

FISHERIES AND AQUACULTURE IN ROMANIA. A GLOBAL OUTLOOK ON SUSTAINABLE DEVELOPMENT

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Abstract

The paper proposes an analysis of the fishing sector in Romania, from the perspective of the exploitation of natural resources. Romania's hydrographic network represents over 3.5% of the country's total area. Fishing and aquaculture are activities carried out in all regions of the country. In the areas along the rivers and the Black Sea, fishing is the primary source of income for the population of the region. In the last decades, fish production from aquaculture has regularly exceeded the catch. Romania's foreign trade with fish and aquatic products has an unbalanced balance, with a significant dependence of the domestic market on imports. The average annual fish consumption per capita in Romania is below the European average, although a positive evolution has been recorded in the recent period. The implementation of European projects by the companies operating in the Romanian fishing sector is difficult, the degree of access to the funds available to the domestic sector being characterized by a relatively low level of absorption. The lack of effective measures from the public authorities to support the national fishing sector will accentuate its decline, and the domestic market's dependence on imports from abroad will continue to grow. The research results can be useful to companies in the fishing sector, for accessing European funds, and to public authorities, in developing appropriate public policies and strategies.

Key words: fish market, Romania, fish farms, aquaculture, strategies

INTRODUCTION

Aquatic products represent a category of food present in human nutrition since ancient times.

Their chemical composition, characterised by components valuable for human metabolism, their availability for sustainable consumption, their relatively affordable price or their perception as healthy foods have led to a growing demand worldwide.

In the 21st century aquaculture and fisheries sectors are recognized as key points for the global food security. Fishery products are considered some of the most active global foods in terms of production and trade, taking into account the development of fisheries and aquaculture, characterised by significant growth in recent decades. The only source of essential fatty acids - omega 3, which are not produced by the human body, but are absolutely necessary, is represented by fish and fish products.

Fish is not only an important food resource in a balanced human nutrition, but the activities

related to catching fish, their preparation and consumption are traditional practices in many regions of the world, which are part of population's cultural heritage.

Short literature review

Farms intended for growing fish and crustaceans, respectively the cultivation of aquatic plants are part of the aquaculture sector or, more generally, the field of fish farming. Aquaculture is one of the most productive food production sectors, responsible for approximately 50% of the world's consumption of fishery products. The production of the aquaculture sector has evolved rapidly over the past 30 years, with an average annual growth rate of 8.8%. (Food and Agriculture Organization of the United Nations FAO, 2020) [8].

FAO also stated that aquaculture is currently the fastest growing and most consistently growing food production sector. The global catch from sea and inland fisheries has registered a relatively stable level in recent years, with quantities fluctuating around 90 million tonnes. To meet the global demand for

aquaculture products, aquaculture production has exhibited continuous growth (Muntenu (Pila) and Stanciu, 2018) [12]. Thus, the world production of fish in 2017 was 172.7 million tons. More than half of the global production (92.5 million tons, representing about 53.6%) was obtained from fisheries, and 80.2 million tons (46.4%) from aquaculture (FAO, 2020) [8].

The FAO forecast predicts that starting with 2030, the production of aquaculture intended for human consumption will quantitatively exceed the volume of catches (Aquaculture Magazine, 2022) [1]. In 2020, according to the latest FAO statistics report on aquatic production, about 178 million tons of aquatic animals were recorded, in a slight decrease compared to the previous production, in the context of the COVID 19 pandemic, and about 36 million tons of algae, increasing by 1.4% compared to the previous year. As a share in global fish production, catches represented 50.57%, the rest being contributed by aquaculture (FAO, 2022) [9].

In the European states bordering marine areas fish consumption is high, this food constituting an important component of the Mediterranean diet. There are many health benefits associated with the consumption of fish and aquaculture products, such as positive effects due to the amino acids present in proteins on blood pressure and lipid profile, the existence of valuable mineral components (iodine, calcium, iron, zinc, selenium or phosphorus), or of vitamins important for human metabolism (A, D and K). The most studied components of fatty fish meat are polyunsaturated fatty acids (mainly n-3 fatty acids including eicosapentaenoic acid EPA and docosahexaenoic acid DHA), with beneficial effects on cardiovascular health, lipid profile, inflammation, insulin resistance, neurocognitive disorders or cancer. Despite pointing out some potential risks associated with fish consumption, they are far outweighed by the benefits, as noted by de Molina-Vega, Gomez-Perez and Tinahones (2020) [11].

A regular consumption of fish can have beneficial impacts on homeostasis, facilitates maintenance of a healthy body weight,

reduces the magnitude of age-associated increases in blood pressure, improves glucose homeostasis helping prevent diabetes and the metabolic syndrome, and has a positive impact on muscle mass preservation among the elderly (Mendivil, 2021) [10].

The afferent study among the population of Croatia, carried out by Pupavac and all (2022) [15] highlighted that age, level of education and an orientation towards the Mediterranean diet, even a moderate one, are factors with a significant effect on the recommended consumption of fish. The Mediterranean diet is considered a model for a healthy life, based on a sustainable diet (Burlingame and Dernini, 2012; Portugal-Nunes et al., 2021) [5, 14] with numerous economic, social and cultural benefits. There are differences between the quality of caught fish and aquaculture fish consumed by the population, because the chemical composition of fish meat depends substantially on the growth mode. Aquaculture-based fish consumption can have beneficial implications for the environment and improve the quantity and degree of population supply (Berry, 2019) [2]. According to the conclusions formulated by the World Economic Forum (2022) [17] the highest level of annual fish consumption per capita is among populations in marine regions (Iceland or the Maldives, with over 80 kg), while in the countries without access to the sea (Afghanistan, Ethiopia and Tajikistan, etc.) the annual consumption is very low (below 1 kg/inhabitant). Between 1960 and 2019, the global average of fish and seafood consumption per capita doubled, reaching a value of 20.5 kg/2019, from 9.9 kg/1960.

Fish and seafood are an important source of protein globally, covering approximately 6% of the food needs of the population. For about 30% of the world's population, fish represents over 20% of the average intake of animal protein per capita.

Global food consumption patterns based on the use of aquaculture products must take into account the complex effects on consumer health and the environment, social and economic aspects. From this perspective, further research and analysis is needed on alternative protein sources (such as based on

algae), on the adverse environmental effects due to pollutants, climate change and their implications on fish stocks, ensuring a balance between aquaculture production and catches etc. (Nesheim, Oria and Yih, 2015) [13].

In this context, the main objective of the paper is an analysis of the fishing sector in Romania, from the perspective of environmental effects and a better exploitation of natural resources.

MATERIALS AND METHODS

Google Scholar, ResearchGate, Web of Science - Clarivate Analytics were taken over for documentation. For the legislative regulations, the information from public institutions was used. Data provided by the European Commission, the European Parliament, the Government of Romania, the Ministry of Agriculture and Rural Development, the Food and Agriculture Organization of the United Nations were collected, processed and analysed. The results were compared with scientific papers from the specialized literature, to validate the conclusions.

RESULTS AND DISCUSSIONS

The European aquaculture production

The European Parliament Report (2022) [7] showed that between 1990 and 2017 there was a 400% increase in world aquaculture production, based on an increasing demand from the population. The total production of aquaculture seafood in Europe has been relatively constant, being valued at around 1.2 million tonnes in 2017, according to the European Union's statistical system.

According to the DG Maritime Affairs and Fisheries (European Commission EC, 2020) [4], the European strategic plan provided for an annual increase in the production of the European aquaculture sector by 3.2%, being estimated to reach a sales volume of 5, 6 billion euros (Figure 1). At the same time, the increase in the profitability of the sector will have to be correlated with measures to protect the environment and reduce CO₂ emissions, with controls to reduce poaching and protect

aquatic fauna, against the background of the reduction in the share of capture fishing at the level of the European Union EU (EC, 2020) [4].

The European aquaculture production covers around 20% of the European common market's fish and crustacean supply.



Fig. 1. Evolution of aquaculture in Europe
Source: Authors, by using EC (2020) [4].

The European aquaculture production sector consists of around 15,000 companies, mainly small or micro-enterprises in coastal and rural areas, employing more than 70,000 people. Increasing the proportion of women in the workforce, reducing costs and higher profitability are the main desires of the sector in the next period (EC, 2020) [4].

From a value point of view, the value of European aquaculture production has evolved constantly, reaching EUR 5.6 billion in 2022, an increase of 24% compared to the previous period (European Parliament, 2022) [7]. About 76% of the sector's production was represented by fish products, the rest by crustaceans and molluscs. Edible algae production is low in Europe, although there is considerable potential for growth.

Around 100 different aquatic species are bred in European aquaculture farms, most specialising in shellfish (45%), followed by marine fish (30%) and freshwater fish (20%). Although there is great diversity in European aquaculture production, 4 species are representative in terms of proportion: mussels, salmon, trout and oysters, covering about 71% of the total. Sea bream, carp, perch and clams are also other species raised by fish farmers. (Figure 2).

Spain (21 %), France (15 %), the United Kingdom (14 %), Italy (14 %) and Greece (10 %) are the countries with the main aquaculture producers in Europe. Approximately 74 % of total aquaculture production in 2017 is provided by these countries. The UK is the largest producer in terms of value of fish and seafood production (21%), followed by France (16%), Spain (13%) Greece (12%) and Italy (11%).

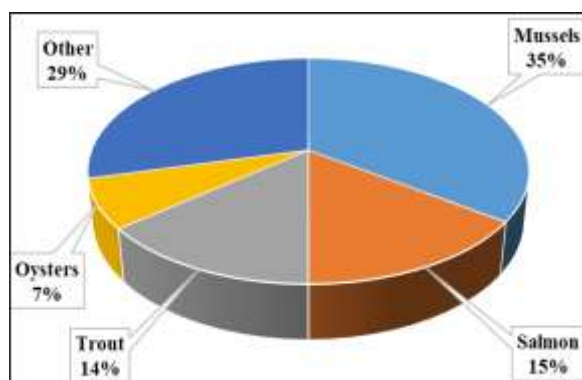


Fig. 2. EU aquaculture by species

Source: Authors, by using European Parliament (2022) [7].

Production of bivalve molluscs (mussels, oysters and clams) predominates in Spain, France and Italy, while salmon is produced in the United Kingdom and Greece supplies the European market with sea bass and sea bream (EC, 2022) [5]. The development of the aquaculture organic sector represents another important objective of the European policy in the field of maritime affairs and fisheries.

The European Market Observatory for Fisheries and Aquaculture (EuMOFA) report, cited by Aquaculture Magazine (2022) [6], estimated that at EU 27 level the total organic aquaculture production reached 74,032 tonnes in 2020 (about 6.4% of total EU aquaculture production). Between 2015 and 2020, the sector grew by 60%, mainly due to organic mussel production. Organic production has stagnated or declined slightly, due to low demand and technical difficulties in implementing organic production standards. The main species in organic aquaculture are mussels, with more than 50% of total production (41,936 tonnes), followed by salmon (12,870 tonnes), trout (4,590 tonnes), carp (3,562 tonnes), oysters (3,228 tonnes)

and European seabass /gilthead seabream (2,750 tonnes). The main European organic aquaculture producers are dedicated to raising certain species: Ireland (salmon and mussels), Italy (mussels and fish), France (oysters, mussels and trout), the Netherlands (mussels), Spain (mussels and sturgeon), Germany, Denmark and Bulgaria (mussels).

Aquaculture in Romania

On the Black Sea coast, Romania has an exclusive economic zone (area 25,000 km² and a coastline of 250 km). About 3% of the national area of Romania is covered by the hydrographic system, with over 843,710 ha. Natural areas with potential for the fisheries sector include: 400,000 ha of natural lakes (including the Danube Delta and 7 reservoirs), 84,500 ha of fish farms, 15,000 ha of nurseries, 66,000 km of rivers, of which 18,200 km in the mountain area and 1,075 km on the Danube River (Government of Romania, 2007) [16]. In 1990-2020 the fishing sector in Romania registered an important decrease, with the reduction of production and consumption. As a result of this process, there is currently a strong dependence of the domestic market on imports.

Integration into the EU brought projects worth more than 730 million euros to the Romanian fishing sector, through the European funding programs: European Fisheries Fund (2007-2014), European Maritime and Fisheries Fund (2014-2020), and European Maritime, Fisheries and Aquaculture Fund (2021-2027), correlated to the contribution of the Romanian Government (Figure 3).

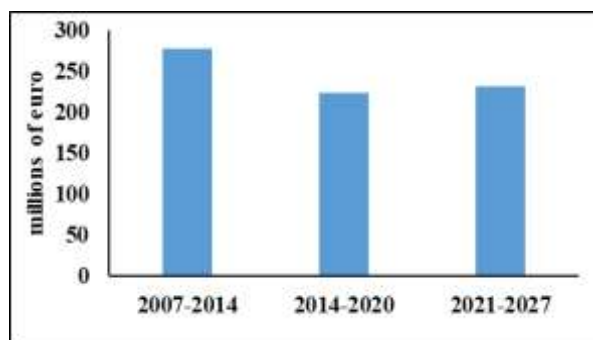


Fig. 3. Funds allocated in Romania

Source: Authors, by using EC (2023) [6].

For the current financial year, total funds in the amount of €232 million are available, of which €162.4 million are allocated in the financial period 2021-2027 through the European Maritime, Fisheries and Aquaculture Fund (EC, 2022) [6], the rest being the contribution of the Government of Romania.

The main activities targeted for financing are the sustainable development of fishing, aquaculture, processing and marketing, as well as the sustainable blue economy in coastal, island and inland regions, in line with European environmental protection policies and the reduction of climate changes (Figure 4).

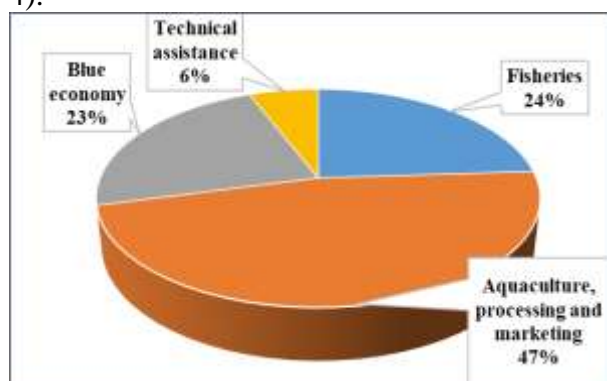


Fig. 4. European funds allocation for the Romanian Fisheries Programme 2021-2027

Source: Authors, by using EC (2022) [6].

The main objectives for European funding are investments related to compliance with the landing obligation and the modernization of fishing infrastructure; compliance with European fisheries conservation policies; increasing energy efficiency and reducing the CO₂ footprint in fishing and aquaculture; the temporary cessation of conservation policy objectives and the public health crisis; encouraging small-scale coastal fishing; sustainable aquaculture projects; support for new producer organizations; compensations for environmental services; fisheries control and data collection in application of the common fisheries policy; innovation in aquaculture and fishing; a sustainable development of coastal and inland areas in the context of the blue economy, support of local action groups.

The European program is focused on the ecological transition of the sector, with

investments in actions to improve the fishing infrastructure, the selectivity of the tools, the reduction of the CO₂ footprint and the increase of energy efficiency, the development and establishment of marine protected areas and a better collection of marine waste (EC, 2022) [6].

CONCLUSIONS

The European funds allocated to the fishing sector did not lead to the expected effects on the domestic fishing sector. Although there are sufficient natural resources available, it is not able to use them and cover domestic demand, in the context of massive imports and competition from European producers.

The cooperation of producers in the fishing sector is still deficient. Producer organizations do not have the financial and organizational capacity to become poles of attraction for other producers in the sector and market decision-makers.

COVID-19 has highlighted the inefficiency of the local fishing sector, with many producers forced to stop production or reduce activity.

The main recommendations that we believe should be mentioned following the research are: development of entrepreneurial skills for fish farmers, more effective support measures from public institutions, actions to raise consumer awareness and promote local fish products can lead to the revitalization of the sector.

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