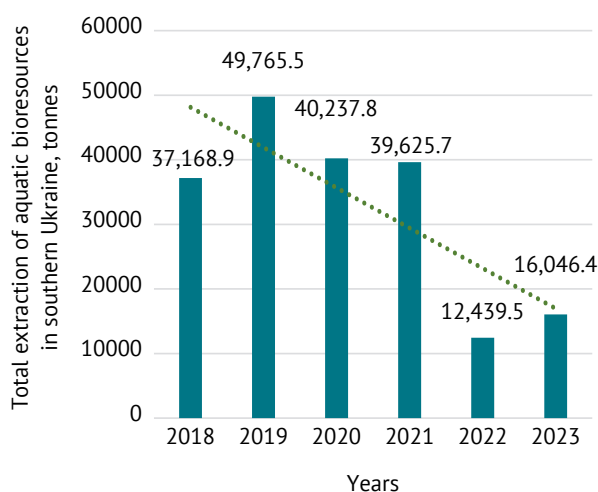
agricultural lands. Furthermore, the region contains 15 small water storages of varying volumes, which, like the ponds, are mainly aimed at comprehensive use and fish breeding.

In the Mykolaiv Region, approximately 6.1% of its area consists of water bodies of various origins, amounting to 150 thousand hectares. The natural water resources in Mykolaiv include rivers such as the Southern Bug, Syniukha, Kodyma, Chornyi Tashlyk, Inhul, Chychykliia, Vysun, and Inhulets. Additionally, the region is home to 1,198 artificial water bodies with various intended purposes. There are 45 small water storages of varying capacities within the region, primarily aimed at irrigation, fish breeding, and comprehensive utilisation. Furthermore, the region has 1,153 ponds, where fishery activities are predominantly conducted.

In the Odesa Region, approximately 8.6% of the territory is occupied by water bodies of both natural and artificial origin, amounting to 286.6 thousand hectares. Odesa Region is home to two major rivers: the Danube and the Dniester. Additionally, the region contains a significant number of medium and small rivers, including the Chychykliia, Kodyma, Kuchurhan, Cogâlnic, and Tylihul. Beyond natural water bodies, the region also has ponds and small water storages, totalling 1,056 water bodies. Compared to other southern oblasts, Odesa has the highest number of small water storages – 64, with a total volume of 2,106.7 million cubic meters. As for ponds, their number in the region reaches 992, with a total volume of 198.0 million m<sup>3</sup>. The ponds and small water storages of the Odesa Region, like those in other southern regions of Ukraine, are primarily constructed for irrigation, fish farming, and multi-purpose use. It should be noted that such a large number of natural and artificial water bodies in the Kherson, Odesa, and Mykolaiv regions provide a favourable foundation for the development of the fisheries sector specifically in southern Ukraine.

During the study, statistical indicators regarding the catch of aquatic bioresources in Odesa, Mykolaiv, and Kherson regions were collected and analysed. Statistical materials from the State Statistics Service of Ukraine (Main Department of Statistics in Kherson region, 2023; Main Department of Statistics in the Mykolaiv region, 2023; Main Department of Statistics in Odesa Region, 2023) indicate that the fisheries sector in southern Ukraine has reached a relatively high level of development. For instance, aggregated data on the extraction of aquatic resources in southern Ukraine in 2018 showed that the catch amounted to 37,168.9 tons, a significant figure compared to other regions of the country. Figure 1 shows that the highest extraction of aquatic bioresources in the southern region was observed in 2019 – 49,765.5 tons. However,

from 2020 onwards, a decline in this sector began, attributed to the COVID-19 pandemic. The lowest catch of aquatic bioresources during the studied period was characteristic of 2022, with a catch of only 12,439.5 tons. The main reason that negatively impacted the extraction of aquatic bioresources in 2022 was the Russian invasion of Ukraine and the ongoing active hostilities in the south, which has practically prevented economic entities from accessing water bodies. Starting from 2023, there has been a slight increase in the catch – 16,046.4 tons, associated with an increase in the extraction of aquatic bioresources in inland water bodies of Odesa and Mykolaiv regions.

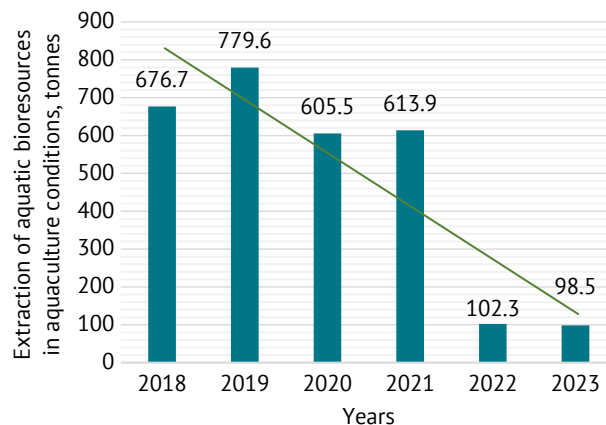


**Figure 1.** Dynamics of aquatic bioresource extraction in the south of Ukraine for the period 2018-2023

**Source:** developed by the authors based on the Main Department of Statistics in the Kherson region (2023), Main Department of Statistics in the Mykolaiv region (2023), Main Department of Statistics in the Odesa Region (2023)

It is important to note that in southern Ukraine, fish farming is also conducted under aquaculture conditions. Fish are primarily cultivated, reared, and bred in small water storages and ponds, as these water bodies possess significant natural bioproduction potential. Furthermore, compared to other regions, the south has a longer growing season, which positively impacts aquaculture overall.

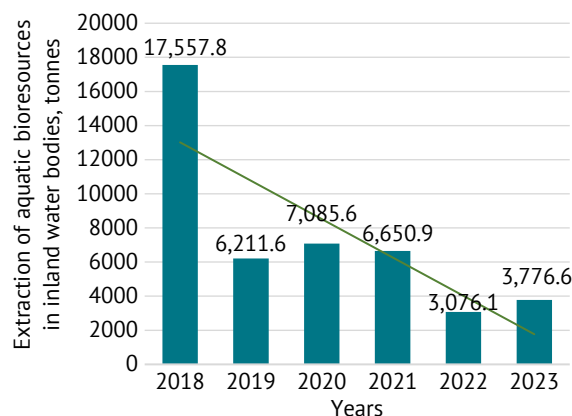
Statistical data indicates that aquaculture is quite widespread in southern Ukraine. Figure 2 graphically depicts the dynamics of aquaculture indicators for the period 2018-2023, where it can be seen that the trends in the extraction of aquatic bioresources during artificial cultivation are similar to natural catches. Thus, in 2018, 676.7 tons of bioresources were caught from artificial water bodies in the south, the highest catch was observed in 2019 – 779.6 tons, and accordingly, the lowest – in 2023 – only 98.5 tons.



**Figure 2.** Dynamics of aquatic bioresources extraction in the south of Ukraine under aquaculture conditions from 2018 to 2023

**Source:** developed by the authors based on the Main Department of Statistics in the Kherson region (2023), Main Department of Statistics in the Mykolaiv region (2023), Main Department of Statistics in the Odesa Region (2023)

As mentioned above, southern Ukraine is quite rich in inland water bodies, where fishing activities are also actively conducted (Fig. 3). Analysis and graphical representation of statistical indicators regarding the extraction of aquatic bioresources in inland waters of the south showed that during 2018-2023, the highest catch was observed only in 2018 – 17,557.8 tons, and from 2019 onwards, there was a sharp decline in the catch of aquatic bioresources. However, in 2023, the catch of aquatic bioresources in inland waters amounted to 3,776.6 tons, indicating a certain “upturn” in extraction compared to previous years.



**Figure 3.** Dynamics of aquatic bioresources extraction in the south of Ukraine in inland water bodies from 2018 to 2023

**Source:** developed by the authors based on the Main Department of Statistics in the Kherson region (2023), Main Department of Statistics in the Mykolaiv region (2023), Main Department of Statistics in the Odesa Region (2023)

Therefore, in southern Ukraine during the studied period, there are negative trends in fish farming, except for a slight increase in catch in 2023 due to inland water bodies in Odesa and Mykolaiv regions. Given that Kherson, Mykolaiv, and Odesa regions have all the necessary prerequisites for the development of this sector, and most importantly, favourable climatic conditions and the presence of a large number of water bodies of various origins, fruitful cooperation between the state, scientists, and the public is necessary for the optimal development of this sector of the economy. Starting from 2019, the main factors “destroying” the fisheries sector of southern Ukraine have been the ongoing pandemic and active military aggression from Russia.

### EXTRACTION OF AQUATIC BIORESOURCES IN THE SOUTHERN REGIONS OF UKRAINE: INDICATORS, TRENDS AND PROSPECTS

During the research, an analysis was conducted of the indicators for the extraction of aquatic bioresources across the southern regions of Ukraine – Mykolaiv, Odesa, and Kherson (Table 1). It was found that all three regions engage in the extraction of aquatic bioresources. The largest quantities are extracted in the Odesa Region, which is due to the presence of a large number of inland water bodies, marine areas, as well as ponds and small water storages. Smaller quantities, compared to the Odesa Region, are extracted in the Mykolaiv Region, and the smallest quantity is in the Kherson Region.

**Table 1.** Dynamics of aquatic bioresource extraction by Odesa, Mykolaiv, and Kherson regions during 2018-2022

Years	The total volume of extracted aquatic bioresources, tons	Including	
		Aquaculture, tons	Caught in inland waters, tons
Odesa Region			
2018	12,802.5	185.9	9,024.2
2019	17,059.0	268.9	3,923.2
2020	11,313.2	200.0	5,058.5
2021	10,472.9	185.8	4,732.0
2022	3,035.6	-	2,877.9
2023	3,609.2	36	3,546.3
Mykolaiv Region			
2018	18,777.6	-	19,591.4
2019	26,230.8	245.6	9,296.6
2020	23,168.4	193.8	8,839.2
2021	24,862.2	235.6	9,078.6
2022	9,403.9	102.3	14,229.6
2023	12,437.2	62.5	230.3
Kherson Region			
2018	5,589.8	490.8	9,350.2
2019	6,475.7	265.1	7,240.9
2020	5,756.2	211.7	13,952.3
2021	4,290.6	192.5	10,628.9
2022	-	-	-
2023	-	-	-

**Note:** there is no data on the extraction of aquatic bioresources within the Kherson region for 2022 and 2023, as it was not carried out due to active hostilities and the ban on access to water bodies in the region

**Source:** developed by the authors based on the Main Department of Statistics in the Kherson region (2023), Main Department of Statistics in the Mykolaiv region (2023), Main Department of Statistics in the Odesa Region (2023)

Such indicators can be explained by the fact that there are fewer water bodies of both artificial and natural origin in the Kherson and Mykolaiv regions compared to Odesa. Such trends in the extraction of aquatic bioresources are rather disappointing and may in the future lead to several negative consequences, including: given that fishery products are a valuable food product and a product for pharmacology and industry, there is a threat to the country's food security; a decrease in the volume of fish catches leads to Ukraine's import dependence on

the global fish products market, and consequently to an increase in prices for fish food products; a decrease in the volume of fish caught can lead to the decline of this industry and the deterioration of economic indicators at both the regional and national levels (Fedchyshyn & Ihnatenko, 2021). Thus, both across Ukraine as a whole and in the south in particular, several factors hinder the development of the fishery sector. In this context, to achieve positive changes in the fisheries of southern Ukraine, the following measures are necessary:



1) at both the national and regional levels, enhance the level and quality of protection, sustainable use, and restoration of “valuable” aquatic bioresources that are popular targets for fish farming (Mugwanya *et al.*, 2022);

2) develop methods that stimulate the growth of the bioproductive potential of artificial aquatic ecosystems, while also employing existing methods such as ichthyomelioration and the application of organic fertilisers. These approaches will significantly increase the natural feed base, regulate the ichthyocenosis in water bodies, and facilitate the cultivation of valuable fish species through natural feeds, resulting in considerable positive economic impacts (Kamali *et al.*, 2022);

3) ensure the sustainable development of aquaculture in southern Ukraine, as the region has a large number of small water storages and ponds with complex multi-purpose designs, which are, however, largely underutilised for fish farming (Fedorenko *et al.*, 2020);

4) utilising blockchain technology to obtain comprehensive statistical data regarding the industrial catch of aquatic bioresources, not only in the south but across all regions of Ukraine. This will provide reliable indicators for fishery management and help combat the “shadow” catch of aquatic bioresources (Gladju *et al.*, 2022);

5) facilitate the restoration of infrastructure damaged by the Russian invasion that is directly linked to or impacts the fishery sector in the southern region. In this context, the restoration of energy facilities, logistical chains, the demining of water bodies, and support for the return of medium-sized enterprises to the region are of key importance (Starchak, 2023);

6) ensure effective and transparent government oversight of various types of fishery enterprises, which will enhance the efficiency of aquaculture activities in the region;

7) from the government’s side, implement measures to stabilise the fishery product market in Ukraine, particularly in the south. Support for domestic fish product manufacturers and the substitution of foreign fish products with Ukrainian alternatives are essential (Sinenok, 2019);

8) foster close collaboration in the field of aquaculture with the European Union and the General Fisheries Commission for the Mediterranean, which will enhance the effectiveness of utilising Ukraine’s industrial capabilities (Kovalenko *et al.*, 2022);

9) provide state subsidies and attract foreign investments into the fishery of southern Ukraine, which will help modernise technological processes for cultivating aquatic bioresources and increase their volume.

Such negative trends in the development of the Ukrainian fishing sector are linked to several factors. Thus, an analysis of existing research and statistical materials from the State Statistics Service of Ukraine (Main Department of Statistics in Kherson region, 2023; Main Department of Statistics in the Mykolaiv region, 2023; Main Department of Statistics in Odesa Region, 2023)

has enabled the authors to identify significant reasons that have led to a decrease in the volume of aquatic bioresource extraction in southern Ukrainian regions. The following are the significant factors that have negatively impacted the fish farming sector in southern Ukraine: imperfections in the regulatory and legal framework for catching; the onset of war and active hostilities in southern Ukraine; an outdated material and technical base; irrational use of the natural productive capacities of water bodies; an insufficient level of development of innovative, scientific, technical, and breeding activities; and a high level of import dependence.

### **THE IMPACT OF POLITICAL, ECONOMIC, AND ENVIRONMENTAL FACTORS ON THE DEVELOPMENT OF FISHERIES INDUSTRY IN SOUTHERN UKRAINE: CHALLENGES AND PROSPECTS**

The onset of the Russian-Ukrainian war in 2022 had a negative impact on the extraction of aquatic bioresources in southern Ukrainian regions. The unstable military and economic situation led to a significant decrease in the volume of aquatic resource extraction in the Kherson, Mykolaiv, and Odesa regions. Research shows that these territories are the most vulnerable to the ecological and economic impact of the war, which is reflected in the overall economic stability and state of aquaculture systems. In the study by N. Arakkal Thaiparambil and V. Radhakrishnan (2022), the challenges associated with achieving an economically sustainable aquaponics system were analysed. Emphasis was placed on the need for managing environmental resources in the face of international challenges, which include not only economic but also environmental aspects, especially in a conflict zone, as in the case of southern Ukraine.

As of 2023, due to active hostilities in southern Ukraine, a significant decrease in population has been observed due to intensive migration outflow, especially from the southern regions. Statistical data confirm that the largest number of people left these regions, leading to a significant decrease in economic activity and demand for fish products. Research (Yemtsev *et al.*, 2023) confirms this fact, indicating the problems of the functioning of the Ukrainian fishery under war conditions, in particular, the impact of population migration outflow on it. The closure of production facilities and a decrease in the consumption of fish products have become a topical issue for discussion in the context of the current challenges of managing regional development during wartime.

It should be noted that the Ukrainian fishing industry faces significant challenges that limit its development and impact the aquatic bioresources of the southern regions of the country. Active hostilities in large territories and the mining of water bodies hinder the normal functioning of fish farming enterprises. This significantly limits the industry’s development opportunities

and contributes to the decline of existing infrastructure. The lack of an effective regulatory framework in the field of fisheries in Ukraine does not provide the necessary regulation and financing of the industry at all levels of management. National, regional, and local initiatives face significant difficulties due to a lack of funds and access to financing, leading to the closure of enterprises and the loss of development opportunities.

Statistical data indicates that 65% of fish farming in Ukraine has an outdated material and technical base, which negatively impacts the quality and volume of their production. This highlights the need for investments in the renewal of technical equipment and infrastructure to support the stable development of the fisheries sector. In comparison to the research of K. Yue and Y. Shen (2022), which examined the prospects of using new technologies in fisheries, the current challenges of the Ukrainian fishing industry point to the need for a comprehensive approach to modernising and supporting the sector to ensure sustainable development under difficult conditions.

In the context of high operational costs in fish farming, a significant portion of water resources remains underutilised. In particular, in southern Ukraine, approximately 85% of water bodies consist of artificial water objects – ponds and small water storages – which have the potential for irrigation and fisheries. However, most of them remain outside the production process due to significant economic costs, leading to the unprofitability of fish production. The irrational use of water bodies for fisheries is another unresolved problem. Regardless of whether they are natural or artificial aquatic ecosystems, southern Ukraine has significant bioproduction potential, determined by climatic conditions and the length of the growing season. However, fish farming often does not utilise the natural food base, or it is minimised in favour of artificial feeds, leading to the irrational use of the potential of water bodies. A comparison of these facts with the research of G.S. Araujo *et al.* (2022) shows that global trends in fisheries management take into account the effective use of water resources and bioproduction potential. The optimisation of these processes can play a significant role in the sustainable development of regional fisheries, including southern Ukraine.

For an extended period, unregulated and “shadow” catching has been occurring in southern Ukraine, leading to the depletion of aquatic ecosystems. This issue is extremely pressing as inadequate control and shortcomings in catching regulations cause significant damage to natural resources. Uncontrolled catching leads to a decrease in biodiversity, and the destruction of natural habitats for fish and other aquatic organisms, which in turn negatively impacts the ecological balance of the region's water bodies. The very low level of scientific support for the fisheries sector, especially selective breeding work in aquaculture, further exacerbates this

problem. The lack of innovative research and modern approaches to fisheries management creates conditions for the degradation of aquatic ecosystems and a decrease in fisheries productivity. Selective breeding, which is the foundation for the development of aquaculture, requires significant investments in scientific research and innovation to ensure the sustainable development of the industry.

The research by V.V. Shekhovtsov and T.V. Yermolayeva (2021) highlights the theoretical and practical problems of rational use of aquatic bioresources in the context of Ukraine's sustainable development. In their research, they note that insufficient legal provisions and shortcomings in legislation lead to ineffective management of aquatic bioresources. They emphasise the importance of integrating scientific achievements into practical applications to improve the efficiency of natural resource use. In particular, A. Falola *et al.* (2022) stress the need to improve the legislative framework for regulating the catch of fish and other aquatic bioresources, as well as implementing modern methods of management and control. They also draw attention to the importance of developing research programs aimed at optimising selective breeding and introducing innovations in aquaculture, which can contribute to the sustainable and economically viable development of the fisheries sector.

Ukraine's high level of import dependency on the global fish products market is a pressing issue for the national economy. According to data from 2022, the Ukrainian population consumed 547.7 thousand tonnes of fish products, of which 84.1% were imported, and only 15.9% were domestically produced. This indicates a reliance of Ukrainian consumers on foreign fish products, which are imported into the country in significant volumes. For comparison, the research of N.M. Vdovenko *et al.* (2019) highlighted the issue of the competitiveness of the fisheries and aquaculture sectors in Ukraine, which is a key factor in the efficiency of the national economy. Their study analyses the state of the fisheries, identifies the factors influencing its development, and proposes ways to increase the sector's competitiveness.

According to the research, one of the main factors contributing to the low competitiveness of domestic fish products is the insufficient level of government support and investment in the fisheries. This leads to low productivity and limited production volumes, preventing Ukrainian producers from competing with imported products. Additionally, the absence of modern technologies and innovations in the fishing industry also acts as a barrier to the sector's development. Therefore, it can be stated that to reduce import dependency and increase the share of domestic fish products in the Ukrainian commodity market, it is necessary to focus on the development of fisheries and aquaculture in Ukraine.

## CONCLUSIONS

Thus, the dynamics of aquatic bioresource extraction in southern Ukraine during the period 2018-2023 has a negative trend, caused by factors such as the COVID-19 pandemic; Russia's military aggression; an outdated material and technical base; the absence of state subsidies and foreign investment, as well as imperfections in the systems of control and regulation of aquatic bioresource extraction. It has been found that fisheries are an important sector of the agricultural complex of southern Ukraine and play a significant role in ensuring food security for the population and the ecological sustainability of aquatic ecosystems. Over the period 2018-2022, a negative trend in the extraction of aquatic bioresources was observed. In 2018, the total catch amounted to 37,169.9 tons, in 2019 – 49,765.5 tons, in 2020 – 40,237.8 tons, in 2021 – 39,625.7 tons, in 2022 – 12,439.5 tons, and in 2023 – 16,046.4 tons.

It has been established that to overcome negative trends in fish farming, it is necessary to implement measures such as: attracting foreign investment; improving the quality of monitoring, regulation, and control of aquatic bioresource extraction; restoring infrastructure, ensuring rational fisheries management, and implementing EU best practices. Key trends and factors influencing the development of the fisheries sector are considered, including the impact of military actions and the pandemic. Negative factors also relate to the outdated material and technical base of fisheries

enterprises, the lack of state subsidies and foreign investment, as well as the irrational use of the water bodies' bioproduction potential.

Existing trends in the extraction of aquatic bioresources have been analysed using a graphical method, allowing for the visual representation of the collected statistical information and highlighting the trends present during the study period. Graphical methods revealed significant fluctuations in the catch of aquatic bioresources, including a decrease in 2020, which coincided with the COVID-19 pandemic, and a gradual recovery in 2021-2022, despite the impact of military actions. Thus, the results of the study indicate that to ensure the sustainable development of the fisheries in southern Ukraine, it is necessary to introduce comprehensive measures aimed at overcoming negative trends and utilising the available bioproduction potential of water bodies. The prospects for further scientific research on this topic lie in the study of the dynamics of the catch of aquatic bioresources within specific water bodies of individual regions of southern Ukraine, which will subsequently allow for the development of comprehensive, scientifically-based measures to improve the state of the fisheries sector.

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## CONFLICT OF INTEREST

None.

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## **Динаміка вилову водних біоресурсів на півдні України: аналіз, проблеми та перспективи їх вирішення в контексті сталого розвитку**

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**Анотація.** З огляду на те, що рибицтво є однією з перспективних галузей сільського господарства України, а Миколаївська, Одеська та Херсонська область характеризуються наявністю великої кількості водних об'єктів природного та штучного походження, дослідження показників вилову водних біоресурсів на півдні є доволі важливим та актуальним. Мета дослідження полягала у визначенні тенденцій вилову водних біоресурсів на півдні України за період 2018-2023 рр. та аналізі чинників впливу на видобуток водних біоресурсів. У статті наведено загальні показники вилову водних біоресурсів, а також показники видобутку в розрізі внутрішніх водойм півдня та в умовах аквакультури за останні шість років. Встановлено, що упродовж 2018-2023 років на півдні України з кожним роком скорочувався видобуток водних біоресурсів. Виявлено, що негативні тенденції у вилові водних біоресурсів як в умовах аквакультури, так і в природних водоймах пов'язані з цілою низкою чинників. Зокрема, на спад у видобутку водних біоресурсів вплинули: Covid – 19; нестабільна військово-політична ситуація в Україні, яка пов'язана з російською військовою агресією; застаріла матеріально-технічна база рибогосподарських підприємств; відсутність державних дотацій та іноземних інвестицій в галузь; недосконалість систем контролю та регулювання видобутку водних біоресурсів; нераціональне використання біопродукційного потенціалу водойм півдня України. На основі проведеного наукового аналізу динаміки видобутку водних біоресурсів в межах півдня України, а також визначенні ключових чинників, які сприяли зменшенню кількості видобутку, було розроблено заходи, які мали б позитивний вплив на рибицтво галузь. До таких заходів, віднесено: залучення іноземних інвестицій в рибицтво; покращення якості моніторингу, регулювання та контролю за виловом водних біоресурсів на локальному, регіональному та державному рівнях; відновлення критичної для рибицтва інфраструктури, яка постраждала від російської агресії; забезпечення раціонального ведення рибного господарства; впровадження у рибицтво України найкращих практик його ведення у ЄС. Отримані наукові результати досліджень можна використовувати на практиці з метою забезпечення сталого розвитку рибного господарства півдня України

**Ключові слова:** водні об'єкти; водойми; стале рибне господарство; аквакультура; внутрішні водойми; раціональне використання

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