

UDC 639.2

DOI <https://doi.org/10.32851/wba.2023.1.14>

ANALYSIS OF FAO DATA ON THE GLOBAL FISHERIES AND AQUACULTURE PRODUCTION VOLUME

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Fish farming, a branch of the national economy, engaged in fish breeding, increasing and improving the quality of fish stocks in the reservoirs, replenishing the fish resources. In order to maintain and to increase the stocks of valuable commercial fish in the world, extensive measures are taken in the artificial fish breeding, improving the conditions of natural fish reproduction, as well as developing lake and pond fisheries for cultivating the commercial fish. Much work is being carried out on acclimatizing the valuable commercial fish species and other fishing objects, aimed at expanding the fish species composition and increasing fish stocks.

Industrial fishing is an extractive branch of the fishing industry, which uses the natural raw resources of the world oceans, seas, lakes, rivers, reservoirs: various types of fish, marine mammals, molluscs, crustaceans, aquatic vegetation. Fishing can be considered as one of the types of nature management, which consists in extracting fish and other seafood (fish, invertebrates, algae, etc.).

To ensure food security and to guarantee the regular access of the world population to high-quality food products, the leading specialized agency (FAO) was created. It deals with developing rural regions and the agricultural production in the UN system.

The purpose of the work was to clarify the state of fishing and extracting aquatic living resources in the waters of the World Ocean, starting from 2010. Based on FAO data, an assessment of the state of extracting aquatic biological resources in the World Ocean for the period from 2010 to 2019 was carried out.

The state of extracting aquatic biological resources in general, in the sea waters and in the internal water bodies in the period from 2010 to 2019; the amount of extracted fish and fish products, and the analysis of consuming aquatic biological resources were studied.

It is defined that, according to the analysis of the FAO statistical data, extracting fish and aquatic biological resources in the World Ocean showed that more intensive fishing is carried out in the marine waters, and fishing in the inland waters is gaining momentum.

Global fisheries play an important role in ensuring economic and food security. In this regard, it is important to know and to understand the state and the trends in developing the world fisheries for effective managing and regulating the conditions of

the increased competition between the countries engaged in the field of fishing and aquaculture activities.

Keywords: world fisheries, aquaculture, catch volumes, consumption, aquatic biological resources, fish farming.

Introduction. The world fish industry in modern economic conditions is the strategic importance component, ensuring food security, socio-economic developing and populating the attracted territories, the employment of the population, the poverty reduction, the development of the World Ocean territories and resources. It is one of the main directions of developing the world civilization. These direction activities in most countries are aimed at increasing the competition in the field of fisheries and aquaculture. In this regard, it is important to know and to take into account the state and the international development of the international fisheries for effective managing the state fishing industry [1].

FAO, an institution dealing with the development of rural regions and the agricultural production in the UN system, is the leading specialized food and agricultural organization. The purpose of FAO activities is primarily to ensure food security and to guarantee the regular access of the world population to high-quality food products.

FAO acts as a neutral forum as well as a source of knowledge and information. The organization helps developing countries and the countries in the transition to modernize and to improve agriculture, forestry and fisheries. In addition, FAO serves as a source of information and assists developing countries to improve their agricultural, forestry and fisheries practices, strives to ensure the healthy nutrition and food security for everybody, and provides the information and the tools to support the policy measures analysis and to assess the impact of military operations on food security and the agricultural products world market [2].

The purpose of the work was to find out the state of global fishing and extracting aquatic biological resources for the period of 2010–2019.

To achieve the goal, the following tasks were set:

- 1) to analyze the state of extracting aquatic biological resources in general and in the inland and marine water bodies for 2010–2019;
- 2) to determine the amount of fish caught in the World Ocean, and to analyze the state of world fisheries;
- 3) to investigate the consumption of fish and fish products in the world, according to changes in the population.

Research material and methods. Based on specialized literature and according to the FAO data (2010–2019) [2–6], an assessment of the state of extracting aquatic biological resources in general in the inland and marine water bodies of the World Ocean for the period from 2010 to 2019 was carried out. Consuming fish and fish products per capita and consuming in the conditions of the growing planet population was studied.

Results and their discussion. The global volume of the world fisheries production, over the period of the study, has a slight increase and remains stable despite a number of clear changes in the fishing trends observed by countries, fishing areas and species, reaching about 180 million tons in 2019 (Fig. 1).

During the last ten years (2010–2019), the total catch in the sea waters varied in the range of 95–115 million tons, the commercial fishing total volume is about 53–77 million tons (Table 1).

Having examined fisheries and aquaculture in 2010 [3], it was found that the fish global catch was about 148 million tons (the total value of 217.5 billion US dollars). The total catch in the sea waters amounted to 95.5 million tons, commercial fishing amounted to 42.9 million tons.

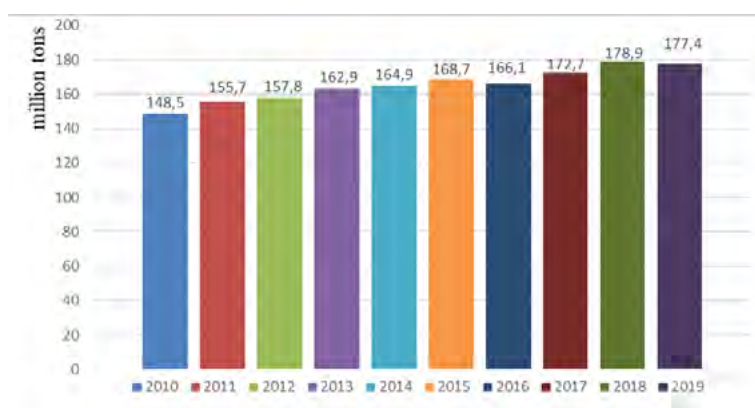


Fig. 1. World fisheries, million tons (According to FAO data [3–7])

In 2011, the volume of fish production increased by 4.8% compared to 2010 to 155.7 million tons, the catch from the sea waters amounted to 105.9 million tons, commercial fishing amounted to 49.8 million tons [3].

The world volume of commercial fishery products in 2012 [4] reached 157.8 million tons. The volume of commercial fishing catch amounted to 53.6 million tons, in the sea waters it amounted to 104.1 million tons. However, these figures indicate that the situation is generally stable and that global catches are growing.

In 2013, the total production of world fisheries increased to 162.9 million tons, which is 3% more than the 2012 catch. The total catch in the sea waters amounted to 106.5 million tons, commercial fishing amounted to 56.5 million tons [4].

The global total production of the world fisheries in 2014 [4] amounted to 164.9 million tons, which is 1.2% more than the production volume in 2013, including the catch in the sea waters amounted to 106.7 million tons, and commercial fishing accounted for about 58.2 million tons.

Table 1. The world production and using the fishery and aquaculture products (excluding aquatic plants), million tons (According to FAO data [3–7])

Indexes	Years										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
Total world fisheries, including:	148,5	155,7	157,8	162,9	164,9	168,7	166,1	172,7	178,9	177,4	
*fishing	88,6	93,7	91,3	92,7	91,2	92,7	89,6	93,1	96,5	92,2	
*aquaculture	59,9	62,0	66,5	70,3	73,7	76,1	76,5	79,5	85,2	87,5	
Including inland waters, total	52,9	49,8	53,6	56,5	58,2	60,0	59,4	61,5	63,6	77,5	
*fishing	11,2	11,1	11,6	11,7	11,3	11,4	11,4	11,9	12,0	12,1	
*aquaculture	41,7	38,7	42,0	44,8	46,9	48,6	48,0	49,6	51,6	53,3	
Including sea waters, total	95,5	105,9	104,1	106,5	106,7	108,7	106,8	111,2	115,4	112,0	
*fishing	77,4	82,6	79,7	81,0	79,9	81,2	78,3	81,2	84,5	80,1	
*aquaculture	18,1	23,3	24,4	25,5	26,8	27,5	28,5	30,0	30,9	31,9	
Human consumption	128,3	131,2	136,9	141,5	144,8	148,8	148,2	152,9	156,8	158,1	
Non-food consumption	20,2	24,5	20,9	21,4	20,0	20,3	17,9	19,7	22,2	19,3	
Population, billion	6,9	7,0	7,1	7,2	7,3	7,3	7,5	7,5	7,6	7,7	
Consumption per capita, kg	18,6	18,7	19,3	19,7	19,9	20,2	19,9	20,3	20,5	20,5	

The global production in 2015 amounted to 168.7 million tons, which is 1.2% less than the production volume in 2014. Commercial fishing in 2015 amounted to 60.0 million tons, including 108.7 million tons due to marine fishing [5].

According to the FAO data in 2016 [6], the global volume of fisheries production amounted to 166.1 million tons, which is almost 2 million tons less than in 2015. Industrial fisheries in 2016 amounted to 59.4 million tons, and due to marine fisheries it was 106.8 million tons (Table 1). In 2016, a decrease in the catch volumes in relation to the results of 2015 was registered for the main countries conducting commercial fishing of the main species.

In 2017, industrial catches accounted for 61.5 million tons, while marine catches accounted for 111.7 million tons. The global catch of the products amounted to 172.7 million tons, which is 4% higher than the catch in 2016 [6].

According to the estimates, in 2018 [6] a record amount of the world fishery products was produced in the world – 178.9 million tons of fish, 115.4 million tons was sea fishing, which is 5.4% higher than the average for the previous three years, the catch in the inland waters accounted for 63.6 million tons. The total sales in the monetary terms amounted to \$ 401 billion; 82 million tons, valued at \$ 250 billion, of which were aquaculture products.

In 2019 [7], the volume of world fisheries products amounted to 177.4 million tons, which is 1% less than in 2018. Commercial fishing amounted to 63.6 million tons, including 112.0 million tons due to marine fisheries. The volume decrease affected both marine industrial fisheries and inland fisheries (by 3% and 22%), which is most likely due to the interruptions in fishing activities due to the COVID-19 pandemic, as well as the continued catch decline in the leading countries.

Having analyzed the FAO data on the catches in the marine and inland waters in the period 2010-2019 [3–7], there is a significant difference in the catches. The extraction of aquatic biological resources in the inland waters is less in relation to the sea waters, but since 2018 there has been an increase in the catch of the leading manufacturers of the industrial fisheries products. Vietnam, Indonesia, China, Peru, the Russian Federation and the United States of America have supplied almost 49% of these products to the world markets, and the 20 largest manufacturers – over 73% (Fig. 2).

Fishing industry includes enterprises of ocean and sea fishing, inland water bodies, fish farming (aquaculture), fish processing, agricultural enterprises, organizations for the reproduction and protection of the fish stocks, sea fishing ports, scientific and educational institutions. Fish and fish products are a valuable and often irreplaceable food product, providing human needs primarily with animal origin proteins, a wide range of vitamins, a variety of microelements and biologically active substances [7].

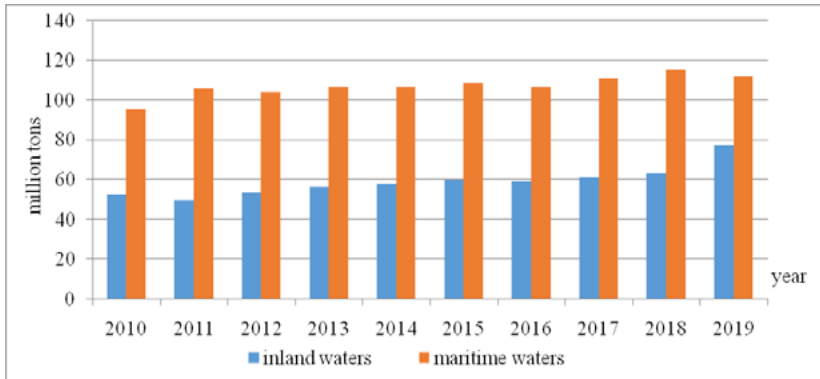


Fig. 2. Total catches in the sea and inland waters from 2010 to 2019 FAO data (FAO data [3–7])

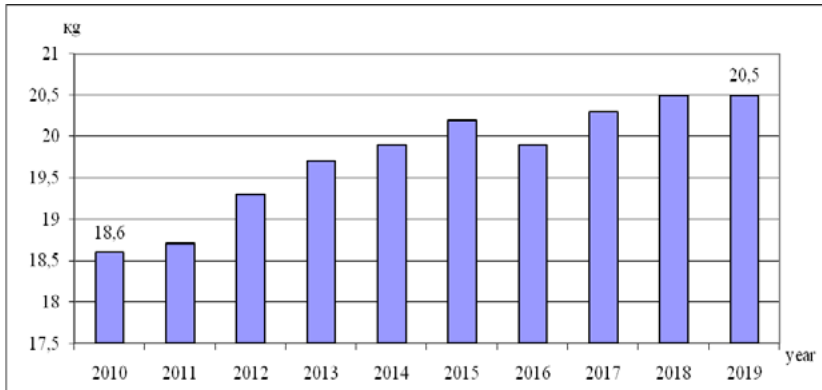


Fig. 3. The consumption of fish and fish products per year per capita, kg (according to FAO data [2–6])

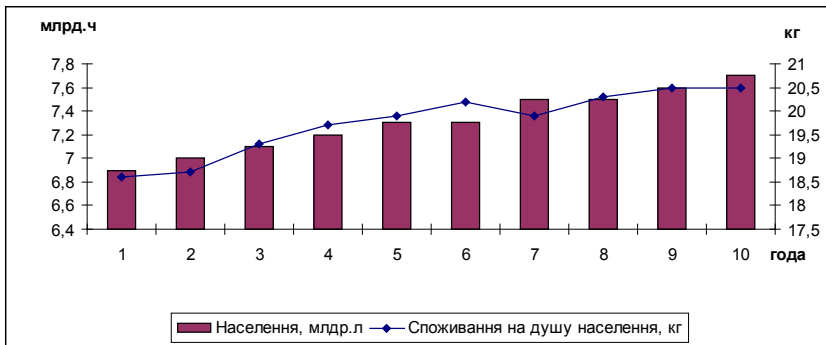


Fig. 4. The consumption of fish and fish products in the world per capita (kg / year) in relation to the population (billion) (FAO data [3–7])

During the recent years (2017–2019) the global consumption of fish and fish products has remained relatively stable. And comparing 2019 and 2010, there is an increase in the consumption by 19% (Fig. 3).

From 2010 to 2019, the global apparent food consumption of the aquatic bioresources grew by an average of 2.3% per year, which is almost twice the annual growth rate of the world population (1.4%) over the same period (Fig. 4). The global food fish supply per capita increased from an average of 18.6 kg (live weight equivalent) in 2010 to 20.5 kg in 2019 [7].

It should be noted that the global catch of aquatic biological resources in 2019 increased by 20%, compared to 2010, and the consumption of aquatic biological resources per capita increased by 23%.

In 2018, about 88% of the world fisheries production (156 million tons) was used for direct human consumption, while in the 1960s this figure was at the level of 67%. The remaining 12% (22 million tons) was for non-food using; 82% of this volume (18 million tons) went to the production of fishmeal and fish oil. The largest proportion (44%) of live, fresh or chilled fish continued to be used for direct consumption, followed by frozen (35%), cooked and canned fish (11%) and dried fish (10%) [8].

Fish and fish products remain among the world largest traded food commodities. In 2018, 67 million tons, or 38% of the total fish production, were sold at the international markets. After a sharp decline in 2015, the trade volume subsequently recovered in 2016, in 2017 and 2018 the annual growth rates was 7%, 9% and 5% respectively in the value terms. Overall, in the value terms the world exports rose from \$ 7.8 billion in 1976 to a peak of \$ 164 billion in 2018, with the growth rates of 8% in the nominal terms and 4% in the real terms (adjusted for inflation). Over the same period, the world volume of exports in the quantitative terms increased from the level of 17.3 million tons by 3% per year [8].

Conclusions. Having analyzed the FAO data for the period 2010–2019, it should be noted that the industrial catch of fish and water bioresources in the World Ocean is increasing every year.

In accordance with the data on the catch in the marine and inland waters, there is a significant difference in the catch of aquatic biological resources. The catch of fish and fish products in the inland waters is less in relation to the sea, but since 2018 there has been an increase in the catch of the leading manufacturers of the industrial fishery products. But, it is also noted that with an increase in the population growth, the catch of fish and fish products in the water bodies of the World Ocean is growing.

The catch volume in the World Ocean increased by only 19%, if we compare 2010 and 2019, but comparing the last 5 years (2015–2019), a slight decline is noted – 1%. In order to fully satisfy the population nutritional needs with fish and fish products, it is necessary to improve the regulatory documents to ensure

the appropriate and sustainable development of fisheries, a high-quality fight against illegal fishing, and the implementation of the innovative solutions in the development of aquaculture.

The analysis of the data on fish production and aquatic bioresources in the world showed that the increase in the volume of extracting fish and aquatic bioresources was mainly due to the marine waters, but fishing in the inland water bodies has a growing trend.

The situation arisen over 10 years shows that the population needs are met mainly due to increasing the catch in the internal reservoirs and the imports, as well as increasing the volume of the illegal market. Thus, in recent years, legal fishing and seafood production has been constantly decreasing, while, on the contrary, the imported fish products supplies have been increasing in almost all countries of the world.

Therefore, the FAO statistical data are an important reference document in which the world statistics data on fishing and aquaculture are presented in detail, and their analysis will allow solving a number of problems of the fishing sector. Solving these problems will lead to the stable development of fishing and aquaculture, and will allow to effectively manage and regulate the activities of the states carrying out their activities in the field of fishing and aquaculture.

АНАЛІЗ ДАНИХ ФАО ЗАГАЛЬНОСВІТОВОГО ОБ'ЄМУ ПРОДУКЦІЇ РИБАЛЬСТВА ТА АКВАКУЛЬТУРИ

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Рибництво, галузь народного господарства, що займається риборозведенням, збільшенням і поліпшенням якості рибних запасів у водоймах, заповненням рибних ресурсів. Для підтримки і збільшення запасів цінних промислових риб в світі здійснюються широкі заходи із штучного риборозведення, поліпшення умов природного відтворення риб, а також розвитку озерного та ставкового рибництва по вирощуванню товарної риби. Великі роботи проводяться по акліматизації цінних промислових видів риб та інших об'єктів промислу, спрямовані на розширення видового складу риб та збільшення рибних запасів.

Промислове рибальство, добувна галузь рибної промисловості, що використовує природні сировинні ресурси Світового океану, морів, озер, річок, водосховищ: різноманітні види риб, морські ссавці, моллюски, ракоподібні, водну рослинність. Рибальство можна розглядати як один із видів природокористування, який полягає у видобутку риби та інших морепродуктів (риби, безхребетних, водоростей тощо).

Для забезпечення продовольчої безпеки і гарантування регулярного доступу населення світу до високоякісних продуктів харчування створена провідна спеціалізована установа ФАО, яка займається проблемами розвитку сільських регіонів і сільськогосподарського виробництва у системі ООН.

Мета роботи полягала у з'ясуванні стану вилову риби та добування водних живих ресурсів у водах Світового океану, починаючи з 2010 р. На основі даних ФАО проведена оцінка стану добування водних біоресурсів у Світовому океані за період з 2010 по 2019 рр.

Досліджувалися стан добування водних біоресурсів загалом, у морських водах та у внутрішніх водних об'єктах у період з 2010 р. по 2019 р.; кількість виловленої риби та рибопродуктів, та аналіз споживання водних біоресурсів.

Встановлено, що згідно аналізу статистичних даних ФАО, добування риби та водних біоресурсів у Світовому океані показав, що більш інтенсивний улов ведеться у морських водах, та вилов у внутрішніх водах набирає оберті.

Світове рибне господарство відіграє важливу роль у забезпеченні економічно-продовольчої безпеки. У зв'язку з цим важливо знати та розуміти стан та тенденції розвитку світового рибного господарства для ефективного управління та регулювання в умовах посилення суперництва між країнами, які здійснюють діяльність у галузі рибальства та аквакультури.

Ключові слова: світове рибне господарство, аквакультура, обсяги вилову, споживання, водні біоресурси, рибництво.

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