

# ORGANIZATIONAL AND ECONOMIC ASPECTS OF AQUACULTURE DEVELOPMENT UNDER CURRENT CONDITIONS

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**Abstract:** *The article considers the organizational and economic aspects of aquaculture development under current conditions. It is revealed that to promote the development of aquaculture, it is necessary to implement a set of measures that include the restoration of the resource and production potential of the fishing industry by creating a favorable economic environment to attract investment in the implementation of innovative technologies for intense aquaculture of the piscine, pond, river, and basin types. It is revealed that aquaculture has proved its effectiveness even where the possibility of developing traditional agriculture is practically excluded. Therefore, it is important to speed up the work on the design of the regulatory framework for fish production, to provide advisory and information support to Russian producers of fish products, who are interested in shifting to efficient production, as well as the work on certification issues based on international standards for an early entry into foreign markets.*

**Keywords:** *aquaculture, production, fish products, regulatory framework, consumption, water resources, assortment.*

## INTRODUCTION

Aquaculture is one of the most promising and at the same time undervalued areas of economic activity, which with the rational use of water resources can provide consumers with a wide range of fish and fish products in a short time. However, despite the importance of aquaculture development, the availability of fish products is currently critically low and does not meet reasonable consumption standards. Accordingly, the study of promising development directions for intense fish farming and the implementation of the economic potential of the industry becomes very relevant. At the same time, fish farming allows obtaining a high level of profitability for the enterprise by using a relatively small area with minimal involvement of material, raw materials, and labor resources in comparison with other branches of the agrifood complex. However, one of the main constraining factors for the development of the industry is the relatively long period of the production cycle, which is on average 3-4 years from growing larvae to catching commercial fish. Besides, fisheries have traditionally played an important role in ensuring food security in many countries of the world and maintaining employment and well-being, while fishing itself forms a significant share of cash receipts and revenues,

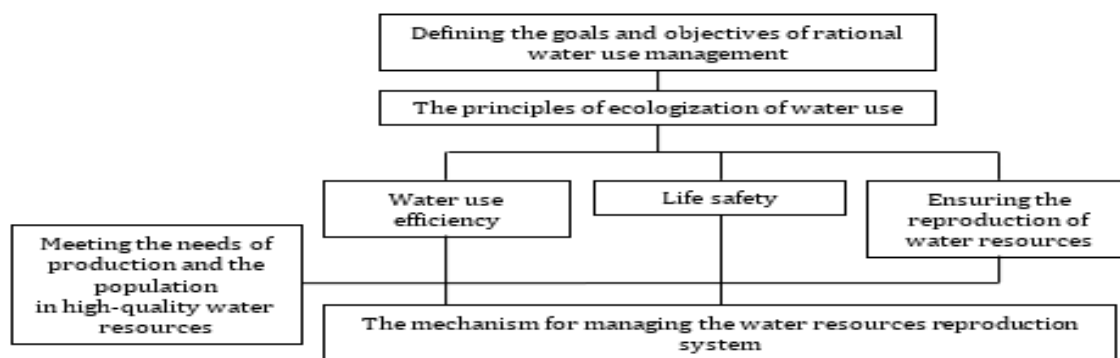
including taxes and fees. In recent years, due to a significant decrease in fish stocks in the world's oceans and seas, and consequently, the fish capture levels, the development of various forms of aquaculture has become increasingly widespread. In this case, fish farming is one of the few branches of the domestic economy that provides not only food security of the state but also allows diversifying agribusiness. The study of issues related to the development of aquaculture is reflected in the works of O.G. Antoshkina (2015), A.A. Korovushkin (2015), V.Ya. Mishchenko (2020), K.V. Pavlov (2018), S.M. Ryzhkova (2020), A.N. Stavtsev (2020), and other researchers. However, in recent years, aquaculture has been characterized by crisis phenomena, which are caused by a sharp decline in fish production and capture, rising prices, and a significant reduction in the consumption fund. The solution to these problems requires a new approach in determining the main promising areas for the development of aquaculture in the Russian Federation.

## METHODS

The theoretical and methodological basis of the research is an abstract-logical method, methods of induction, deduction, analysis, synthesis, and systematization used to justify approaches to the development of aquaculture; as well as statistical-economic and graphic methods employed to study the organizational and economic aspects of the aquaculture development in the present-day conditions. The information base of the article includes statistical data of state bodies, legislative and regulatory documents governing the problems of aquaculture development in the current context, as well as the results of scientific research (Agamirova et al., 2017; Akateva et al., 2020; Lukiyanchuk et al., 2020). In the course of the research, it is planned to analyze approaches to the development of aquaculture, establish and justify the main promising areas for the development of intense aquaculture to provide the consumer market with competitive fish products. The implementation of these conditions will allow saving on resources, developing new products and technologies in aquaculture, reducing the cost of fish products, as well as shorten the time of their implementation.

## RESULTS

Research shows that the fishing industry, due to its specifics, could quickly and significantly increase the country's food resources through the growth in the number of the fishing fleet and improvement of its material and technical base. In this case, aquaculture is an agricultural activity aimed at artificial fish-rearing and maintenance of aquaculture objects in fully or partially controlled conditions for obtaining agricultural products within the framework of the water resources reproduction management mechanism (Fig. 1). This activity also includes the production of feed, reproduction of bioresources, rearing, relocation, acclimatization of hydrobionts, replenishment of water bioresources, conservation of their biodiversity, as well as the provision of recreational services.



**Figure 1.** The mechanism of water resources reproduction management

At that, the intense form of aquaculture is considered as an organizational-technological form of fishery activities in the field of aquaculture, in which the rearing of aquaculture is carried out from compacted fish stockings with intense artificial feeding of combined feed, balanced in the composition according to the biological needs of specific aquatic organisms, as well as other feeds with a high nutritional value. Research shows that the decline in fish consumption is due to the low purchasing power of the population caused by rising fish prices and falling real incomes of the majority of citizens of the Russian Federation. In this case, the crisis in the fishing industry is, first and foremost, due to the rapid pace of moral and physical wear of fixed assets of enterprises, deterioration of the technical condition of equipment at fish processing plants, whose modernization is very slow, as well as the use of outdated technologies, a significant shortage of capacities for the base fish processing that in turn leads to insufficient use of raw materials, and deterioration in the quality of fish products. At the same time, the Russian Federation has a significant potential for the development of aquaculture, which is undervalued and left untapped in the wake of the stagnation processes that have occurred in the economy. Also, the fishing industry in the Northern regions is the least developed. To meet the domestic needs of the population of the Russian Federation, it is necessary to increase the fish rearing volume and capture level by 10 times, which is impossible without the rational use of water resources and the development of high-tech aquaculture on this basis.

The practice has shown that the fish products market in the Russian Federation is mainly formed based on imported raw materials, which negatively affects food security. It should also be noted that the problem lies in the structure of fish consumption by the population of the country, in which the proportion of freshwater fish reared by domestic farms is insignificant, while the proportion of marine fish is not fully covered by domestic production, so it is imported to meet domestic demand. In this case, the problem of aquaculture development in the Russian Federation is fundamental. It lies in the structure of fish consumption by the population, which is a consequence of the very consumption culture. Thus, changing the consumption culture in favor of freshwater fish grown by Russian enterprises can change the balance of fish and fish products, and reduce imports, whose absolute majority is marine fish species. The essence of this hypothesis is to change the structure of consumer demand in favor of fish species such as carp, grass carp, silver carp, bream, and catfish, whose rearing volumes and capture levels can be significantly increased in 3-4 years by fishery enterprises to provide fish products to the population and create food security for this food.

The traditional formation of the Russian market of fish products based on imported raw materials is a reflection of the consumer habits of buyers. In this case, it is

necessary to implement an active communications policy aimed at changing consumer preferences of buyers to change the fish consumption structure in favor of freshwater species that are reared and captured by Russian fishery enterprises. Increasing demand for important fish species such as carp, silver carp, and bream will contribute to the active development of fish farming in inland waters and partially reduce the volume of imports. However, ensuring the growth of fish production and catch should be based on the implementation of a comprehensive state program for the development of aquaculture involving all available water, material, technical, and raw material resources. Besides, there are two main prerequisites for the development of aquaculture in the Russian Federation. The first one is the growing consumer demand for freshwater fish species, whose farming is mainly based on the potential of inland fisheries. The second one concerns the implementation of a set of measures to restore the resource and production potential of the fishing industry. In particular, it is worth noting the feasibility of creating a favorable economic environment to attract investment in the implementation of the latest resource-saving technologies for the intense piscine, pond, river, and basin fish farming. This requires providing preferential loans to fishing enterprises to update the material and technical base, restoring water bodies and hydraulic structures, developing marketing infrastructure aimed at selling products through direct channels from the manufacturer to the consumer to ensure more significant impact of enterprises on the sale price, which as a result will contribute to reducing consumer prices on fish sold to the population.

It is also necessary to implement state policy in the field of providing state orders to machine-building enterprises to provide fixed assets at affordable prices and on leasing terms, as well as train in specialized universities highly qualified specialists having knowledge about effective fish farming technologies and economy. Besides, it is advisable to develop and test several economic and mathematical models for analyzing and predicting the performance of the fishery complex for effective production management, stock formation, and regulation of the fish market in general. The key focus should be made on promoting the development of intense, rather than pasture fish farming, with access for fish farms to relatively inexpensive waste from crop and livestock production, as well as to the grain-processing, fat-and-oil, and meat-processing industries through the formation of mutually beneficial integration links between them. In this case, an important problem is the establishment of market game rules and the fight against illegal fishing, illegal sale of fish products with tax evasion by unscrupulous entrepreneurs, who often hide the scale of their economic activities. The practice has shown that fish farming in the Russian Federation is carried out by enterprises of various forms of ownership, including peasant farms and individual entrepreneurs. At that, the number of commercial fish farming enterprises is constantly increasing from year to year. To a large extent, this trend is facilitated by the availability in the country of a large number of water bodies suitable for fish farming. The main areas of the country's fisheries include pond fish farming, industrial fish farming, and pasture fish farming (Fig. 2).

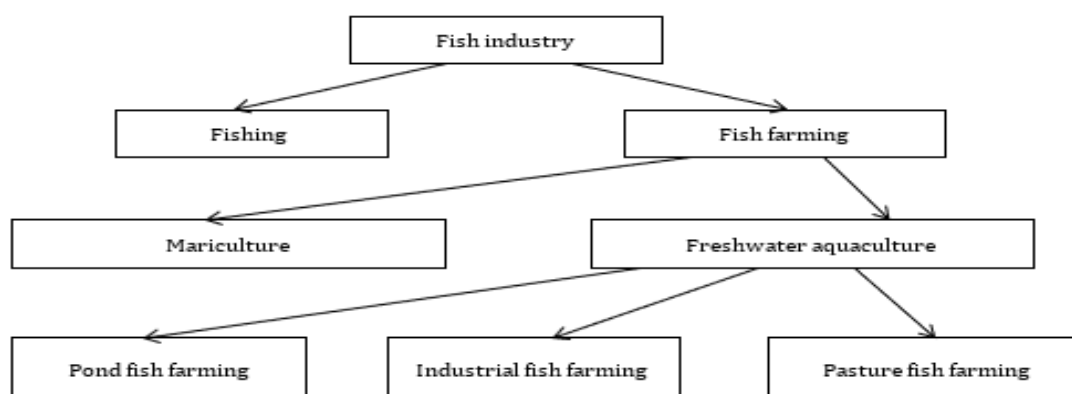


Figure 2. The fish farms development directions

Promising areas of fish farming, such as trout and sturgeon rearing, which are among the most valuable and fast-growing fish species and can be sold both live and in chilled and processed form, are also actively developing in terms of economic efficiency. An important factor in the development of commercial aquaculture is also the pricing policy of this segment. At the same time, the increase in prices is primarily associated with an increase in the cost of fish products, most of which is taken up by the cost of feed. Feed in the fish farming industry is quite expensive that predetermines competition with the livestock and poultry industries in the use of feed. However, the main problem for fish farms is related to the sale and transportation of live fish. The peculiarity of transportation of pond aquaculture is that when transporting live fish, the ratio between its volume and water should be 1:3, while in other industries, transport costs are usually proportional to the volume of products transported. Thus, the products of fish farms are considered ready for sale only if they have been transported from the places where fish is raised to the places where it is consumed. Besides, live fish is a low-transportable perishable product. So, if a certain volume of production is produced, a guaranteed sale of the produced volume of commercial products is necessary, otherwise, it can lead to loss-making of the farm. It should be noted that fish farming enterprises, as well as large wholesale companies, actively cooperate with organizations in other regions where they sell their products. The largest share in the sold fish products is occupied by carp, as well as white grass carp, silver carp, trout, and sturgeon which are also very popular with customers.

## DISCUSSION

The reliability of the presented approaches is confirmed by the fact that the functioning of the fish farming industry in the Russian Federation can be assessed as stable over the last period. But, due to lack of funding of fish farming, the construction of new and reconstruction of operating fish-farming facilities is carried out very slowly, which prevents to fully utilize the potential of aquaculture development (Blokhina et al., 2020; Fedulin et al., 2017; Zavalko et al., 2017). There is practically no mechanism for subsidizing commercial fish farming, which would take into account seasonal costs. Existing difficulties are associated with the implementation of reclamation and anti-epizootic measures. Fish stocks protection system is organized poorly since there are no effective measures to prevent fish theft during the period of fish ponds farming and fishing. In many respects, the development of aquaculture is hindered by the lack of a state support program for commercial fish farming, which would allow fish farms reimbursing

the cost of purchased fish seed, technical means, and equipment for commercial fish farming, as well as the cost of reclamation activities in fish reservoirs. The main measures that would increase the production of farmed fish, and therefore the volume of its supply in the domestic market, include liming of ponds; mowing and sprinkling of ponds; improving the technical equipment of fish farms (building pontoon bridges for fixing cages, purchasing reed-mowers, oxygen plants, containers for transporting live fish, and feeders); organizing ponds condition monitoring; computerizing and automating the whole production cycle; restoring old and unused ponds; as well as increasing the production of promising fish species. All these areas require significant financial investments in the industry. For example, the payback period for investment projects in fish farming is on average 6-8 years, which makes it necessary to use credit resources. Small and medium-sized businesses also require subsidies to reimburse part of the costs associated with the payment of the first installment when entering into an equipment leasing agreement to start or develop production, to purchase equipment necessary for creating or developing production, to pay interest on loans for the construction of industrial buildings, as well as to provide grants to novice small and medium-sized businesses.

## CONCLUSION

Summing up, it can be noted that to promote the development of aquaculture, it is necessary to implement a set of measures that would include the restoration of the fishing industry resource and production potential. This can be achieved by creating a favorable economic environment to attract the investment necessary to implement innovative technologies for intense aquaculture of the piscine, pond, river and basin types, develop marketing infrastructure, provide preferentially targeted lending to fishing enterprises, as well as to renew basic production facilities, and restore water bodies. At the same time, aquaculture has proved to be effective even where the possibility of developing traditional agriculture is practically excluded. Therefore, it is important to speed up the work on the design of the regulatory framework for organic fish production, to provide advisory and information support to Russian producers of fish products, who are interested in shifting to efficient production, as well as the work on certification issues based on international standards for an early entry into foreign markets.

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